

A History of Brewing in Holland 900–1900

**Economy, Technology
and the State**

Richard W. Unger



Brill

A HISTORY OF BREWING IN HOLLAND
900-1900

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900-1900

Economy, Technology and the State

BY

RICHARD W. UNGER



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For Friends and Colleagues past and present of
the History Department of the
University of British Columbia

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ABBREVIATIONS

A. R. A. = Algemeen Rijksarchief, The Hague

A. R. = Algemeen Rijksarchief/Archives générales du Royaume, Brussels

G. A. = Gemeente Archief of the town stated

R. Z. = Rijksarchief in Zeeland

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PREFACE

The history of brewing belongs to that virtually infinite collection of oft-neglected topics. While historians may have by-passed beer, drinkers have not. At least since the fourth millennium B. C. people in Europe and the Middle East have consumed a kind of beer in varying but typically increasing quantities. Beer was long and still is part of the diet, of the ritual and of the culture of northern Europe and specifically of Holland. This study attempts an understanding of how the interplay of technical change and government action along with the evolution of the economy made beer so important and then unimportant and then important again to the Dutch.

The study of brewing in the kingdom of the Netherlands benefited from the decision by Professor N. W. Posthumous in the years before World War II to devote his seminar in late medieval and early modern economic history at the University of Amsterdam to an examination of brewing in different towns. Students shared out the towns in the provinces of what would be the Dutch Republic. Their individual essays together form an invaluable, but unfortunately hardly accessible body of knowledge about Dutch brewing. In one case a Posthumous student, Jacques van Loenen, went on to complete a doctoral dissertation and in the process produced the most exhaustive study of brewing in any one town in the Netherlands. Unfortunately the archivist of Gouda, A. van der Poest Clement, never did finish his dissertation on brewing in that city even though he did gather a mass of data on the industry, material which he dutifully preserved in his own archive. For the seventeenth century the economic historian, E. M. A. Timmer, in the early years of this century produced a series of institutional studies about the organization of the brewing industry. H. A. Korthals did a biography of the founder of the largest brewery in the country, Heineken, which appeared just after the Second World War. More recently Thera Wijzenbeek-Olthius has written on the important brewing centre of Delft, unfortunately for only a short period. Richard Yntema in a dissertation done at the University of Chicago has produced an excellent study of Dutch brewing in the sixteenth through eighteenth centuries. Based squarely on extensive archival study, it offers a marked advance on all earlier work.

Professional historians, while typically avoiding the pitfalls of an overzealous antiquarianism, come to the history of brewing with different goals and different interests. Business historians are concerned with individual firms. Economic historians are concerned with the development of the entire industry and its place

in general economic development. Social historians increasingly see in the history of brewing a way to examine the lives of lesser folk and also to find out how the place of women, legally and economically, came to change over time since so many beer makers over the centuries were women. The broad collection of interests of historians combined with the contributions of those devoted to the industry for personal more than professional reasons make for a varied literature, varied in both approach and quality. The quantity of documentation, thanks to close government regulation of brewing, is overwhelming and the secondary literature turns out to be almost as daunting.

This study of Dutch brewing has required in the end a long time, a great deal of help and significant financial assistance. While breweries seem to be rarely interested in their own histories or in supporting the study of that history, there are exceptions. The Grolsch brewery of Enschede has long taken seriously its origins and has supported historical study in the Netherlands. I am indebted to Directors of the brewery for allowing me to cite the material in their archive, to F. Bataille-van den Berg who made transcripts of the material, and G. L. Bakker who arranged for me to look at the material. The many archivists in various town archives in Holland and in the General State Archive in The Hague made possible the collection of data almost invariably under pleasant and improving conditions. A number of those archivists as well supplied information about novel avenues of research.

I am indebted to the Social Sciences and Humanities Research Council of Canada which, a number of years ago, offered extensive financial support so that it was possible to travel to the Netherlands and begin this study of Dutch brewing. The University of British Columbia has supplied incidental funds as part of the funding of other projects for some research and also for travel to meetings and seminars to present interim results of the work. More significant and substantial support has come from the John Simon Guggenheim Foundation. A grant made possible a year to read and write about brewing. Mount Holyoke College very kindly opened their doors to me for that year. I am grateful to the History Department and to then Dean J. J. Ellis for welcoming me and for tolerating me during what was a frustrating period. I am also indebted to the College for making available funds for research assistance as well as computer services during my time there. Clare Hall, Cambridge University, later offered me a visiting fellowship and another chance to pursue work on brewing. Most recently thanks to the help of Jan Lucassen and Lex Heerma van Voss I have found new information and been able to finish many parts of the study while working at the International Institute of Social History in Amsterdam.

The research assistance of Shannon Parker at the University of British Columbia was invaluable in the closing stages of bringing together material on brewing.

Virginia Green supplied extensive help with manipulation of statistics and the use of statistical packages. The staff of the Library at the University of British Columbia, and especially Diana Cooper and Keith Bunnell, proved invariably to be of great service, despite having to work under constantly deteriorating conditions.

I owe a debt of thanks to the program committees of the Medieval Association of the Pacific twice, the Twenty-Sixth International Congress of Medieval Studies held at Western Michigan University in Kalamazoo, the conference on urban life sponsored by the Centre for Medieval Studies of the University of Toronto, the interdisciplinary Symposium on "17th-Century Dutch Art and Life" held at Hofstra University, to the organizers of the sessions on alcoholic beverages at the Tenth International Economic History Congress held at Leuven, and to John Tucker, Elizabeth Ewan and the historians of the University of Victoria, to Mavis Mate and the American Historical Association, to Wim Blockmans and the medievalists, both students and staff, at Leiden University, to Derek Keene and participants in the Metropolitan History Seminar at Institute of Historical Research, University of London, to the history group of Clare Hall, Cambridge University, to Raymond van Uytven and the history department of the University Faculty of Antwerp, and to Leo Noordegraaf, Clé Lesger, Marolein 't Hart and other members of the department of economic history at the University of Amsterdam all for giving me opportunities at various times over the last two decades to report at various levels and in various ways on my findings.

I have not been alone in studying brewing in the Low Countries and others working in the field, such as Erik Aerts, Richard Yntema and Thera Wijzenbeek, have offered encouragement and assistance in various ways. Richard Yntema allowed me to see his excellent dissertation and learn from him about the errors of earlier scholars. Our working on many of the same issues has proven highly productive for me and I hope that he can and will be able to say that what I have done is helpful to him. Certainly we have both learned a great deal from the work of Erik Aerts on brewing in the southern Low Countries and possibly such exchange will continue to prove productive. I am very much indebted to others who have added to their encouragement the sharing of some of their findings: Kristof Glamann in Denmark, Gerald Stefke and Lydia Niehoff in Germany, Erik Aerts, Hugo Soly, Herman van der Wee and Raymond van Uytven in Belgium, Richard Wilson and Peter Mathias in England, Joaneth Spicer, John Montias, Myra Orth, Kathleen Kish, Jessica Warner, Judith Bennett and Jim Tracy in the United States, and Peter Hoppenbrouwers and Dick De Boer in the Netherlands among a number of others. Wim De Bell and Norbert Middelkoop along with the staff of the Amsterdams Historisch Museum have been especially helpful in identification and preparation of illustrations.

It has certainly taken me too long a time to write about what I have learned over the last many years. There can be many excuses but they are no more than that: excuses for what should have been accomplished sooner. Many friends have been very patient, listening long to disparate details about brewing and have offered their suggestions, often an extra citation, their thoughts and, above all, their encouragement: Richard Hoffman, John Munro and Melitta Weiss-Adamson in Canada, Maryanne Kowaleski, Hugh M. Thomas and Brad Blaine in the United States, Ernest Ungar in Australia, Hermann van der Wee in Belgium, and Wim Blockmans, Hans Blom, and Peter Klein in Holland. Material and information about material came from Peter Jansen, Geertruida De Moor, Julian Woltjer, Els Jacobs and Hendrik Brood in the Netherlands. In Vancouver Herman van Wermeskerken and Rein Doorman, members of the local chapter of the Canadian Association for the Advancement of Netherlandic Studies, gave me useful material. At the University of British Columbia I am indebted to colleagues of the Committee for Medieval Studies and to colleagues in the History Department, especially A. Jean Elder, Janos Bak, Ted Hill, and Dianne Newell. Bob Allen in the Economics Department has been very patient in waiting for the end of this enterprise and in the long wait has offered perceptive advice. The staff of the History Department has been of great assistance, particularly Beryl Morphet and Jocelyn Smith who read an earlier version of the text. The botanist Jack Maze went beyond the requirements of the discipline in locating some bog myrtle and helping me one sunny afternoon to harvest some for a brewing experiment which unfortunately, something like the eighteenth century Dutch industry, collapsed with the disappearance of the brewer.

Projects such as this one, carried out of necessity over long periods, can only come to fruition through the constant support of old friends. J. R. Bruijn at Leiden University was always a patient and strong supporter of the work. He and his family were always gracious and hospitable when I needed a place to call home while chasing from one archive to another in the Netherlands. A number of other colleagues and close friends at different universities both in the Low Countries and in British Columbia offered advice but more important support in this long lasting project. Even more a necessity has been and is the patience, understanding and good humour of my former wife and daughter.

Works such as this one, with luck, show the importance of the practical, the day-to-day, the mundane — in a positive sense — in the history of all people. They possibly generate some appreciation of what has preceded what all contemporaries see around them but do not acknowledge or understand. With a great deal of good fortune this study and others like it will help to hold back, more successfully than King Cnut, the rising tide, in this case the rising tide of knowing nothing or of knowing only about just one thing. History is poorly

served by ever increasing insularity and specialization. It is absolutely necessary for everyone, and especially all historians, to see and understand the past in many dimensions, to see it as serious but not sombre, to see it as alive, complex and — above all — fascinating. This book does not solve all the problems of writing history or even of trying to understand brewing in Holland. This book will be riddled with errors, errors not of fact it is hoped but of vision or understanding or expression. If all goes well others will take up what is wrong and misdirected and improve on what has been done here. The imperfections, though they must exist, should not be so great as to destroy any value this book might have as a survey of a critical industry with a varied and complex history over a long period of time. For all the imperfections and errors which remain, and remain despite the best advice of friends and colleagues, and despite the support of my family, the responsibility falls only to me.



INTRODUCTION

Holland and Beer

Beer is, according to the great nineteenth century scientist and one of the fathers of modern brewing, Louis Pasteur, "...a beverage which has been known from the earliest times. It may be described as an infusion of germinated barley and hops, which has been caused to ferment after having been cooled, and which, by means of 'settling' and racking, has ultimately been brought to a high state of clarification. It is an alcoholic beverage, vegetable in its origin — *a barley wine*, as it is sometimes rightly called".¹ Even that broad definition does not do justice to the varieties of beer that brewers have made in Holland through the last twelve centuries. It can be any undistilled, fermented malt beverage of relatively low alcohol content. It does not even have to be made exclusively with malt or even exclusively with grain. It contains hundreds of different components and as a result there are many variations in the taste of the beverage. Traces of diverse chemicals, organic and inorganic, can create small differences that the drinker can sense. Historically the terms used to describe different drinks made from grain have been less than precise which makes following the history of brewing difficult, but does indicate that brewing technology was far from static. The varieties of beer resulted from choices brewers made in the ingredients they used and the ways they treated those ingredients.

The making of beer in Holland from the earliest efforts in the Middle Ages down to the revival of what had formerly been a thriving industry at the close of the nineteenth century touched the lives of masses of people who lived in the Low Countries and beyond in that millennium. For Holland brewing held a prominent place in the economy at least from the thirteenth century and that role did nothing but expand in the later Middle Ages. Brewing was a major employer for the Dutch in the fifteenth century. The industry grew in the sixteenth only to come on hard times after 1650 which persisted until the revival of brewing in the 1860s and 1870s. The history of brewing indicates a great deal about the history of Holland, the most important constituent of the most pros-

¹ Louis Pasteur, *Studies on Fermentation. The Diseases of Beer, Their Causes, and the Means of Preventing Them. A Translation, Made with the Author's Sanction, of "Etudes Sur La Biere," with Notes, Index and Original Illustrations by Frank Faulkner, author of "The Art of Brewing," etc. and D. Constable Robb* (London, 1879), p. 1.

perous of seventeenth century European states. The evolution of the economy of that small region had a unique character from the closing years of the Middle Ages, set a precedent and example for all European states through the eighteenth century and then enjoyed rapid economic growth in a highly successful imitation of the industrial development of other European states from the closing years of the nineteenth century.

Holland was one of many counties in the renewed Roman Empire of the high Middle Ages. Counts from various dynasties ruled until the fifteenth century when Holland become one of the jurisdictions in the hands of the Dukes of Burgundy. Inheritance made it part of the Hapsburg patrimony by the end of the century but the Revolt with its first rumblings in 1567 and the Eighty Years War which followed ended rule by a count who was also the King of Spain. Holland found itself part of and in fact the dominant province in the Dutch Republic during its economic and cultural 'Golden Age'. The fall of the Republic in 1795 in the wake of the French Revolution and foreign invasion led to a series of new governments, temporary absorption into the French Empire and then the creation in 1814 of a Kingdom of the Netherlands ruled by the House of Orange. The province of Holland, split north and south, was a critical constituent of that kingdom and made so even more with the separation of the southern provinces and the establishment of Belgium in 1830. The varied political history of the county and province is made even more confusing by the constitutional twists and turns which changed rules and changed the form and structure of governments again and again over 1000 years. Those changes and the diversity create problems about even the most simple things in describing the history of Holland. Even the choice of what name to use for the region and the people who lived there presents difficulties. Dutch, while referring to Holland, also usually applies to all the seven provinces of the Republic along with appended lands and to the entire region of the Kingdom of the Netherlands and, in some instances, even the entire region of Netherlandic speech in the Low Countries. Precision is difficult to achieve in using the term Dutch as is precision with various terms for the legislative and judicial bodies of the various governments that have predominated in the region. Despite care errors occur and confusion, it seems, can not be avoided.

Holland was the most urbanized province of seventeenth century Europe. Holland was already a county of towns by the close of the Middle Ages. It is in the history of Delft, Gouda, Haarlem, Leiden, Rotterdam, Amsterdam, Alkmaar and a number of lesser centers that the history of brewing is to be found. The towns enjoyed a great degree of political independence, having control over many aspects of life within their limits. The prevailing constitutions meant that for many centuries they had great influence over the politics of the county and

even more so over the politics of the Dutch Republic. The records of the towns offer a massive body of evidence about the history of brewing. The records show the varying levels of success among the towns and over time. The records offer tantalizing comparisons and so examples from each presented next to each other demonstrate the most that is to be learned about brewing in Holland.

The Holland industry functioned within a much larger context. It was like brewing in other parts of the Low Countries and elsewhere in Europe. Holland brewers traded ideas, technologies and strategies with their counterparts near by but also some distance away. The scope and scale of brewing and the scope and scale of those contacts fall far beyond the space available. Descriptions of the context and the interaction of different brewing practices only appear where the impact of those connections on Holland brewing was great. At least what went on in the important province of Holland gives some strong indication of what went on elsewhere and also what features of brewing in the rest of Europe were important to the development and the industry and the development of other industries. To understand brewing in Holland it must be seen in the context of those other industries in northern Europe and, from the sixteenth century, in the rest of world as trade and technology hurtled ever more quickly toward globalization of markets.

Brewing in Holland offers a dramatic case of the interplay, over the long term, of developments in the economy, in technology and reactive and aggressive government policy. The history of brewing is not just for those with an interest in economic change. Beer was part of the life of virtually everyone in Holland in some way or other from the mid fourteenth through the first half of the seventeenth century. Beer was an integral feature of urban life even in the early nineteenth century when production had collapsed. What happened to the industry reveals a great deal about the society in which it operated. Beer making was always different from other industries because of the structure of demand for the product. The archives of public authorities typically have extensive records of taxes collected on the production and sale of beer. That is because officials from the early Middle Ages found in alcoholic beverages a reliable source of income and one acceptable for moral as well as economic reasons. The first tax regulations on beer in the Low Countries date from the ninth century. The records of government on beer are often continuous with long series of tax records running annually or even quarterly for decades or even centuries. Brewers, beer sellers and consumers did try to evade taxes and so government records include various regulations designed to guarantee the collection of the taxes and court actions to punish those who avoided them. Governments in general and especially urban governments were concerned with maintaining the quality of consumer goods. They did that to protect their own citizens but also, if there was any potential for

export, to insure a good name for their products in distant markets. The overriding consideration typically was the potential income from taxing the production, distribution and sale of beer. The anticipation of income for public authorities meant constant surveillance by them, close ties between brewers and government and potential for conflict. The mass of surviving records in their various forms and types illuminate the origin and development of general theories about policy and taxation and even illuminate the evolution of state power in early modern Europe.

The theoretical basis of government policy on beer did not change from the early Middle Ages to well into the nineteenth century, sometimes to the detriment of brewers. Public authorities discovered early the nature and character of demand for beer or rather for alcoholic beverages. There were always, it seems, two sources for that demand. The diet of medieval and early modern Europe was dominated by bread. The texture alone dictated the need for something to wash down the food. The salt and the spices regularly used in food preparation added to the need for liquid,² a liquid which was not going to poison the drinker. Pollution made the water of towns increasingly dangerous and beer was a healthier alternative. The second source of demand for beer was a desire for something to cause inebriation. The desire for the physical reaction to alcohol made consumers willing to pay considerably more for beer than it cost to make it. Wine and brandy, from the thirteenth century, and spirits, from the sixteenth, could serve the purpose but beer was an older and better established choice. The second source of demand led beer to be associated in many places with celebrations. Groups or communities saw it as a necessary part of certain occasions. In Amsterdam in the Middle Ages there were drinking guilds, societies set up solely for the members to drink together and in 1313 the count of Holland, William III, forbade anyone in the town of Leiden to belong to a drinking guild.³ Beer was for centuries the preferred source of alcohol in Holland which made consumers willing to pay a premium for beer and governments sought to appropriate part of the premium.

The two types of demand for beer dictated at least two different types of beer and different policies. The need for a reliable drink meant that when consumers had a little more disposable income, either because of rising incomes or falling prices, they would buy more beer. On the other hand when incomes fell or beer

² Leo Noordegraaf, "Nijverheid in de Noordelijke Nederlanden," *Algemene Geschiedenis der Nederlanden*, volume 6 (Haarlem, 1979), p. 19.

³ P.J. Blok, *Geschiedenis eener Hollandsche Stad*, four volumes, second edition (The Hague, 1910-18), 1, p. 176; V. C. C. J. Pinkse, "Het Goudse Kuitbier, Gouda's Welvaren in de Late Middeleeuwen 1400-1568," *Gouda Zeven Eeuwen Stad* (19 July, 1972), p. 98; J. Ter Gouw, *Geschiedenis van Amsterdam*, eight volumes (Amsterdam, 1879), 3, p. 286.

prices rose consumers tried as best they could to maintain older consumption levels. Changes in the amount of beer drunk were much less sensitive to changes in prices at or below a certain quantity. Governments could then tax beer knowing that the higher price would only slightly deter consumers. The second type of demand created a market where consumption levels depended heavily on price and quality. If incomes went up consumption went up and markedly. If incomes went down consumption would fall. If the price of beer rose consumers would switch to some other drink, substituting another beverage as a source of alcohol. The relative price of beer to wine and later brandy then made a significant difference but only at the upper end of the market, in the sale of higher quality beers. The majority of consumers continued to drink just as much thin beer of low alcohol content even if the cost to them rose. Both brewers and governments always had to be cognizant of the dual market for what was not a single product but at least two different products each facing a different demand structure.

Governments encouraged some form of monopoly in the production and sale of beer. By limiting supplies of beer, or limiting access to essential ingredients which amounted to the same thing, they drove up the price of beer. The limitations of governments created monopoly profits which could then be extracted. Neither governments nor brewers wanted to drive up prices too much, however, since the monopoly profits were always greater so long as consumers were buying beer as a matter of choice and not just as a matter of necessity. Governments tended to set prices for beer, not allowing them to vary. That left consumers with the impression that they were getting the same thing even if the quality of the beer varied. Neither governments nor brewers wanted prices to fall. It was not the price of beer but rather the real incomes of potential consumers, along with taste, that became the basis for the levels of sales. If the government was committed, for tax reasons, to keep up prices then brewers for their own gain could and did conspire with governments to levy taxes, in the process enhancing their chances for commercial success. Brewers and the town government shared an interest in keeping up the profits of brewers. Still, brewers found themselves almost invariably at odds with governments. On the one hand, brewers wanted to promote and extend protection accorded them by authorities. On the other, brewers wanted to decrease the control over their own actions so that they could retain a larger portion of the difference between revenue and costs.

Technical change in the production of beer was a threat to tax income. At the very least brewers would only introduce a new procedure if they could cut costs and so enhance their incomes. Such a change would mean a shift in the proportion of profits to the benefit of brewers. The owner of superior knowledge might well be able to capture more of the monopoly profit to the disadvantage of the public authority. Fearful of changes or development of new kinds of beer govern-

ments often regulated against the introduction of novel production methods. Government regulation decreased the possibility of developing or adopting new techniques. Successful innovation typically tended to increase regulation so improved methods made future innovation all the more difficult.

Despite the role forced on the industry by the state Dutch brewing lasted for a long time and even prospered for lengthy periods. Brewers succeeded in part because regulation developed slowly. Though the regulation process had already started in the eleventh century, it was one which advanced through vigorous action followed by long periods of lassitude. Authorities might well be slow to understand what was going on in brewing, and until they realized and took action brewers enjoyed some freedom. Regulation was never complete. No system laid down by government at any level proved foolproof. Since brewers were intimately acquainted with the system of taxation and brewing methods they often were able to circumvent some aspects of control.

The common interest in the gains from brewing generated an identity of the government and the brewing industry. In many cases brewers were part of civic government in Holland from the fourteenth through the seventeenth century. The frequency of brewers taking public positions can be explained in part by their prosperity and by their being tied to the town, not travelling. In part, though, that frequency of public service must also be explained by the mutual interest of public authorities and brewers. Brewers constantly found themselves lobbying, negotiating, and bargaining with government. That did not change regardless of the fortunes of brewers or the methods they used through the entire history of Dutch brewing.

The production of beer reveals some things about society and culture, matters more clearly illustrated in the study of the social issues created by drinking and drunkenness. Those were a continuing source of trouble for towns and their consequences created questions for brewing about how and where and when to sell beer and what kinds to sell. Records from Holland are abundant on such issues and they deserve to be explored as well, that is in addition to the staggering task of trying to understand methods of making beer and the relationship of the industry to the economy and government. The history of brewing is often not taken seriously, one reason being that histories of brewing or of specific breweries have sacrificed scholarly rigor for entertainment of reader and author. More important, undoubtedly, in degrading the study of beer and brewing is the temperance movement. The drive to destroy sale and consumption of all alcoholic beverages in the nineteenth and early twentieth century made beer, among other drinks, naughty. Beer was, in the eyes of the more extreme of temperance advocates, a demon to be stamped out. As nutrition improved and food prices fell after about 1860 beer was no longer a dietary necessity but rather a supple-

ment so its inebriating effects became more prominent in the eyes of both opponents of beer and consumers. The history of brewing is something which is almost invariably greeted by smiles and smirks. It is a sign of the success of temperance propaganda. It is also a sign of the changing place of beer in the diets of Europeans. In the sixteenth century when almost everyone drank beer and most of the time, the topic would not be one to generate subdued laughter but rather serious consideration.

The chronological attack of the history of brewing in Holland rather than a topical one automatically creates problems first of repetition since problems of institutions, policy and practice recurred, and second of periodization since the industry changed at its own pace at times in step with the rest of the economy and politics but at times very much at odds with general trends. Brewing was rural in Holland until the late thirteenth century when urban breweries appeared. The industry was transformed in the fourteenth century by technical change which ushered in the golden age of brewing in the country. That period of prosperity lasted from late in the fourteenth century down to the middle of the seventeenth. While performance and practice were not uniform through the entire golden age it was an era in sharp contrast to the long decline which set in around 1650, a decline that was only to be relieved when the industry went through a second great transformation in the 1860s and 1870s, establishing the foundation for the prosperous contemporary Dutch brewing industry. The birth of commercial brewing in the high Middle Ages was followed by rapid development, a slow process of maturation and then a decline into a collapse and then a rebirth which mirrored its origins some five hundred years before.

Brewing was one of the earliest industries, preceded possibly only by pottery making, which started as a domestic pastime and became a commercialized industry. The history of brewing, at least in the Middle Ages, is in part the history of that transformation of a domestic chore into an industrial enterprise. Dutch brewing was one of the earliest and probably the first of the *traficken*, the transforming industries. They formed the basis for the prosperity of the Dutch economy in the seventeenth century, the 'Golden Age', and indeed for the prosperity of all of Europe in the years before the Industrial Revolution. Traders imported raw materials from overseas, they were worked up in combination with domestic materials by native workers and the final products were then exported by traders to markets throughout Europe. To understand the success of the Dutch economy, its character and structure, and indeed to understand the pattern of economic development from the late Middle Ages to the Industrial Revolution some appreciation of what happened in brewing is a necessity. While the examination of yet one more Dutch industry does help in understanding what happened to the economy of Holland the examination of brewing indicates the more funda-

mental structural metamorphosis as well as the critical role of technical change in the evolution not just of the Dutch but also of the European economy in the years up to the Industrial Revolution. Holland brewing was like other industries, though, and the examination of its history does draw attention to the long term internal development of one industry and how it moved, adapted and responded under the influence of changes in the economy, demography, government policy and technological change.

There is little that is universal in the tale of brewing in Holland. It was an industry always being buffeted by forces outside the trade. It was a composite of distinct urban industries in different towns, each with its own practices and policies which created variation in performance. The uniqueness of Holland brewing and of its various components over time explains the largely descriptive nature of the study of the industry. There were common features, ones which transcended the different towns, transcended the long period of development and even transcended the borders of Holland and of the Low Countries. Brewing was always an object of interest for governments, all of them and all the time. The brewing industry was always an arena for both conflict and cooperation among producers. The common interests of brewers could create institutions and joint action in the midst of intense competition with neighbors and with brewers from other towns or counties or countries. The brewing industry, even in a period of slow development in science and technology, was always suffering under the influence of technical change, both over the short and long run. Brewers had to react to developments in methods and to developments in basic knowledge about the processes that went on in the various vessels in their breweries though they were largely spared such problems until the nineteenth century.

When in 1979 the prominent Belgian economic historian, Erik Aerts, bemoaned the lack of a synthetic study of brewing covering the many towns and cities and the diverse regions of the southern Low Countries over a long period and dealing with institutional, economic and social problems, he took comfort in the fact that there was no such work covering the history of brewing in France, England or Holland.⁴ There are for all parts of each of the countries and provinces and for many towns in them studies which deal with brewing for a short period or incidentally as part of some larger inquiry. The task of doing a full history of brewing is truly daunting and one which few historians would even attempt. The present effort despite some pretensions to the contrary, is not the

⁴ E. Aerts, "De Zuidnederlandse brouwindustrie tijdens het Ancien Régime. Status quaestionis van het onderzoek," *Handelingen XXXIII der Koninklijke Zuidnederlandse Maatschappij voor Taal- en Letterkunde en Geschiedenis* (1979), pp. 6-7.

complete history of all aspects of Dutch brewing which would certainly be a great asset. Many features of brewing, especially questions about the social significance of beer drinking and the role of labor in making beer, are given little consideration. Some bodies of records, such as the notarial acts of many towns which survive from the sixteenth century onward, are used sparingly at best. Literary sources also get little consideration. Even with those gaps and shortcomings there are, with any luck, still some other threads that emerge from what could be a colourful history. Consumers have since the early Middle Ages typically connected beer with a certain joviality, with celebration. Such ideas about the drink still prevail and that helps to explain not only how people think about beer but also how historians write about beer. It would be wrong to contradict the notion that connects beer with happiness and more pleasure. But for many people for centuries it was a trade, a way to make a living, and one which involved a great deal of hard work under difficult conditions. It also carried with it uncertainty about the work and uncertainty about the outcome of all the effort. For the makers of beer it was above all a job and invariably a serious business. The seriousness of this effort to examine the industry conveys almost certainly the more sombre, practical and political dimensions of making beer. That was by no means all there was to brewing.

The history of beer making could easily be written to include virtually all aspects of life in the province of Holland. That task, at least for this historian, has proven beyond the scope of skill and strength. Despite that there still may be enough here, gathered together, about the history of Dutch brewing to save some time and effort in the future and to offer a platform from which it will be easier to gain some understanding of the character, nature, importance and universal presence of beer and brewing in Dutch life. Perhaps in the process some of the prosperity and feelings of good will and celebration associated with beer from its beginnings in Mesopotamia that carried on in the houses, public and private, of Holland from the ninth through the nineteenth centuries, filters through the many pages that make up this work.

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CHAPTER ONE

BREWING IN THE EARLY MIDDLE AGES

Brewing had a long history before people settled in the coastal provinces of the Netherlands. In Holland at the end of the Middle Ages and through the early seventeenth century, brewing took a central place in daily life. It was critical to the health of the economy. It was a model for other industries. It developed and changed because of changes in the way beer was made. It developed and changed because of ways government treated the industry.

The Low Countries were at the extreme border of the Roman state and so were the site of a series of defensive stations along the river boundary. When the Roman government disappeared so too did most of those settlements. Peat bogs to the east hemmed in the land that would become the province of Holland. There were few places to settle among the sand dunes and along the riverbanks. The density of population was low in Holland in the fifth, sixth and seventh centuries. Presumably in these few small collections of houses in the countryside farmers, herders and fishermen carried on traditional brewing. Archaeological evidence exists that brewers made beer in the region of Namur in the third and fourth centuries, after the Romans had left.¹ Immigrant German tribes settled in the Low Countries, attracted by the connection with the old Roman Empire and also by the sparse settlement. Exactly how they brewed is not known but they certainly did brew beer.

The first large scale production of beer using more and better equipment, using the best of techniques and with artisans developing special skills to produce the drink came in the monasteries which emerged in the eighth and ninth centuries. Monasteries offer the first signs of large scale production. Brewing was common in the Frankish kingdom, the kingdom which Charlemagne converted into a universal Latin Christian empire. The greatest force for growth in brewing in the ninth and tenth centuries in the Low Countries was the extension of Carolingian authority northward. What is now the province of Holland first had to undergo conversion to Christianity, a process started by Anglo-Saxon missionaries in the late seventh century with the enthusiastic support of the ancestors of

¹ William H. TeBrake, *Medieval Frontier Culture and Ecology in Rijnland* (College Station, Texas, 1985), pp. 141-181; J. Deckers, "Recherches sur l'histoire des brasseries dans la région mosane au moyen âge," *Le Moyen Age Revue d'Histoire et de Philologie* 76/3-4 (1970), p. 448.

Charlemagne. The slow and halting integration of the region into the Empire meant, among other things, the establishment of royal right to power over unexploited land and also the establishment of royal officers.² Another sign of integration was the establishment of large monasteries in the wake of conversions and in the wake of or as part of the extension of Carolingian civil authority. The monasteries were invariably centers of brewing. "Before the twelfth and thirteenth centuries when brewing first emerged as a commercial venture, the monastery was probably the only institution where beer was manufactured on anything like a commercial scale."³ The example of monasteries as producers and as consumers of beer was not lost on contemporary village and town dwellers. Monastic practice proved an inspiration to secular producers. It also proved an inspiration to governments. The methods public authorities developed for taxing monastic brewing were the ones first used in taxing the new and gradually emerging commercial brewing industry. The indisputable evidence that monasteries in fact did make beer comes from grants awarded to them of the right to use *gruit*.

Both rural and monastic brewers used all kinds of additives in the Middle Ages to give a specific taste and other attributes to beer. Traditional practices in Norway examined in the twentieth century showed that additives varied with local conditions and the availability of raw materials. The various herbs or other plants were part of making beer, adding taste and thought to add in some cases preservative qualities. That was presumably true in the Low Countries in the early and the high Middle Ages. Without doubt there in that period the most popular additive, by far and away, was something called *gruit*.⁴

Gruit was not unique to Holland or even to the Low Countries. Brewers used it commonly in the high Middle Ages throughout the lower Rhine Valley and in Scandinavia. It was even used in northern France. The exact origins of *gruit* or the earliest use of the additive is not known. It does appear, though, that governments played a prominent role, as early as the ninth century, in fixing *gruit* as the predominant additive for beer brewed in monastic or any other religious establishments. The need of the Count of Holland in 1324 to prohibit the making of *gruit* unless he had granted the right to do so⁵ suggests that in the countryside there were users of the additive. Evidence from towns confirms the widespread use of *gruit*, though urban sources are typically from a later period than the

² TeBrake, *Medieval Frontier*, pp. 126-128.

³ Walter Horn and Ernest Born, *The Plan of St. Gall: A Study of the Architecture and Economy of, and Life in a Paradigmatic Carolingian Monastery* (Berkeley, 1979), vol. II, p. 261.

⁴ Odd Nordlund, *Brewing and Beer Traditions in Norway: The Social Anthropological Background of the Brewing Industry* (Oslo, 1969), pp. 126, 132-134, 144, 158-159, 173-193, 217-219, 225-226; Deckers, "Recherches sur l'histoire des brasseries dans la région mosane au moyen âge," p. 457.

⁵ G. Doorman, *De Middeleeuwse Brouwerij en de Gruit* (The Hague, 1955) p. 16.

monastic ones. There are different views of what was in *gruit*. Even as early as the 1660s, at least one writer had great trouble in deciding what might have been in it.⁶ The language of medieval documents is confusing since the additive travelled under a number of different names, both in Latin and in vernacular tongues. One theory equates *gruit* with fermented grain or with malt, that is with the essential raw materials of brewing. This theory was based in part on the proposed etymology of the word *gruit*, that is that it referred to the incomplete or rough grinding of the grains. Another explanation was that it was a combination of grains and had some role in aiding yeast. It is possible that part of the confusion over the term comes from the brewing method. In the early and high Middle Ages, rather than extracting nutrients from the malt in a separate mash tun before taking off the wort to boil it in a kettle, the two procedures typically took place in the same vessel. Water and malt could be thrown together in a kettle and heated along with any additives the brewer might think helpful. Then the resulting liquor was placed in wooden troughs or even barrels for fermentation by airborne yeast.⁷ If the malt was introduced directly into the brewing kettle then the additives probably were mixed with the grains beforehand. In reading the documents assuming the later practice of separate mashing and brewing processes could be a source of confusion about the exact role of *gruit*.

Gruit gave beer a specific taste, smell and some resistance to spoilage.⁸ An act from the town of Huy of 1068 used the word *pigmentum* for *gruit* which suggests that it added color as well. There now seems to be little question that *gruit* was a combination of vegetable matter used as an additive. The question remains of exactly what was included in that combination of herbs. The dominant view, based on specific urban accounts, is that *gruit* was a mixture of dried herbs, including wild rosemary, with the most prominent ingredient being bog myrtle.

⁶ Dirck van Bleyswijck, *Beschryvinge der Stadt Delft* (Delft, 1667), pp. 694-695; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 20-22.

⁷ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. x; H. Ebbing and V. T. van Vilsteren, "Van gruiters, gruitketels en gruithuizen Over en typisch middeleeuws fenomeen," *Bier! Geschiedenis van een volksdrank*, edited by R. E. Kistemaker and V. T. van Vilsteren (Amsterdam, 1994), pp. 21-22, 27.

⁸ W. C. Ackersdyck, "Het regt van de gruit," *Verhandelingen van de Maatschappij der Nederlandsche Letterkunde te Leiden*, 32 (1819), pp. 177-202; J. Deckers, "Gruit et droit de gruit. Aspects techniques et fiscaux de la fabrication de la bière dans la région mosane au Moyen Age," *Handelingen van het XLIIe Congres te Mechelen 3-6-IX-1970*, (1971), p. 188; J. De Hullu, "Iets over de gruit," *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde*, Third series, 10 (1899), p. 118; Th. E. Jensma, "Bronnen tot de geschiedenis van het recht van de gruit in het graafschap Holland, het bisdom Utrecht en het hertogdom Gelre," *Verslagen en Mededeelingen tot uitgaaf der Bronnen van het Oud-Vaderlandsch Recht*, 12 (1960), p. 167; Aloys Schulte, "Vom Grutbiere: Eine Studie zur Wirtschafts- und Verfassungsgeschichte," *Annalen des historischen Vereins für den Niederrhein*, 85 (1908), pp. 118-146.

Bog myrtle or *miricia gale* is related probably most closely to the willow. It is a bush reaching about 1.5 meters in height and can grow in clumps. It is deciduous and flowers in the late spring or summer. It grows in swampy ground near rivers or along the shoreline so it was well-suited to the Netherlands. People picked the leaves, dried them, crushed them and then used them in making beer. There seem to have been other plants included, such as laurel leaves or the resin from an unknown plant called *serpentien* which is mentioned in some documents. The best evidence for the composition of *gruit* comes from later in the Middle Ages but it seems likely that the mixture of herbs was much the same from its earliest appearance in the records in the ninth century.⁹ There is no chemical indication that beer made with bog myrtle was more intoxicating or that it had a narcotic effect, though some contemporaries may have thought otherwise.¹⁰ There seems little doubt that beer made with *gruit* would have had a distinctive and probably potent taste.

Government asserted the right to dispense *gruit*. The source of *gruitrecht*, the exclusive right of supplying that herb mixture, was not a limitation or diminution of some greater government power but instead a specific imperial right vested in the emperor based on his authority over and control of the benefits from unused land. It was uncultivated land from which the bog myrtle came. In the ninth and tenth centuries, as the empire of Charlemagne and with it public authority disintegrated, bishops and counts usurped many of the powers and functions of the emperor. In some cases the emperor even gave away those powers. In 974 emperor Otto II, in granting a church in the district of Namur to a certain Notker of Liege also granted rights of toll, market, minting and *gruitrecht*. It is clear that the emperor considered the monopoly of trade in *gruit* to belong with other major regalian rights. The emperor in making such grants reaffirmed the public character of the right and his ownership of it. The recipient, count or bishop, got the income. Emperor Otto I had already made such a grant to the monastery at Gembloers perhaps as early as 946, one reaffirmed by Otto II in 979. A grant to the bishop of Utrecht in 999 placed *gruitrecht* squarely among those powers which came from public authority. Emperor Otto III turned the town and district of Bommel over to the bishop along with toll and mint rights and the right to all

⁹ Deckers, "Gruit et droit de gruit...", pp. 184-188; J. Deckers, "Recherches sur l'histoire des brasseries dans la region mosane...", pp. 459-460; A. Hallema and J.A. Emmens, *Het bier en zijn brouwers. De geschiedenis van onze oudste volksdrank* (Amsterdam, 1968), p. 29; Léo Moulin, "Bière, houblon et cervoise," *Bulletin de l'Académie Royale de Langue et de Littérature Françaises*, 59, 2 (1981), p. 117; Schulte, "Vom Grutbiere: Eine Studie zur Wirtschafts- und Verfassungsgeschichte," p. 130.

¹⁰ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 27-31; G. Doorman, *Techniek en Octrooiwezen in Hun Aanvang* (The Hague, 1953), p. 76; Nordlund, *Brewing and Beer Traditions in Norway...*, pp. 216, 222-223, 226.

trade in the raw material for beer. He used the word *gruit*, a common term he said.¹¹ The lands around Bommel south of the river Maas apparently are well-suited to the growing of bog myrtle. Emperor Henry III in 1040 in making a grant to a nunnery divided very clearly the public powers, which included *gruitrecht*, from the fees and charges due the lord of the manor for the use of goods in his possession. Once recipients had the right from the emperor they could grant or lease it to others. The supply of *gruit* to brewers was a right taken over by the counts of Holland and was in effect a right to levy a tax on beer production. It proved a lucrative power, one which the counts jealously guarded and tried to extend, expand and perpetuate. For the counts that meant insisting that all makers of beer throughout their domain use *gruit* supplied by the counts or their agents or those who had bought the right to distribution from them.¹²

Towns expanded as population grew in the eleventh and twelfth centuries. Urban growth came with government support and even active promotion. For example, in 1285 land was sold off by the local count in what is now the province of Zeeland to establish the completely planned town of Brouwershaven. The hope was to concentrate the beer trade at the single port. The scheme did not work and even though not all efforts to promote urbanization were crowned with immediate success, still the result by the thirteenth century was to make the Low Countries the most urbanized part of northern Europe and the most urbanized region of Latin Christendom outside of Italy. Holland lagged behind in the drive toward urbanization. Even in 1300, despite the growth of towns like Dordrecht and Leiden, the county was still predominately rural with large areas of virtually uninhabited peat bog. Later in the Middle Ages, though, urban populations grew in Holland. In the fourteenth century the expansion of town walls, something that happened at Gouda in 1355, at Delft in 1300, 1350 and 1395, at Haarlem in 1355 and 1360 and in Leiden in 1294, 1353, 1386 and 1403 reflected that growth. In Holland Dordrecht had some brewing by the eleventh century and a beer called Dordrecht *mom* is mentioned as early as 1285. There were beer brewers in Leiden before the fourteenth century.¹³ Without doubt commer-

¹¹ Moulin, "Bière, houblon et cerveise," p. 112 n. 6.

¹² Deckers, "Gruit et droit de gruit...," pp. 189-191; Deckers, "Recherches sur l'histoire des brasseries dans la region mosane...," pp. 463-465; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 8-10; C. van de Kieft, "Gruit en ban," *Tijdschrift voor Geschiedenis* 77 (1964), pp. 159-168; Schulte, "Vom Grutbiere...," pp. 132, 135; W. De Vries, "Enige opmerkingen naar aanleiding van de Zutphense gruit," *Tijdschrift voor Rechtsgeschiedenis* 28 (1960), pp. 66-69.

¹³ W. Jappe Alberts and H. P. H. Jansen, *Welvaart in Wording* (The Hague, 1964), pp. 85, 106; H. Blink, "Geschiedenis en verbreiding van de bierproductie en van den bierhandel," *Tijdschrift voor economische geographie* 10 (1914), p. 104; J.L. van Dalen, *Geschiedenis van Dordrecht* (Dordrecht, 1931-33), I, p. 389; V.C.C.J. Pinkse, "Het Goudse Kuitbier...," p. 109.

cial brewing in towns by individuals independent of any church connection was possible in Holland by the end of the thirteenth century. The source of the urban brewing industry was the transfer from the countryside of traditional brewing practice which came embodied in the rural migrants to the cities, the people who swelled the population of towns in the twelfth and thirteenth centuries. The beer making skill of urban dwellers was, in the first instance, the skill of the village brewer.

Brewers continued in towns the same practices that they had followed in the countryside, at least initially. There was already some degree of specialization among rural brewers. A few village residents seem to have taken on making larger quantities of beer and then exchanging or selling the surplus to their neighbors. Brewing was often done by couples with both husband and wife taking a role in producing the beer. Women were so important to making beer that in a number of Holland towns in the middle of the thirteenth century a limit was placed on the quantity of beer for which a man could be responsible. Presumably the woman — usually his wife — was responsible for the rest. The count of Holland in 1246 told men living in Delft that they could not stop their wives brewing the volume the wives liked, that is if the women were accustomed to brewing. It was a statement repeated for the town of Medemblik by a successor in 1288. The tendency was to reassert the freedom to brew and especially the freedom of women to brew. Domestic brewing predominated in much of the rural Netherlands and there the tendency toward specialization was incomplete.¹⁴

It was the better-off who tended to brew. By the end of the fifteenth century in the Dutch village of Noordwijk 277 individuals were well off enough to be taxed and 12 of those were specialists in brewing. Many others did brew at home but only small quantities. In Noordwijk somewhat later, 1496 tax records showed the same pattern with only some 7% of those brewing making more than 50 barrels of beer each year. Those 7% accounted for almost 56% of total output in the village. At the other end of the spectrum, some 7% of those brewing made less than 1 barrel in the year. A full 80% of all those brewing produced less than 10 barrels in the year.¹⁵

Urban brewing in Dutch towns took on a different character over time from its rural predecessor. There was a series of powerful reasons for the differences. First, as towns became more densely populated fewer residents, especially in the

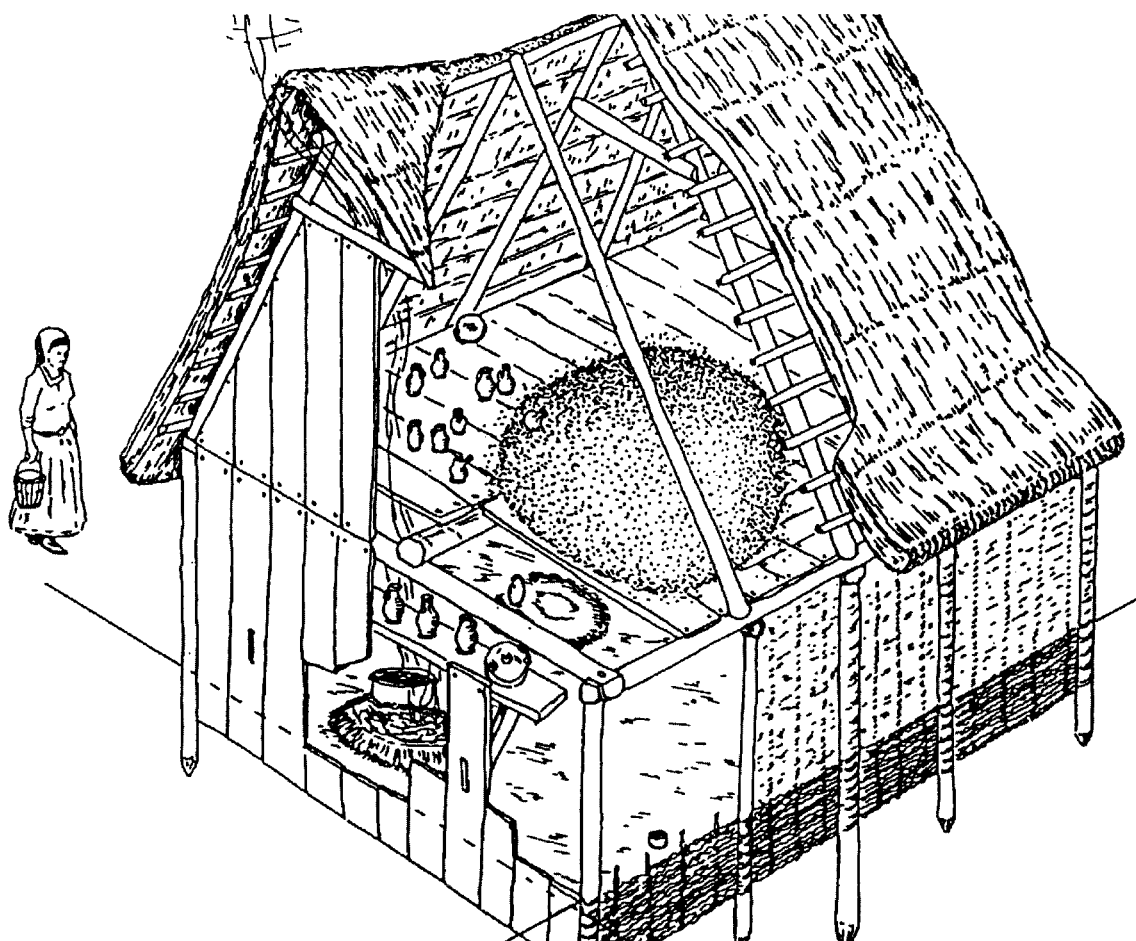
¹⁴ Deckers, "Recherches sur l'histoire des brasseries dans la région mosane...", pp. 463, 469; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, pp. 51-52; Frans van Mieris, *Groot Charterboek der Graven van Holland, van Zeeland en heeren van Vriesland*, (Leiden, 1753-56), I, pp. 234, 481.

¹⁵ G. A. Noordwijk, *Oud Archief*, #292. I am indebted to Geertruida de Moor for bringing the information to my attention and for her analysis of it.

centers of towns, had the space for kettles, tuns, troughs and barrels as well as an open space to use as a malting floor. The tendency in towns was toward larger units where the division of labor among brewery workers could be greater. Second, the greater concentration of population and the greater concentration of industry led to the fouling of water supplies. Good water was absolutely necessary to the production of drinkable beer. Brewers were polluters themselves, from the products of their cleaning to the smoke and ash generated by the wood or peat they used for heating.¹⁶ The usual pattern from the beginning was for breweries to be located on major waterways, both to guarantee supplies of water but also to give easy access to raw materials and easy access to markets for the bulky final product. Third, governments in Holland, to gain advantage from the sale of beer, held control over that critical ingredient, *gruit*. There were savings in both time and capital by buying the mixture of herbs in larger units which could only give an advantage to the specialist brewer. Fourth, there were increased capital requirements for entry into the trade in towns. Regulations to reduce the danger of fire combined with the potential for greater productive investment, given the larger size of the market and the promise of more division of labor. In some cases the government supplied common equipment. The investment was recouped through fees for use of kettles or tuns or barrels. In some Frisian villages as late as the beginning of the nineteenth century there were public brew-houses where housewives from the district could bring their grain for making beer. Rather than the lord, as was typical in the countryside, the town owned the building and the equipment and then rented them to users for short periods. In towns with more prosperous brewing industries such commonly owned equipment was rare. Yet there were cases, for example at Hamburg and in the Netherlands, where two producers would own a brewery jointly but would brew separately and sell beer each in his or her own cask with his or her own mark. It was another way to raise the increasing amount of capital needed to start a brewery.

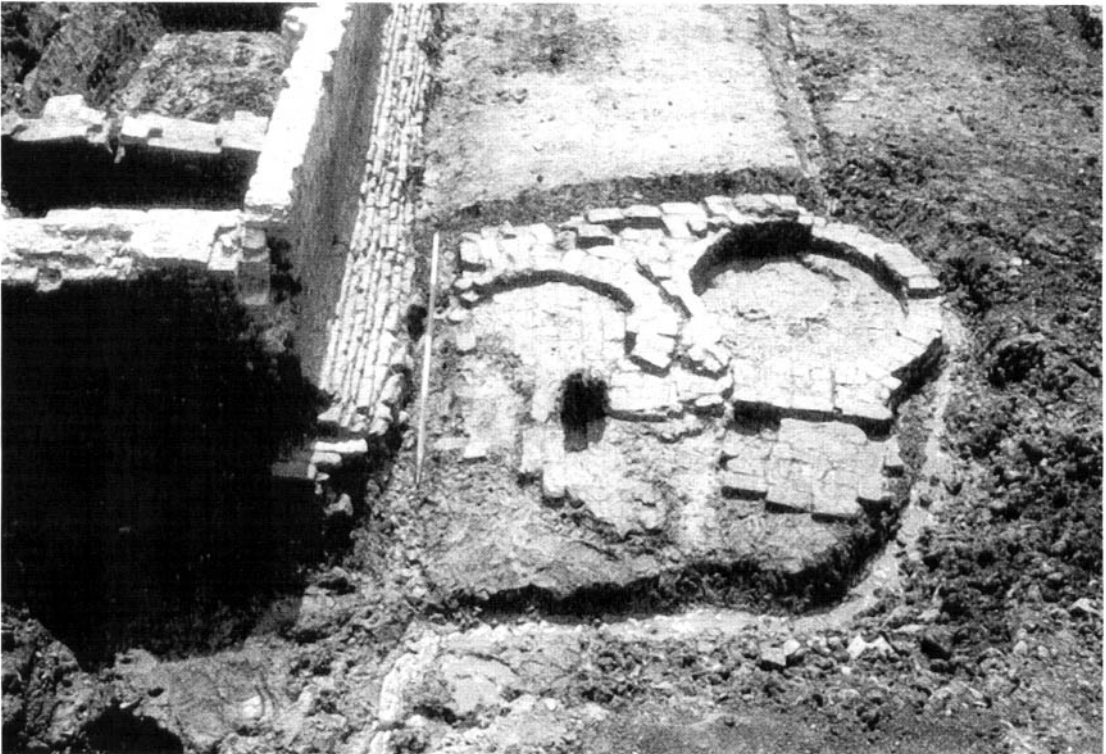
Exactly what brewers did use in the twelfth and thirteenth centuries to make beer can only be vaguely known from the extremely sparse sources. Having a copper kettle did give a brewer an advantage. The ability to produce good copper kettles increased in the high Middle Ages. The kettles may have been made up only of copper bands soldered together and may have had trouble sustaining

¹⁶ Wolf Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, Dissertation zur Erlangung der Doctorwürde der Philosophischen Fakultät der Universität Leipzig, Eingereicht im Jahre 1907, *Zeitschrift des Vereins für Hamburgischen Geschichte* 14 (1909), p. 214; J. A. Faber, H. A. Diederiks and S. Hart. "Urbanisering, Industrialisering en Milieuaantasting in Nederland in de Periode van 1500 tot 1800," *A.A.G. Bijdragen* 18 (1973), pp. 263-265.



1. A reconstruction of a small Zutphen brewery based on archeological investigation of the site. The building was 3.5 by 4.5 meters. It was destroyed, possibly by fire, in 1284. An area on the ground floor was dug out for the fire under the kettle. The loft had a store of barley and a number of pottery containers.

Source: Drawing by Michel Groothedde, Gemeente Zutphen, Archeologie.



2. Two ovens, that is circular bases for the heating of kettles, from the mid 13th century. The site in Dordrecht was excavated in 1969.

Source: Rijksdienst voor Oudheidkundig Bodemonderzoek, Amersfoort

long periods of intense heating, but they did make possible extracting more vegetable matter from grains, they decreased the loss in boiling and in general sped up the process of brewing compared to the alternatives. The kettle was undoubtedly the most valuable piece of equipment in the trade. Any brewer producing for more than just personal and local consumption would have had one of copper. The earlier pottery kettles were not as durable. The need to have an opening near the bottom for draining off the wort created a weakness. That was not the only part of the kettle which was vulnerable and so pottery vessels were limited to capacities of 100 to 150 litres. Copper kettles probably ran to a maximum of over 1,000 litres by the late thirteenth century and possibly to 4,000 by the fifteenth. Though smaller copper kettles might be made with a hanger so they could be suspended over a fire, to take advantage of the greater size it became common to have them sit on a circular and solid brick oven. The change to copper made it possible to build the kettle with a flat bottom so it could be firmly placed on a grate or supports over the place where the fire was built.¹⁷ The use of copper kettles may indicate the start of mashing and boiling in separate vessels. By the thirteenth century it appears that urban brewers added hot water to the ground malt in a wooden mash tun and then took off the resulting wort to boil in the kettle with any additives. It is possible that there was an intermediate stage where, after mashing, not only the wort but also the spent grains were put into the copper kettle. In addition to a kettle for boiling water and wort and in addition to a mash tun brewers also had wooden troughs, long cooling containers which might well be hollowed out tree trunks. They were long, narrow and shallow and at times called ships, presumably because of their appearance.¹⁸ Brewers also needed barrels. The number depended on production levels. The size depended on the brewer's choice but soon it was to depend on government regulation.

The towns took over the tax on *gruit* in the twelfth and thirteenth centuries. The public authorities which owned *gruitrecht*, which in the Low Countries meant counts or bishops, granted, leased, or sold the taxing power to towns. In selling counts or bishops capitalized their asset, probably for a good deal more than the value based on the income stream from the tax. Towns preferred the indication of political independence from higher authority shown by their collecting their own taxes and were often willing to pay a premium for that sign of freedom.

¹⁷ Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, pp. 54, 56-58; Jacques C. van. Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), p. 26; Friedrich Techen, "Das Brauwerk in Wismar," *Hansisches Geschichtsblätter* 21 (1915), p. 333; V. T. van Vilsteren, "De oorsprong en techniek van het brouwen tot de 14de eeuw," in *Bier! Geschiedenis van een volksdrank*, edited by R. E. Kistemaker and V. T. van Vilsteren (Amsterdam, 1994), pp. 14-19.

¹⁸ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. x-xi, 48, 53-54.

Moreover, the ownership of the tax on *gruit* gave them greater authority over what was in most towns by the late thirteenth century an important industry. The grant to the town to collect a tax on beer might also be for a specific purpose, as at Schiedam in 1399 when the count gave the town the right to collect the tax to cover the cost of dredging and maintaining the harbor.¹⁹

The *gruit* tax, in fact, was often farmed. Some citizen, who could even be a brewer or the town government, gave the count a fixed sum annually for the right to collect the tax. Having the town act as the farmer was the simple compromise between comital ownership and urban collection of the tax. Farming by towns, in imitation of the practice of counts and bishops, was already well-established in the county of Holland by the end of the thirteenth century. Delft was the first to farm the tax, by at least 1274, Dordrecht by 1278, Leiden before 1326, Haarlem before 1327 and Rotterdam from 1334. In 1274 Count Floris V told the farmer of the tax in Delft that he could not raise the fee unilaterally and could not charge more than was being paid elsewhere. Over time more and more towns inside and outside Holland got power over the tax. In the case of Rotterdam the count had borrowed some money and rather than pay it back he granted his right to tax *gruit* to the town but that came only in 1402. Amsterdam was among the slowest, buying *gruutrecht* for the town from their new monarch, Philip II of Spain, finally in 1559.²⁰

Once the town had the right to tax *gruit*, it then had to have a system of collection. In this, too, practice tended to follow that of the counts or bishops who had sold or leased the taxing power to the towns. If all brewers had to use *gruit*, no matter how much beer they made, then it was control over the supply of *gruit* that was needed. The monopoly of supply was handed over to an official, a *gruyter* or *gruiter*. He made the combination of spices and sold them at fixed prices which included the tax. In larger towns he operated from the *gruithuis* or *gruthuse*, a building designated for the storage and sale of the herbs. Apparently all buyers got the same mixture. The seller might be called the *fermentarius* in official documents though to the town residents he was the *gruyter*. He could be a town bureaucrat, paid a salary by the town. More commonly he was a tax farmer and often a brewer who not only dispensed the herbs but also brewed in the building. That would explain why the *gruithuis* at Dordrecht in 1324 also had barrels and would also help to explain why the farmer of the *gruit* tax at Schiedam in 1344 paid a reduced fee for that right as compensation for his being forbidden from brewing. The *gruithuis* may have had kettles and vats for measuring and packing

¹⁹ G. van der Feijst, *Geschiedenis van Schiedam* (Schiedam, 1975), p. 22.

²⁰ Ackersdyck, "Het regt van de gruit," pp. 198-200; van Bleyswijck, *Beschryvinge der Stadt Delft*, p. 694; Jensma, "Bronnen tot de geschiedenis van het recht van de gruit...", p. 173.

the herbs which had to be crushed, compressed and then measured out for distribution. The men who farmed or administered *gruitrecht* for the towns were already in the thirteenth century wealthy and important figures.²¹

In 1322 the count of Holland farmed the *gruithuis* at Dordrecht for a period of four years, the agreement implying that the house itself was the property of the count. In 1324 an understanding was reached that there was to be no other *gruithuis* anywhere in South Holland. Obviously this enhanced the value of the right to the one in Dordrecht. The presence of a building specially set aside for *gruit* equipped with kettles and vats, the fact that in 1324 *gruit* was supplied in casks, wet, the 1322 Dordrecht requirement that brewers bring all the malt they were going to use to the *gruithuis* and that *gruitgeld* was charged per unit of malt and not per unit of *gruit*, all combine to suggest that there was more to *gruit* than simply a mixture of dried leaves. The method of supply gives support, though rather weak support, to speculation that *gruit* played some role in fermentation. Brewers had to go to the *gruithuis* to mix their malt with *gruit* but that requirement may have been inspired by a desire to guarantee brewers used an adequate amount of grain and did not try to brew thinner beer to enhance their profits. It may also have been a way to keep secret the exact composition of *gruit*.²² If brewers were carrying on mashing and brewing in the same vessel then mixing the additives with the malt would save trouble and also assure even distribution of the additive.

Presumably the use of *gruit* for brewing in Holland was virtually universal and it is only gaps in the surviving evidence which leave any impression that some places escaped making beer flavored with bog myrtle. Amsterdam first appears in documents in 1275 and the settlement had its first brewery soon after 1300, before its first church. The charging of *gruitgeld* dates from even before 1304, an indication of how universal the tax was. Amersfoort, not far to the east and destined to be a great center of brewing, already had a brewing industry when it got *stadtrecht* from the bishop of Utrecht in 1259. It proved impossible to impose *gruitrecht* in the countryside though it was tried by a family who owned the tax in

²¹ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, p. 220; Ebbing and Vilstern, "Van gruiters, gruitketels en gruihuizen...", pp. 24-27; Rudolph Häpke, *Brügges Entwicklung zum mittelalterlichen Weltmarkt* (Berlin, 1908), p. 94; Jensma, "Bronnen tot de geschiedenis van het recht van de gruit...", pp. 168-169, 172.

²² G. A. Dordrecht, Archief der Gemeente Dordrecht, Keur- en Handvestboeken, #5, fol. 153r; Ackersdyck, "Het regt van de gruit," pp. 183, 186; Jan Alleblas, "Nieuw Leven in een Oud Brouwerij? Geschiedenis en Toekomst van De Sleutel," *Kwartaal & Tekenen van Dordrecht Gemeentelijke Archiefdienst Dordrecht* 9, 2 (1983), p. 1; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 37; Jensma, "Bronnen tot de geschiedenis van het recht van de gruit...", p. 170; W. De Vries, "Enige opmerkingen naar aanleiding van de Zutphense gruit," *Tijdschrift voor Rechtsgeschiedenis* 28 (1960), pp. 59, 67.

the northern part of Holland and in Westfriesland in the fourteenth century.²³ On the other hand the concentrated nature of urban brewing and the tendency toward specialization all played into the hands of tax collectors in towns. By 1300 *gruit* and *gruit* taxes, though perhaps treated differently in different places, were a common feature of life in Dutch towns.

Strict regulation of urban brewing, well known in Germany by the fifteenth century and increasing in England, was extreme by Dutch standards but the tendency was in the same direction. Town governments imposed regulations and restrictions because of pressure from professional brewers. Those townspeople who specialized in brewing and earned the overwhelming majority of their incomes from making beer wanted to be freed of the inconvenience of extensive competition. Restrictions to entry served to give them some monopoly power. Towns in Holland were slow to limit brewing legally unlike their counterparts elsewhere, but even so the tax system in the Netherlands did tend to promote the development of an urban industry increasingly dominated by professional brewers.

The production of beer in the Low Countries, in general, grew through the eleventh, twelfth, and thirteenth centuries. It is impossible to say with certainty how much output grew since there are virtually no production or even tax data to show the trend. The towns in Holland were only just emerging as urban centers in the twelfth and thirteenth centuries. In 1300 Amsterdam had perhaps 1,000 residents, Leiden 3,000 and Dordrecht 5,000.²⁴ Dutch towns quickly got breweries and as population increased, so too did the level of production. The number of breweries mentioned in the thirteenth century is greater than before, in part because of more abundant documentation but also because there were simply more breweries. The early emergence of taxes on beer and the important place which such taxes found in the finances of Dutch towns indicate the close association of urban growth with the growth in brewing. Taxes on beer inspired and became part of a system of excise taxes on the sale of specific goods with a fixed fee due added on to the purchase price of any item subject to tax. The

²³ Abraham van Bemmelen, *Beschrijving der Stad Amersfoort...* (Utrecht, 1760), 2, p. 905; Jensma, "Bronnen tot de geschiedenis van het recht van de gruit...", p. 179; A. H. Klop, "De Amersfoortse Brouwerijen tot de 19e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #104 (1935), p. 6; J. P. W. Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1937), pp. 2-3; H. J. Smit, *De Opkomst van den Handel van Amsterdam, Onderzoekingen naar de economische ontwikkeling der stad tot 1441* (Amsterdam, 1914), pp. 18-22.

²⁴ Paul Bairoch, Jean Batou and Pierre Chèvre, *The Population of European Cities Data Bank and Short Summary of Results* (Geneva, 1988), pp. 11, 53.

Abbey of Saint Trond as early as 1112 had collected a fee from tradespeople who engaged in business on their lands. The monks also required that brewers supply them with a fixed quantity of beer each week. In 1141 the monastery of Crepin also in the southern Low Countries got the right to collect a tax levied directly on beer which had nothing to do with *gruit* or *gruitrecht*. By 1233 the brewers of Cambrai were paying excise taxes. In the early thirteenth century in Brabant, at least in most towns, there were excises and a designated place where those excises would be paid and in Flanders by 1280 excises were long standing and well-established taxes. Beer was one of the most popular goods to fall under such taxes and the practices in the southern Netherlands made their way north into Holland in the late thirteenth and fourteenth centuries. Haarlem received the right to levy excise taxes for ten years from Count Floris V in 1274. A number of items were to be subject to tax, among them beer, foreign and domestic. It may be that the Haarlem grant was the first in Holland but that is doubtful.²⁵ In 1350 the count of Holland gave the town of Leiden the power to levy excises and the town taxed beer along with wine, grain, meat, and salt among other items. The excise quickly became the most important regular source of income for the town. By 1476 and probably much earlier beer drinkers in Amsterdam had to pay excise on beer, the rate on beer brewed outside the town being 55% higher than that on domestically brewed beer. By the fifteenth century in many towns the tax on *gruit* had in essence been made over into an excise tax.²⁶

Dutch towns lagged behind those of Flanders and Brabant just to the south in population, in trade, in industry, and, therefore, in the development of brewing. Holland did have four natural advantages which in the long term would work very much to its benefit. First, the extensive systems of internal waterways gave a ready-made transportation network to bring together raw materials and to ship out finished goods. Second, the poor quality of the soil made growing barley and oats, the raw materials of beer, less risky than raising the standard medieval bread grains, wheat and rye. Third, the rural population, faced with infertile soil and a landscape largely of water, migrated to towns and supplied a ready made

²⁵ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 7; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 10-11; R. van Uytven, *Stadsfinanciën en Stadseconomie te Leuven van de XIIe tot het einde der XVIe Eeuw* (Brussels, 1961), p. 324; J. de. Wal, "Accijnsbrief van Haarlem in 1274 door Floris V verleend of ontworpen," *Werken van de Maatschappij van Nederlandse Letterkunde te Leiden*, Nieuwe Reeks 7/2 (1856), pp. 161-187; Carlos Wyffels, *De Oorsprong der Ambachten in Vlaanderen en Brabant* (Brussels, 1951), pp. 101-102.

²⁶ Jannis Willem Marsilje, *Het financiële beleid van Leiden in de Laat-Beierse en Bourgondische periode 1390-1477* (Hilversum, 1985), p. 114; De Vries, "Enige opmerkingen naar aanleiding van de Zutphense gruit," pp. 65-66; Jan Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen, voorregten, koophandel, Gebouwen, kerkenstaat, scholen, schutterye, Gilden en Regeeringe* (Amsterdam, 1760-1768), 8, p. 227.

workforce and ready made market for industry.²⁷ Fourth, much of the rural land in eastern Holland and Utrecht was rich in peat, a logical fuel for making beer.

By 1300 the concentration of brewing in hands of professionals was becoming increasingly obvious. By 1300 as well a distribution system for beer was in place in the towns. There were taverns often even in the same buildings as the breweries or supplied on some regular basis by certain brewers. Just as the system of distribution through taverns was regularized, so too was the system of taxation. In Holland taxes on *gruit* were complemented by the newer excise taxes. The system of payment and officers responsible were in place in almost every town, even in some rather small ones.

The product of urban brewers might be made with the same ingredients and in the same way as the product of country brewers but there was apparently a significant difference in the quality of the beers. Urban brewers could produce better beer and by 1300 were finding a market in the countryside for their superior product. Access to better raw materials, to better equipment and economies of larger scale production all worked to their advantage. Presumably specialist urban brewers had more chance than did their rural counterparts to practice and to experiment. The brewing industry was to evolve in the fourteenth century from a local and then a regional to an international one as urban brewers exploited their advantages. Rural brewing did not disappear and in fact may have benefitted from the rising production of raw materials for brewing.²⁸ In 1300 in Dutch towns there was no sign of innovation in the production of beer. Brewers had taken a domestic chore, simply increased its scale of production and commercialized distribution of its product.

Towns throughout northern Europe had offered larger possible markets in the twelfth and thirteenth centuries as more individuals in those towns found it difficult to brew beer for themselves. The pattern of the high Middle Ages was repeated again and again over subsequent centuries as the scale of brewing increased. Short periods of rapid growth, marked by greater consolidation and specialization, were followed by long periods of stability in output, technology and scale. The first instance came principally in the southern Netherlands but also in Holland around 1200. The second came, especially in Holland, in the closing years of the thirteenth and in the course of the fourteenth century with the introduction of a new kind of beer from towns of the north German coast made, not with *gruit* but with hops.

²⁷ Walter Prevenier and Wim Blockmans, *The Burgundian Netherlands* (Cambridge, 1986), pp. 25-26.

²⁸ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, pp. 213-214; Prevenier and Blockmans, *The Burgundian Netherlands*, pp. 83-86; De Vries, "Enige opmerkingen naar aanleiding van de Zutphense gruit," p. 68.

CHAPTER TWO

THE MEDIEVAL TRANSFORMATION

The invasion of beer made with hops from member towns of the Hanseatic League along the north coast of Germany forced technical change on the brewing industry of Holland. The reaction of Dutch brewers to the challenge was a slow one. The policy of governments very much directed if not fully dictated reactions to the new competition. The principal features of taxation of beer were in place by 1300. Technical change in brewing shook that stable establishment. Adjustment became absolutely necessary, but it did not come easily. The results by the mid fifteenth century, after reorganization, the development of new techniques and the levying of new taxes administered in a different way, was an industry much bigger, more prosperous and with an even greater role in the life and politics of Holland.

By 1300 hops were widely cultivated in northern Europe and they were used among other things, in place of *gruit* or other herbs, in the making of beer. Any change in flavor that beer got from the addition of hops was considered less important than the greater durability they gave the drink. Brewers also found in hops an agent which precipitated some of the nitrogenous constituents out of the wort and a medium for filtering the wort as it ran out of the brew kettle. Those advantages were minor in comparison with the ability of the chemicals in hops to sterilize the wort and prevent infection.¹ Hops were an additive very much like *gruit*. The method or timing of the addition of hops might not be exactly the same and certainly the chemical composition was not the same as any of the other additives known to medieval brewers, but the purpose of using hops was the same. Above all beer with hops could last longer so it was better for shipping over long distances.²

Hopped beer had to compete with beer made with *gruit* which was well known and served the purpose of an alcoholic beverage of some purity and good taste. Brewers had technical problems with getting the relationship of the quantity and variety of hops and the quantities of malt and water right. In fact the brewing of hopped beer may have started in monasteries because of the large quantities pro-

¹ P. R. Ashurst, "Hops and Their Use in Brewing," in *Modern Brewing Technology*, edited by W. P. K. Findlay (London, 1971), pp. 31-32, 55; Deckers, "Gruit et droit de gruit...", p. 186.

² Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 17; Louis Pasteur, *Studies on Fermentation*, pp. 16-17, 21.

duced and so their greater interest in preservation. What was different in the thirteenth and fourteenth centuries was that brewers in Hamburg, Bremen, Wismar and elsewhere in northern Germany made hopped beer for commercial purposes. They could sell the superior product in their own markets and then later in distant ones where they could compete successfully against locally brewed beers.³

Made with hops, the new commercial product was exported from Bremen, Wismar, and Rostock but above all from Hamburg. Beer is much heavier than the grain used to make it. Beer is about 90% water so transport costs are always a serious consideration in the location of any brewery. Moving beer by land in the late Middle Ages added from 25% to 70% to the price for each 100 kilometers that the good had to travel. The wide variation in price increase depended on the terrain through which the beer was moved and on the tolls that could not be avoided on land. High transport costs on land is why port towns dominated the beer trade. The trade in beer started in the thirteenth century but it was in the fourteenth that the industry in Hamburg grew rapidly. Hopped beer from north Germany found a logical market in the Low Countries. Bremen beer was reported brought into the town of Groningen in 1272 and by 1318 Hamburg beer was drunk there too. Throughout the fourteenth century Frisian traders carried Hamburg beer and only grain was a more frequently transported good. Wismar beer turns up in import records at Enkhuizen already in 1448 but rarely after that, perhaps because hopped beer got the generic name of Hamburg beer. Hamburg beer is mentioned in Gouda in 1357 though it certainly was being sold in Holland well before that date.⁴

In 1364 Emperor Charles IV spoke of the success of making beer with hops. He lauded the *novus modus fermentandi cervisiam* which had brought a thriving industry to the northern part of his lands and especially to Hamburg. One chronicler called the town the "*Brauhaus der Hansa*". The town was so successful that Hamburg beer became synonymous with beer made with hops.⁵ The total

³ Irena Ciesla, "Taberna Wczesnosredniowieczna na Ziemiach Polskich," *Studia Wczesnosredniowieczne* 4 (1958), p. 225; Hans Huntemann, *Das deutsche Braugewerbe vom Ausgang des Mittelalters bis zum Beginn der Industrialisierung. Biererzeugung — Bierhandel — Bierverbrauch* (Nürnberg, 1971), p. 9; Moulin, "Bière, houblon et cervoise," pp. 145-147; Smit, *De Opkomst van den Handel van Amsterdam...*, p. 31.

⁴ G. A. Hoorn, #481[2879]; F. C. Berkenvelder, "Friesland's Handel in de late Middeleeuwen," *Economisch-Historisch Jaarboek* 29 (1963), pp. 138-140, 143-145, 153, 156; A. van der Poest Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," incomplete and unpublished doctoral dissertation, 1959, G. A. Gouda, p. 37; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 18; Hallema and Emmens, *Het bier en zijn brouwers*, p. 75; Tegen, "Das Brauwerk in Wismar," 22 (1916), pp. 201-202.

⁵ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, p. 212; Clement, "De Bierbrouwerijen van Gouda...", p. 31; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 5.

volume of beer exported from Hamburg in the fourteenth century was large by contemporary standards. It is difficult to state quantities with accuracy but records from Amsterdam import tolls, levied there from 1323, do indicate how much of that beer, at least for the few years that records survive, made its way to the Low Countries.⁶

The export of Hamburg beer to Holland, well underway by the 1320s, saw significant growth from 1343. There was a sharp setback in 1347. The disruption of the European economy caused by the Black Death and a piratical war between Holland and Friesland combined to generate a disaster for Hamburg beer exports. In 1351 exports returned to their former absolute level and continued at that level until the mid 1360s when they rose again and stabilized at a new plateau. It would seem that by the 1360s the average annual shipment from Hamburg to Amsterdam was almost 32,000 barrels or at least 5,600,000 liters, that is more than 20% of total Hamburg output in 1375 and probably more than half of all Hamburg exports. Imports of beer to Amsterdam fell in the 1370s but rose again in the 1390s.⁷ The ships travelled in convoy, varying in number from 3 to 25 in the 1350s. They did not sail in the winter and the shipping season was short, some 6 months in 1352-1353, in part because then Hamburg prohibited export before 22 February. The season lengthened but not by much over the rest of the century. Data on beer shipped appear in the Hamburg *Pfundzollbuch* for February, 1369, to February, 1370, show that beer made up a full one-third of all Hamburg exports by value and that Amsterdam was the destination of 47% of the barrels of beer exported from Hamburg in those twelve months.⁸

A few Hamburg brewers were relatively large producers and concentrated on the Amsterdam market. Some produced over 2,000 barrels in a year, and many more of them made over 1,000 barrels of beer. Overseas Hamburgers had factories or organizations of their merchants involved in the beer trade. The one at Stavoren, for example, dated from 1358 but there were others at Bruges in Flanders and, of course, at Amsterdam. The number of agents at Amsterdam fell over time as specialist beer importers tended to take over the trade. In 1365 72 of

⁶ Smit, *De Opkomst van den Handel van Amsterdam...*, p. 48; H. J. Smit, "De Registers van den Bier-tol te Amsterdam," *Historisch Genootschap te Utrecht, Bijdragen en Mededelingen* 38 (1917), pp. 3-7.

⁷ J. Bracker, "Hopbier uit Hamburg Het verhaal van een middeleeuwse succes-formule," in *Bier! Geschiedenis van een volksdrank*, edited by R. E. Kistemaker and V. T. van Vilsteren (Amsterdam, 1994), pp. 28-29; Huntemann, *Das deutsche Braugewerbe...*, pp. 14-15; Smit, *De Opkomst van den Handel van Amsterdam*, pp. 37-39, 89; Gerald Stefke, *Ein Städtisches Exportgewerbe Des Spätmittelalters in seiner Entfaltung und ersten Blüte Untersuchungen Zur Geschichte Der Hamburger Seebrauerei Des 14. Jahrhunderts* (Hamburg, 1979), pp. 63-83, 129-131, xlv-liv.

⁸ Phillippe Dollinger, *La Hanse* (Paris, 1964), p. 275; Stefke, *Ein Städtisches Exportgewerbe Des Spätmittelalters...*, pp. 88-90, 95, 117-118.

the 78 beer importers there came from Hamburg. The groups of factors overseas even had their own regulations and statutes granted by Hamburg.⁹ The group in Amsterdam had formed their own *hanze* even before 1358 and maintained a chapel in the Oude Kerk. The agents or *liggers* in Amsterdam were typically relatives of brewers back in Hamburg. The agents were involved principally in dealing with the sale of beer and in some cases exclusively with the sale of beer. There was cooperation among them, in one case an agent looking after the estate of another, all done with permission of the city government of Amsterdam. This permission was granted at the request of the Hamburg government.¹⁰

The Counts of Holland in the second half of the fourteenth century embarked on a policy of economic development. They promoted drainage projects to expand farmland. They promoted commerce, trying to divert some of the trade of Flanders into their own ports. They granted town rights to a number of settlements.¹¹ The emerging policy on beer in the fourteenth century was consistent with all the other efforts to promote commerce and to increase the flow of tax income.

In 1321, the Count of Holland, William III, prohibited the import of Hamburg and eastern beer into three districts in the county. The count got nothing from the import of beer and presumably that was the reason for the prohibition. Already on 22 June, 1319, the count had lifted the toll freedom which he had granted in 1313 to the merchants from the *Oestlande* for goods imported by sea, and had imposed a toll on beer, grain and all other goods. The decision to go further two years later was presumably based on the volume of imported beer which had, it seems, been rising since late in the previous century. The prohibition was straightforward and applied to all foreign beers. This meant

⁹ Ernest Daenell, *Die Blütezeit der Deutschen Hanse* (Berlin, 1905), 1, pp. 266-267; Ernest Daenell, "Holland und die Hanse im 15. Jahrhundert," *Hansische Geschichtsblätter* 9 (1903), pp. 10-11; Smit, *De Opkomst van den Handel van Amsterdam*, pp. 39-44, 91, 103, 107; Stefke, *Ein Städtisches Exportgewerbe Des Spätmittelalters*, pp. 84-87.

¹⁰ H. Ebbing, "Bier op transport De binnenvaart door Holland en de ontwikkeling van de Hollandse brouwnijverheid tot 1500," in *Bier! Geschiedenis van een volksdrank*, edited by R. E. Kistemaker and V. T. van Vilsteren (Amsterdam, 1994), p. 44; F. Ketner, *Handel en Scheepvaart van Amsterdam in de Vijftiende Eeuw* (Leiden, 1946), p. 5; P. H. J. van der Laan, *Oorkondenboek van Amsterdam tot 1400* (Amsterdam, 1975), #522; Smit, *De Opkomst van den Handel van Amsterdam*, p. 45; Smit, "De Registers van den Biertol te Amsterdam," pp. 6-7; Gerald Stefke, "Die Hamburger Zollbücher von 1399/1400 und '1418' Der Werkzoll im 14. und Frühen 15. Jahrhundert und die Ausfuhr von Hamburger Bier über See im Jahre 1417," *Zeitschrift des Vereins für Hamburgische Geschichte*, 69 (1983), pp. 20-21, 23-25; J. Ter Gouw, *Geschiedenis van Amsterdam*, 2, p. 309, 5, p. 140.

¹¹ D. E. H. De Boer, "Delft Omstreeks 1400," in *De Stad Delft cultuur en maatschappij tot 1572*, edited by I. Spander and R. A. Leeuw (Delft, 1979), p. 92; Daenell, *Die Blütezeit der Deutschen Hanse*, 1, p. 261.

some hardship for the count since his household was a consumer of Hamburg beer.¹² What is more surprising is that just two years later, in 1323, the count rescinded the blanket prohibition and replaced it with a tax on imports. The reason given for the toll was that importers brought large quantities of beer into the county from the East and from the bishopric of Utrecht. In the first case the goal was to protect domestic brewing. In the second the goal was to enhance the count's income. The regulations of 1321 and of 1323 succeeded in accomplishing both goals.

All imported beer from Hamburg had to pass through either the port of Amsterdam or of Medemblik, a town just to the north of what would be the metropolis of Holland. Since Amsterdam was in a better geographical position it quickly became the site chosen by most vessels for paying the toll if they were to pass through Holland carrying beer. When Count William V renewed the toll in 1351 he mentioned only Amsterdam as a port of entry. Beer smugglers who did not pay the toll were to have their goods and vessels seized. In 1351 the count also decreed that only locally brewed beer could be drunk in the northern part of Holland with Amsterdam being the sole exception which allowed the town to remain a trading center. The toll at Amsterdam, though there was some confusion about the exact amount, remained the same throughout the century.¹³

The decision to reverse the policy of total prohibition of eastern beer begun in 1321 and to go back to levying tolls as in 1319 may have been caused by a shortage of beer in Holland. The 1323 decision may also been a return to the policy the counts of Holland had pursued since the beginning of the fourteenth century, granting trading rights both to promote trade in Holland, taking it away from Flemish centers to the south, and controlling trade for the benefit of their own tax collection. Dordrecht was the first beneficiary of such policies. Counts in a series of grants in 1282, 1299, 1313 and 1355 required all goods coming down the Rhine to be off-loaded and put up for sale in Dordrecht before they could be moved on. The goal was to make Dordrecht the center of all wholesale trade in Holland. The expansion of the rights, *stapelrecht* and *Maasrecht*, in 1355 required that with the exception of beer virtually all goods going in and out of Holland by

¹² Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, p. 218; Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, p. 18; van der Laan, *Oorkondenboek van Amsterdam tot 1400*, p. 20; J. F. Niermeyer, ed, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied. Eerste deel: 1104-1399* (The Hague, 1968), #193, #210; Smit, *De Opkomst van den Handel van Amsterdam*, p. 31.

¹³ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," p. 32; Ebbing, "Bier op transport....," pp. 44-45; van der Laan, *Oorkondenboek van Amsterdam tot 1400*, #16, #129, #602, #618; Smit, *De Opkomst van den Handel van Amsterdam*, pp. 31-33; Ter Gouw, *Geschiedenis van Amsterdam*, 1, p. 356.

river had to go through Dordrecht.¹⁴ William III may have had visions of doing the same thing with beer, Amsterdam being the Dordrecht of his plan.

Much of the Hamburg beer that landed at ports in the northern Low Countries was destined for the Flemish market. It could be transferred to smaller vessels at towns like Stavoren and Amsterdam, or the ships from German North Sea ports could make their own way along the rivers and lakes of Holland to Flanders. Hamburg beer passing through Dordrecht or through the village of Geervliet was subject to toll.¹⁵ The toll at Geervliet existed from at least 1195 but it was not the only one. Towns along the inland route from the Zuider Zee to the River Scheldt relied heavily on the transit trade and used income from tolls to improve the waterways. Gouda, destined to be a major brewing center, was on the most direct route between Amsterdam to the north and Bruges and Antwerp to the south. Boats at Gouda had to pass through a number of locks and in 1306 the town built a new canal to make movement easier. The toll at Gouda is first mentioned in 1331 but it may well have been the successor of a toll collected at nearby Moordrecht mentioned already by the mid thirteenth century. Once at Antwerp or Bruges the beer might well continue on, shipped along streams or canals to markets further inland such as Mechelen, Lier, or possibly even Brussels. Such trade at least is indicated by tolls of the second half of the fourteenth century. Men responsible for collecting taxes on beer in those Brabant towns may have even travelled to Gouda to buy beer and arrange for shipment south. The toll at Dordrecht for 1380-1385 showed how important beer was for Holland trade. The value of imported beer was about 50% of the value of wheat imports and 20% of the value of rye imports. Total beer imports in the 51 weeks starting 5 April, 1383, were 415 lasts, a rather high figure compared to the previous year and the following two years. The volume probably exceeded 500,000 liters though the exact size of the last is difficult to estimate. By the last years of the fourteenth century the movement of beer southward from Amsterdam to markets in the southern Low Countries was an integral part of Dutch trade.¹⁶

¹⁴ J.L. van Dalen, "Het stapel- en Maasrecht van Dordrecht," *Tijdschrift voor Geschiedenis* 6 (1891), pp. 2-9; J. F. Niermeyer, "Dordrecht als handelsstad in de tweede helft van de veertiende eeuw," *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde* 8th series, 3 (1942), pp. 6-32; Bernard van Rijswijk, *Geschiedenis van het Dordtsche Stapelrecht* (The Hague, 1900), pp. 8-9, 19-40; Smit, "De Registers van den Biertol te Amsterdam," pp. 1-2; W. S. Unger, "De Hollandsche Graanhandel en Graanhandelspolitiek in de Middeleeuwen," p. 252.

¹⁵ Renée Doehaerd, "Bierhandel van Brabantsche Kooplieden met Nederland in de 14e eeuw," *Handelingen van de koninklijke kring voor Oudheidkunde, Letteren en Kunst van Mechelen* 50 (1946), p. 89; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 59; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #674, p. 474.

¹⁶ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 19-20; Doehaerd, "Bierhandel van Brabantsche Kooplieden met Nederland in de 14e eeuw," pp. 85-89;

The commercial prosperity of Amsterdam was bound up in the Hamburg beer trade. Comital policy favoring Dordrecht diverted trade there with Amsterdam enjoying an advantage only in the import of beer. The beer trade not only supplied an import good but also made the town the center of a network of inland trade stretching south to Flanders and to the east to Amersfoort and to Deventer and towns along the IJssel River. By 1342 when Count William IV expanded her grant of privileges, Amsterdam was already one of the largest towns in Holland. Her rapid growth to perhaps the fifth largest settlement by 1350 can be attributed to the growth in trade through the port and that in turn principally to her position as the first port of entry of Hamburg traders and therefore as a gateway to Holland's inland waterways. The port was so important that some Hamburg brewers were known as *braxatores de Ammelstredamme*. The only other outlet for Hamburg beer of any consequence in the northern Netherlands was the small port of Stavoren in Friesland, and Hamburg did have brewers identified as *braxatores de Stauria*. The decision by the count of Holland to set the beer toll at Amsterdam may not have been the reason for the rise of the town to commercial and eventually political prominence but the trade in beer was critical to the early development of her trading relations.¹⁷

The income to the count from the toll on charged on Hamburg beer was sizeable. It was already close to 250 Holland pounds in 1343, more than 15% of the income from his district of Amstelland. It went down to a little more than 150 pounds in the following year, but that was still 2.5% of all the money collected by the count. The income from the tax rose, reaching 400 Holland pounds in 1368. The income from tolls on other beers including Wismar and Amersfoort beer was small in comparison. By the first quarter of the fifteenth century the beer trade had begun to decline. The income from the beer toll at Amsterdam fell and in 1449/50 and 1469/70 it did not even appear in the toll registers.¹⁸ The relative importance of the beer trade to Amsterdam had been decreasing for some time as other goods from a variety of ports appeared on the wharfs of the town.

Renée Doehaerd, *Comptes du Tonlieu D'Anvers 1365-1404* (Brussels, 1947), pp 59-60, 68-69; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, pp. 458-459, 484-487, 501-502, 547-556, 590-610, 616, 619-687, 689-711, 713-715.

¹⁷ H. Brugmans, *Opkomst en Bloei van Amsterdam*, second edition, edited by A.L. Cosquino de Bussy and N. W. Posthumus (Amsterdam, 1944), p. 18; Ebbing, "Bier op transport...", pp. 39, 41; Ketner, *Handel en Scheepvaart van Amsterdam in de Vijftiende Eeuw*. 4; Pinkse, "Het Goudse Kuitbier...", p. 155; Smit, *De Opkomst van den Handel van Amsterdam*, pp. 29-31, 34, 115; Ter Gouw, *Geschiedenis van Amsterdam*, 1, p. 312.

¹⁸ H. G. Hamaker, ed., *De Rekeningen der Grafelijkheid van Holland onder Het Henegouwsche Huis* (Utrecht, 1875-1878), pp. 311, 318, 330; Smit, *De Opkomst van den Handel van Amsterdam*, pp. 35-35; Smit, "De Registers van den Biertol te Amsterdam," p. 5; Ter Gouw, *Geschiedenis van Amsterdam*, 5, pp. 499-503.

The continued sales of Hamburg beer can be explained only by the fact or at least the belief that it was of high quality and so deserved a greater sacrifice from the consumer. It tasted better and lasted longer. This higher quality also allowed Hamburg beer to compete effectively with wine. In Flanders the price of Hamburg beer was apparently about the same as that for good wine, especially after 1494 when the tax on Hamburg beer was raised. Despite that, beer still sold, supplanting wine to some degree. Where in the mid thirteenth century Flemish bourgeois drank wine at meals by the fifteenth century they had joined skilled artisans in preferring good quality beer. The poor and sick drank ale made with *gruit* while hopped beer consumption was a sign of status. One Flemish author in 1441 said so explicitly but other fifteenth and sixteenth century sources support the conclusion.¹⁹

As early as 1319 when the countess of Holland and Hainault visited the former, she and her household consumed an average of about 13 barrels of beer each week and about a third of that came from Hamburg. The drinkers were not just servants and lesser folk. Everyone in her court drank beer both then and in 1326-1327 and 1344-1345, years for which there are also records of court beer consumption. It does appear that in Dordrecht wine still played a more important role than beer. Wine along with salt was the most important trade good for that town and from 1304 the count had required that wine stay in the town 14 days before being allowed to move on, a term shortened to eight days in 1342. The presence of abundant quantities of wine at Dordrecht gave the drink a distinct advantage as did the presence of French wines at Middelburg in Zeeland, the import center in the Netherlands for that good. At least by the mid fourteenth century, and in some cases because of local conditions, the shift of preferences from wine to beer was still making its way southward through Holland. Centers of the wine trade, like Dordrecht, found themselves exchanging wine with other towns for beer,²⁰ and increasingly so over time. The expansion in the quantity and geographical range of beer consumption was aided by the increasing ability to produce hopped beer in Holland itself.

In the early fourteenth century when the count allowed brewers to make hopped beer in Holland and so opened the door to the development of a domestic hopped beer brewing industry he created a problem for the holders of *gruitrecht*. Brewers using hops stopped using *gruit* or at the very least decreased

¹⁹ Jan Craeybeckx, *Un grand commerce d'importation: Les vins de France aux anciens Pays-Bas (XIIIe-XVIe siècle)* (Paris, 1958), p. 2; Moulin, "Bière, houblon et cervoise," pp. 134, 137-138; Stefke, *Ein Städtisches Exportgewerbe Des Spätmittelalters...*, pp. xli-xlv.

²⁰ Niermeyer, "Dordrecht als handelsstad in de tweede helft van de veertiende eeuw," pp. 200-201; Rijswijk, *Geschiedenis van het Dordtsche Stapelrecht*, pp. 20, 36; Stefke, *Ein Städtisches Exportgewerbe Des Spätmittelalters...*, pp. xxiii-xxxiv, 58-60.

their use. When income from taxes on *gruit* declined the collectors of those taxes turned to the count for help. His first reaction was simply to outlaw the use of hops in the production of beer. Consumers turned to alternate sources of hopped beer and when imports from Hamburg began to erode the tax collectors' income he outlawed imports. Then, presumably because domestic production could not meet demand for hopped beer, he reversed that policy. He permitted imports but at the same time allowed and even promoted the production of hopped beer in Holland. His only condition, one insisted on by all holders of *gruitrecht*, was that there be no prejudice to the income from taxes on *gruit*. The language of grants to brew hopped beer was often explicit. The grants show a limited understanding of what brewing with hops meant and a limited tolerance for the difficulties of being a successful brewer. In all cases the primary goal was to protect the financial health of the count. In 1321 the count decreed that all brewers who made beer with hops in much of the province of Holland would have to pay the *gruiter* just as much as if the brewer had made the same quantity of beer with *gruit*. A local official, the burggraaf of Leiden, in the towns of Leiden and Delft followed with similar rulings in 1326, in both cases with the full support of the count and with a clear statement that the income from the brewing tax was not to diminish. The burggraaf had a special interest since half the income from the tax came to him.²¹

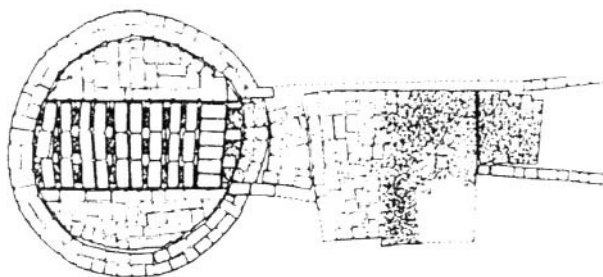
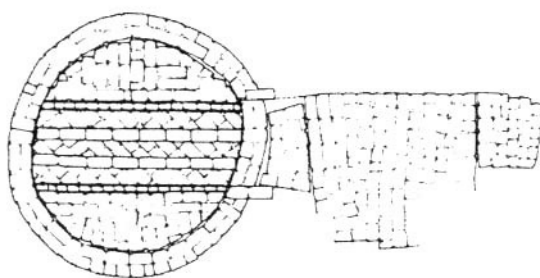
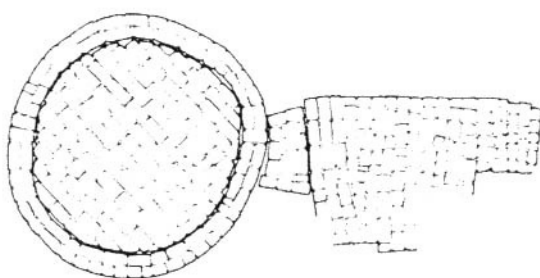
At first brewing hopped beer was limited to the winter months, a way perhaps to slow the changeover to hopped beer but also a way to improve beer supplies since the hopped beer lasted longer and so could be kept in reserve to supplement supplies of other beers in the summer. In Delft the *gruiter* even got a monopoly of the supply of hops, a monopoly broken in 1341 after brewers complained about the poor quality of his supplies. After that date, brewers could buy their hops anywhere, but of course had to pay tax on the beer they brewed. The fact that Count William IV set the tax on hops initially at one-fourth the tax on *gruit* suggests that the volume of hops used was four times that of the old additive.²² Medieval beers were typically heavily hopped, and that would have been especially true in the early days of adjusting to the new type of beer making.

²¹ Ackersdyck, "Het regt van de gruit," p. 193; Dick E. H. De Boer, *Graaf en Grafiek Sociale en economische ontwikkelingen in het middeleeuwse 'Noorholland' tussen ±1345 en ±1415* (Leiden, 1978), pp. 275, 285; Ebbing, "Bier op transport...," pp. 45-46; van Mieris, *Groot Charterboek der Graven van Holland...*, 2, pp. 391, 397; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #256; Smit, *De Opkomst van den Handel van Amsterdam...*, pp. 31-32.

²² van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 695-696; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 50-51, 87; Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, p. 77; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 37-38; Jensma, "Bronnen tot de geschiedenis van het recht van de gruit in het graafschap Holland..." p. 174; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #324.



3. Sketch of a brewery in operation from a manuscript of 1462, now in the archive of Kampen in the eastern Netherlands, with a mash tun on the left and a brew kettle on the right.
Source: G. A. Kampen.



4. Excavation of a fifteenth century base for a brewing kettle 2.5 meters in diameter. The levels are shown from the lowest at the top to the bottom which show the supports for holding a grate above the space for the kettle. Amersfoort, Kamp, number 82.

Source: Rijksdienst voor Oudheidkundig Bodemonderzoek, Amersfoort

A 1327 Haarlem agreement allowed brewers to use hops, that is if and only if they paid a fixed fee for each barrel of beer they made. There followed in the first half of the fourteenth century a series of grants to towns for their brewers to make hopped beer. Obviously it was the urban industry that wanted the right, the industry that had developed through the high Middle Ages. At Dordrecht brewers made hopped beer already in 1322. The new product they called *hoppenbier*, the old *ael*. At Haarlem hopped beer was made in 1324, at Gouda and Amersfoort and Kampen and Utrecht in 1325, at Delft and Leiden in 1326, at Alkmaar in 1333.²³

In 1392 the count of Holland went even further and granted both Haarlem and Gouda permission to brew something called Hamburg beer. Gouda then set down a bylaw governing the process. A Leiden document from the first half of the fifteenth century talks about beer brewed there in the style of Hamburg beer. When Dutch brewers first added hops to their beer, the results probably were not up to the level of what came from the more experienced brewers of north Germany. Some brewers even used both *gruut* and hops in the same brew, a way to decrease the risk of mistakes with the new additive. By the end of the fourteenth century, though, some Dutch brewers could match the imports. The decision to brew beer in the Hamburg style suggests that the imported beer remained strong competition for the local product at least through the fourteenth century.²⁴ Hamburg beer was always more expensive than domestic beer on the Amsterdam market as well as at Leiden. The higher price may have been caused by taxation, though, in 1371 at Dordrecht, for example, the tax on all beers with hops was set at the same level. In 1345 when the Count William IV of Holland was starting a campaign against his enemy, the Bishop of Utrecht, he ordered beer for his troops. Of that beer more than half, about 55%, came from Hamburg but over a quarter, about 30% was hopped beer from Haarlem. There were additional quantities of domestically produced hopped beer so, though Hamburg beer still was the preferred choice, close to two-fifths of the beer made with hops at that early date came from Dutch brewhouses.²⁵

²³ Ackersdyck, "Het regt van de gruit," p. 194; W. J. Alberts, "Bijdrage tot de geschiedenis der accijnzen te Arnhem in de middeleeuwen", *Tijdschrift voor Geschiedenis* 64 (1951), pp. 339, 340-341; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 18; R. van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," *Arca Lovaniensis jaarboek 1975* 4 (1975), p. 337.

²⁴ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," p. 57; L. M. Rollin Couquerque, and A. Meerkamp van Embden, *Rechtsbronnen der Stad Gouda* (The Hague, 1917), pp. 46-7; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 76; A. Swartelé, "Iets over de Geschiedenis van het Bier in de Nederlanden," *Fermentatio*, 3 (1961), p. 118.

²⁵ P. J. Blok, *Geschiedenis eener Hollandsche Stad*, 1, 205; Stefke, *Ein Städtisches Exportgewerbe Des Spätmittelalters...*, pp. 60-63; de Wal, "Accijnsbrief van Haarlem in 1274 door Floris V verleend of ontworpen," pp. 172-174.

Dutch brewers were slow to change to the new technology. The nature of hops and of brewing itself must have created some difficulties. Brewers may well have found there were technical problems in the making of hopped beer, technical problems which could be overcome only through experiment. Government restrictions on the industry and low levels of production in individual breweries limited experimentation by brewers. This latter was especially true in the early days of the adoption of hopped brewing when Hamburg beer offered consumers an excellent and proven alternative. The strong competition from imports must have dampened enthusiasm for trying the new kind of brewing but, more important, it must have decreased the chances brewers had to try out the new method and so make mistakes from which they could learn.

Dutch brewers at first had to import hops but from about 1325 they were grown near Kampen and also near Gouda and Breda. Some Holland farmers found that they could grow hops commercially, selling them to the increasing number of local brewers. By the fifteenth century hops typically came from the Land of Heusden near Gouda or from Brabant. The rise of hopped beer brewing was reflected in changes in farming in the Heusden district where the soil was especially suited to hops. The principal crop of the area in the second half of the thirteenth century was oats, largely used to feed animals. By 1391 if not earlier hops were being grown as a field crop, replacing grain. Areas under hops were always small, absolutely and relatively, but cultivation was intensive and many villagers had their own small hop gardens. By the 1420s at the latest farmers were making contracts to supply fixed amounts of hops on a regular basis to the nearby market at 's-Hertogenbosch. At about the same time, the lord of the district started charging for measuring quantities of hops which further suggests a rise in the volume of production. Hops were shipped along internal waterways for distribution to brewers in various towns. They went by ship to Delft and even to more distant Amsterdam but farmers could sell their product to brewers in Heusden itself.²⁶ Presumably convenient and plentiful supplies of hops helped the competitive position of Dutch brewers. As brewing expanded Dutch brewers went further afield and the southern Low Countries became a supplier of hops. Holland remained the biggest export market for hops from the south until around 1800 when Dutch brewers started turning to suppliers in England and the United States. Haarlem brewers had a guild by the early fifteenth century

²⁶ De Boer, *Graaf en Grafiek*, p. 279; P. C. M. Hoppenbrouwers, *Een Middeleeuwse Samenleving Het Land van Heusden (ca. 1360 — ca. 1515)* (Wageningen, 1992), pp. 255-260; Pinkse, "Het Goudse Kuitbier...", p. 120; Smit, "De Registers van den Biertol te Amsterdam," p. 51; R. van Uytven, "Oudheid en middeleeuwen," in *De economische geschiedenis van Nederland*, edited by J.H. van Stuijvenberg (Groningen, 1977), p. 40.

and one of its responsibilities was surveillance of the sale of hops. Guild officers had to approve hops before they went on the market and they also watched to be sure that no new hops which came on the market in the Fall were mixed with old hops, that is up until Christmas day. Quality of hops was clearly a problem as a 1340 dispute at Delft showed. The problem did not go away and even in 1643 the Holland government was regulating the packing of hops to stop adulteration.²⁷

Dutch brewers typically made their own malt. They had houses large enough, with floors often in the attic where the grain could be spread out. Drying the malt over a fire was mentioned as early as 1010 so presumably drying in kilns was common by the fourteenth century. Along with kilns came regulations, for example at Haarlem, to prevent fires. The malters themselves began to enclose the fires and so have ovens for drying, all for the sake of safety. After sieving, which separated the rootlets and unwanted portions from the malt, off it went to be milled. Brewers were concerned about milling not only because they feared that millers would steal some of their malt but also because the malt had to be ground properly.

Increasingly in the fourteenth century brewers were subject to regulations on the frequency of brewing and on what they could use to brew. The Gouda brewing bylaw of 20 April, 1366, limited brewing to twice a week. Three times a week was possible only with permission and if demand was especially high. The bylaw fixed a single brew at 13 barrels and laid down how much and what type of grain was to be used in each brew. Similar rules appeared at Delft between 1326 and 1340. There once brewers had reached the limit of how much the town would let them brew, they were allowed to let another brewer make beer for them so they could meet demand. At Haarlem 1407 bylaws set out the frequency of brewing, the grain proportions and the size of the brew. Delft followed Gouda later in regulating the total quantity of grain to be used in making a brew.²⁸ Brewers in general did retain freedom about the way in which they brewed and when during the year they could brew.

The introduction of hops may in fact have promoted the separation of the two tasks of mashing and boiling so that the herb could be added in the later

²⁷ Cornelis Cau, Simon van Leeuwen, Jacobus, Paulus and Isaac Schultus, eds., *Groot Placaatboek vervattende de Placaaten, Ordonnantien en Edicten van den Hoog Mog. Heeren Staaten Generaal der Vereenigde Nederlanden...* (The Hague, 1658-1770), 1, pp. 1202-1205; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 60-62; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 99; Swartelé, "Iets over de Geschiedenis van het Bier in de Nederlanden," p. 123.

²⁸ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 51-53; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 47-49, 55, 87-88, 90-91; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 23-25, 32; Pinkse, "Het Goudse Kuitbier...", p. 105.

stage and its role more carefully monitored. The separation of the two tasks made boiling not the phase for extracting vegetable matter but the phase for stopping the work of certain enzymes, of getting the most from the hops and of sterilizing the brew. The hops in some cases was lowered into the boiling wort in a sack which solved the problem of getting the hops out quickly. Haarlem brewers used something in the form of a hamper made of straw. A 1407 Haarlem bye-law prohibited the throwing of that straw into the town canals, to prevent pollution. Otherwise the wort was filtered to separate out the hops and other unwanted material. The strainer could be, in the simplest form, some twigs which could also give the beer some flavor, the exact flavor depending on the type of twigs used.²⁹

If brewers used two vessels then the wort was taken from the mash tun and boiled in a kettle. With repeated mashings each fraction was weaker than the previous one and could be boiled separately or in combination with some other fraction to adjust the strength of the final product to the desired or, in places with strict regulations, required levels. Water came typically from canals in the towns. At Haarlem a 1390 regulation suggests that brewers built a small scaffold-like arrangement off of their breweries. It directed the flow of water so that the right kind passed next to the brewery and also made it easier for the brewery workers to lift the water up into the brewery.³⁰

It appears that much of eighteenth century brewing practice was already in place by 1450. Though there were certainly changes over time, the essentials of equipment, raw materials and processes of beer making were, it seems, present in Holland breweries in the fifteenth century and would remain much the same for at least three hundred years. Already even in the fourteenth century commercial Dutch brewers typically used copper kettles. Though English ale makers are said to have used lead vessels, it appears that Dutch brewers never had to try that alternative. Dutch brewers often added a second kettle which with multiple mashings of the same malt implied a sharp increase in efficiency. It also implied a dramatic increase in investment. The rest of the equipment of cooling troughs and barrels remained much the same as before. The sources for information on brewing technology around 1400 are sparse, though better than before that period. The introduction of hops, the great technical change in the making of beer in fourteenth century Holland, does not seem to have upset

²⁹ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. vi, x-xi; 53, 63; J. S. Hough, *The Biotechnology of Malting and Brewing* (Cambridge, 1985), pp. 87-88; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 26; Nordlund, *Brewing and Beer Traditions in Norway*, pp. 227-228; Matti Räsänen, *Von Halm zum Fass. Die volkstümlichen alkoholarmen Getreidegetränke in Finnland* (Helsinki, 1975), p. 146.

³⁰ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 58-59; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 27-29.

brewing practice. The similarity of the use of *gruit* and hops contributed to the continuing similarity in practice. It was the growing scale of production and the higher levels of investment that went along with that growth which gradually made inroads into brewing techniques in the fourteenth and fifteenth centuries. The use of hops, copper kettles and brick ovens on which to set those ever larger kettles along with greater investment undoubtedly combined to increase specialization in production and in production methods.³¹ The stages of the process of beer making were separated more sharply, as were the tasks for workers in the brewery. The records of taxes levied on brewing indicate the technological changes that prevailed in the industry, both the change to hops and the expansion of production associated with greater investment. The taxation policy of the counts of Holland left no room for confusion. The taxes on hops and on *gruit* were collected side-by-side through the fourteenth century. Even the institution for collecting the tax typically remained the same. Brewers had to go to the *gruithuis* to pick up their hops or simply to pay the tax due, even if they bought the hops elsewhere. Many brewers obviously still made *ael* as the Dordrecht bylaw called it and so there was still an income from holding the right to sell *gruit*. At Leiden in 1343-1344 the tax on *gruit* brought in some four and a half times as much as the tax on hops and in the following tax year almost eight times as much.³² Over time, however, the tax on *gruit* gradually disappeared. Complaints about the success of hopped beer, which began around 1300 were to be repeated through the next one hundred years. At town after town a new tax, a *hoppegeld*, was added to the *gruitgeld* due from brewers. One potential advantage was that monasteries or other institutions which enjoyed freedom from the *gruit* tax might have to pay the new one. By the 1470s *gruit* had largely disappeared from tax rolls both at Gouda and at Delft while it was still used extensively in Leiden. The rapid adoption of hops was, it appears, associated with levels of export. The more beer sold at a distance the more hops were used. At Delft by the opening years of the fifteenth century there were few mentions of *gruitgeld*. The explanation offered by the tax collector in 1437 was that one did not brew with *gruit* any more. Most authorities, however, kept the tax

³¹ G. Boeknoogen and F. Snieder, "Bierbrouwen in middeleeuws Amersfoort", *Stichting Archaeologie Amersfoort* (March, 1998); Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 44-45, 58; Christopher Dyer, *Standards of Living in the Later Middle Ages Social change in England c. 1200-1520* (Cambridge, 1989), p. 172; Richard J. Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," Unpublished Doctoral Dissertation, The University of Chicago, March 1992, pp. 267-268.

³² G. A. Dordrecht, *Archief der Gemeente Dordrecht*, #5, fol. 153r-v; Hamaker, *De Rekeningen der Grafelijkheid van Holland onder Het Henegouwsche Huis*, 2, pp. 19, 125; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #230.

on *gruit* going by farming it at a fixed sum or by combining it in some way with other taxes on beer.³³

Another way around the technical change was to convert the *gruit* tax to one on beer of any type based only on quantity, not on type or additive. When in 1402 Albert of Bavaria, the Count of Holland, surrendered his right to the annual income from *gruit* to the town of Rotterdam to cover an outstanding loan, he did so easily. The value of it was undoubtedly falling. The tax collector at Gouda commented in his accounts in 1468-1469 that the tax on *gruit* used to bring a sizeable sum but it has not for many years because "*gruytebier*" was not produced there anymore. On the other hand, the income from the tax on hopped beer had risen steadily since around 1360. In Holland, the tax disappeared from the records at Leiden after 1501 and it was not until 1559 that Alkmaar and Amsterdam bought that right from the monarch, in both cases for a lump sum. Delft bought the right from the holders who in turn had bought it from the successors of the count in 1660 and by then, though the word *gruit* was used, it certainly meant a tax on hopped beer.³⁴

Towns in Holland also added to their taxes higher levies on beers from elsewhere to promote their own industries. The first signs of protection of local brewing appeared soon after the adoption of hopped brewing. One reason was the potential for expansion of local brewing. Another, and probably more pressing, was the great success of certain towns such as Delft, Gouda, Haarlem and Amersfoort in producing hopped beer which flooded the Holland market and threatened, in the first instance, local producers in other Holland towns. In 1331 there was a *biertol* at the harbor of Schiedam and Prussian and Westphalian merchants faced a toll on beer imports at Dordrecht from 1340. In the 1350s when the count of Holland codified tariffs of various tolls existing levies on beer imports were retained. He was pursuing the consistent policy of promoting the income of his office. Thirty years after his previous attempt to close the Dutch market, domestic production capacity was, it appears, large enough to make such a policy, especially with some minor loopholes, feasible. Albert of Bavaria in 1377 for the welfare and benefit of the residents of South Holland said that henceforth no beer could be sold there which had not been brewed

³³ De Boer, "Delft Omstreeks 1400," p. 96; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 19; A. J. Vis, "Iets over Delftse accijnzen in de 15e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #198 (1945), pp. 9-10; De Vries, "Enige opmerkingen naar aanleiding van de Zutphense gruit," pp. 64-65.

³⁴ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 57, 203-204; Jensma, "Bronnen tot de geschiedenis van het recht van de gruit...," pp. 174-176, 202; H. van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen; mitsgaders Willekeuren, Costumen, Ordonnantien en Handelingen der Stad Amstelredam...* (Amsterdam, 1748), pp. 185-186.

there, with the exception of beer imported from overseas which had paid import duties. In 1420 the then Count of Holland, John of Bavaria, would repeat that purely protectionist legislation, saying that no beer could be sold anywhere in Holland or Zeeland that was not brewed in either of those two counties.³⁵

While the counts might be willing to make exceptions on imports if it meant some improvement in their incomes, towns were more likely to be strictly protectionist. At Dordrecht in 1324 only beer brewed in the town could be sold in the town. The ban of imports was taken by towns not only as an advantageous economic policy but also as a sign of their political independence from their lords. The count did on at least one occasion try to counteract protectionist tendencies when in 1411 William VI ordered that no town in Holland or Zeeland could levy any tax on imports from Delft over and above what they charged their own citizens. Beer was specifically the target.³⁶ The rule seemed to address an established problem and seems to have had only partial success. The grant would be a bone of contention and a precedent for exporting towns up to the Dutch Revolt.

Because authorities retained the old tax in some cases long after hops had come to dominate the technology of beer making and because in some cases they rolled the old tax into the hop tax, as for example at Delft,³⁷ it is often difficult to tell how long brewers added *gruit* to beer. Still the general pattern of change in taxes in a number of towns suggests that *gruit* remained in widespread use until the closing years of the fourteenth century and from then on it was rapidly swamped by the use of hops. The production data on hopped and *gruit* beer come from accounts on taxes on those two additives. Tax figures exist for *gruitgeld* and *hoppegeld* for a number of Holland towns and for Zutphen and Deventer in the eastern part of the Netherlands for the fourteenth and fifteenth centuries.³⁸ To deal with the many gaps in the data and to make the data comparable across towns and across time, the average of tax income was taken for the period 1380-1409 and that was used as a standard. Each surviving figure was divided by the

³⁵ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 61; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #309, #317, #441, #552.

³⁶ van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 697-699; A. van Vollenhoven, *Ambachten en Neringen in Dordrecht* (The Hague, 1923), pp. 3-4.

³⁷ van Bleyswijck, *Beschryvinge der Stadt Delft*, p. 696.

³⁸ A. R. A., The Hague, Archief van de Grafelijkheids-Rekenkamer of Rekenkamer der Domeinen van Holland, 197-424, 343-416, 1489-1499, 1696-1826, 5640-5673; G. A. Gouda, *Aanteekeningen v. d. Poest Clement, Hopaccijn 1360-1584*; De Boer, *Graaf en Grafiek*, pp. 273-294; G.M. De Meyer, ed., *De Stadsrekeningen van Deventer* (Groningen, 1968-1979); R. Wartena, *De Stadsrekeningen van Zutphen 1364-1455/6* (Zutphen, 1977).

Table II-1
Income from Taxes on Gruit and Hops
Average 1380-1409 = 100

Year	Zutphen		Delft		Gouda		Leiden		Schoonhoven		Rotterdam	Schiedam	Gouda
	Beer	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Hops
1343	.	.	1948.56	34.30	.	.	.	.	.	.	.	.	.
1344	.	.	2303.48	66.22	.	.	.	.	.	.	.	.	.
1345
1346	.	.	1391.83	57.94	.	.	.	.	.	.	.	.	.
1347
1348
1349
1350	.	.	.	39.21	.	.	.	.	.	.	.	.	.
1351	.	.	.	110.37	.	.	.	.	.	.	.	.	.
1352	.	.	.	110.37	.	.	85.44	.	.	.	178.22	677.14	.
1353	.	.	.	60.74	.	.	66.72	.	.	.	73.66	296.25	.
1354	.	.	.	88.95	.	.	102.53	1.76	.	.	350.22	490.93	.
1355	.	.	27.84	93.27	.	.	.	.	.	.	361.52	600.96	.
1356	418.19	.	.	.	42277.4	.	.	.	.
1357	.	.	.	96.57	357.73	.	98.93	19.62	67808.2	.	437.78	541.71	.
1358	.	.	.	109.35	579.42	.	110.86	21.22	93493.2	.	460.37	414.75	.
1359	.	.	.	33.11	385.44	44.28	127.91	16.39	42123.3	.	282.44	414.75	.
1360	.	.	.	55.19	.	.	102.33	13.06	.	.	282.44	355.50	45.14
1361	.	.	.	55.19	146.14	47.22	127.91	26.12	93493.2	.	282.44	304.71	.
1362	.	.	.	63.46	125.96	66.99	110.86	52.23	61643.8	.	245.72	177.75	64.12
1363	.	.	.	60.15	113.36	53.92	95.51	52.23	22602.7	72.69	228.77	135.51	68.29
1364	.	.	.	48.57	100.77	89.86	148.39	97.94	39041.1	83.57	299.38	203.14	54.96
1365	.	.	24.36	55.19	158.71	80.06	143.26	78.35	41609.6	88.11	240.07	203.14	91.61
1366	81.61
1367	183.90	99.01	.	.	22602.7	63.77	.	.	.
1368	214.13	127.60	.	.	12339.0	89.04	.	.	100.93
1369	232.02	163.22	.	.	205.48	92.93	.	.	130.08
1370	.	.	1531.01	12.69	176.72	55.55	100.64	19.59	4109.59	109.00	231.60	101.57	166.39
1371	.	.	904.69	10.49	289.71	74.66	102.35	39.21	205.48	60.04	333.28	118.50	75.62
1372	.	.	974.28	16.56	251.92	37.58	151.79	69.05	205.48	34.52	285.26	135.51	76.12
1373	51.95	.	.	.	272.07	66.17	.	.	205.48	54.50	.	.	38.31
1374	.	.	278.37	25.39	377.88	74.83	153.49	49.00	297.95	50.14	152.52	93.11	67.46
1375	.	.	278.37	35.32	292.35	64.07	119.38	52.23	236.30	78.12	112.97	135.43	76.28
1376	.	.	278.37	28.70	335.48	95.58	136.46	39.18	.	.	112.97	93.19	56.30
1377	338.03	102.28	.	.	4232.88	85.51	.	.	76.45
1378	.	.	278.37	62.39	.	.	175.77	58.96	.	.	87.61	76.18	.
1379	62.01	.	.	.	.	.	.	.	.	.	.	.	.

1380	62.67	.	278.37	81.14	116.16	107.51	131.58	65.29	205.48	98.43	121.62	93.11	.
1381	70.42	43.07	278.37	82.78	.	.	163.76	94.94	.	.	124.50	84.64	109.59
1382	63.00	40.34	278.37	70.64	131.12	105.90	167.14	62.03	102.74	101.86	124.50	76.18	.
1383	.	.	.	.	136.34	74.20	.	.	102.74	85.48	.	.	107.93
1384	73.55	47.86	278.37	64.02	221.69	89.86	144.97	65.29	61.64	103.83	121.45	101.57	75.62
1385	.	.	34.80	70.09	217.11	100.66	122.81	84.91	51.37	92.93	101.68	84.64	91.61
1386	73.88	47.72	288.80	95.50	96.01	82.36	136.44	101.21	51.37	87.20	104.50	84.64	.
1387	79.82	47.59	219.91	101.54	125.96	95.58	119.38	137.12	513.70	87.37	107.33	67.80	.
1388	.	.	27.84	109.82	.	.	85.27	173.06	.	.	79.08	101.57	97.44
1389	87.24	68.37	.	.	151.30	102.79	.	.	51.37	90.98	.	.	.
1390	.	.	.	.	108.53	99.19	.	.	51.37	94.49	.	.	104.76
1391	84.10	94.63	22.27	101.61	73.06	92.66	47.77	130.59	51.37	134.73	56.49	245.46	101.10
1392	101.42	90.94	.	.	100.92	104.26	.	.	51.37	124.45	.	.	94.44
1393	101.42	99.14	16.70	90.53	60.86	77.14	85.29	107.77	51.37	92.76	93.20	101.57	106.26
1394	113.13	121.70	12.53	125.28	65.70	78.42	93.82	130.62	51.37	110.97	98.85	177.83	78.61
1395	113.13	101.19	10.44	126.45	70.74	85.46	86.98	111.00	51.37	94.58	101.68	110.04	79.95
1396	.	.	11.83	115.37	90.89	90.21	75.04	133.85	51.37	96.45	112.97	67.71	87.11
1397	.	.	12.53	129.17	65.58	96.74	73.34	130.59	.	90.85	101.68	67.71	91.94
1398	118.41	.	12.53	128.03	93.21	102.30	73.35	114.26	.	112.66	101.68	67.71	98.60
1399	112.63	115.55	12.53	136.41	.	.	93.80	107.73	.	.	112.97	67.80	139.07
1400	111.64	117.87	12.53	138.03	.	.	88.68	88.15	.	.	115.80	.	.
1401	116.43	128.13	.	.	.	.	.	.	.	.	.	.	.
1402	118.08	138.11	17.40	36.98	.	.	112.56	58.76	.	.	.	.	.
1403	112.47	160.27	17.40	.	.	.	114.27	52.27	.	.	101.68	.	.
1404	.	.	281.85	.	83.51	114.69	105.74	55.50	.	.	59.34	.	.
1405	110.16	140.44	139.88	20.50	68.04	118.22	93.80	65.29	.	.	33.92	.	93.60
1406	108.35	127.04	27.14	.	38.24	115.86	88.68	130.59	.	.	177.96	.	99.93
1407	109.99	127.99	.	.	35.65	128.12	.	.	.	.	.	.	103.93
1408	102.41	134.69	7.66	131.43	49.38	137.89	52.89	104.50	.	.	76.51	.	114.92
1409	155.68	107.35	.	144.67	.	.	42.64	94.68	.	.	70.61	.	123.58
1410	97.30	109.67	.	121.96	.	.	28.99	166.53	.	.	90.38	.	.
1411	82.46	99.82	.	133.55	.	.	28.99	166.53	.	.	104.50	.	.
1412	115.77	126.63	.	134.66	.	.	25.60	192.62	.	.	98.85	.	.
1413	.	.	.	33.68	.	.	23.94	166.56	.	.	104.50	.	.
1414	118.90	151.92	.	36.53	.	.	25.60	195.88	.	.	98.85	68.56	.
1415	85.92	122.52	.	28.75	.	.	33.26	97.94	.	.	93.20	.	.
1416	80.31	125.94	.	.	.	.	.	.	.	.	.	.	.
1417	.	.	.	27.59	.	.	27.46	65.29	.	.	.	.	.
1418	.	.	.	19.87	.	.	.	.	.	.	.	.	.
1419	88.06	117.33	.	78.04	.	.	25.58	65.29	.	.	.	.	.
1420	88.06	156.57	.	17.16	.	.	.	13.06	.	.	.	.	.
1421	98.29	156.57	.	.	.	.	.	.	.	.	.	.	.
1422	.	.	.	.	.	.	.	.	.	.	.	.	.
1423	.	.	.	.	.	.	.	.	.	.	.	.	.
1424	84.93	159.45	.	.	1889.78	.	.	.	.	.	.	.	.
1425	93.34	179.55	.	.	.	.	32.57	97.94	.	.	.	.	109.93

<i>Year</i>	<i>Zutphen</i>		<i>Delft</i>		<i>Gouda</i>		<i>Leiden</i>		<i>Schoonhoven</i>		<i>Rotterdam</i>	<i>Schiedam</i>	<i>Gouda</i>
	Beer	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Hops
1426	82.46	180.50	.	36.42	.	.	.	78.35	.	.	.	.	.
1427	85.75	167.51	.	32.56	.	.	.	68.56	.	.	.	.	.
1428	.	.	.	44.70	.	.	.	61.70	.	.	.	.	.
1429	84.10	177.77	.	.	.	.	.	.	.	.	.	.	.
1430	88.23	208.54	.	106.51	.	.	.	.	.	.	.	.	.
1431	82.46	195.55	.	88.90	.	.	.	160.33	.	.	.	.	.
1432	82.46	200.74	.	82.81	.	.	.	157.19	.	.	.	.	.
1433	.	.	.	45.84	.	.	.	176.75	.	.	.	.	.
1434	88.56	208.81	.	21.62	.	.	.	180.86	.	.	.	.	.
1435	88.39	191.44	.	191.53	.	.	.	186.38	.	.	.	.	.
1436	89.05	191.44	.	190.43	.	.	.	182.89	.	.	.	.	.
1437	.	.	.	151.86	.	.	.	222.32	.	.	.	.	.
1438	103.89	227.13	.	137.44	.	.	.	189.48	.	.	.	.	.
1439	105.54	231.24	.	139.63	.	.	.	156.70	.	.	.	.	.
1440	.	.	.	149.04	.	.	.	235.06	.	.	.	.	.
1441	97.30	217.43	.	152.33	.	.	.	258.04	.	.	.	.	.
1442	103.23	232.47	.	145.20	.	.	.	225.39	.	.	.	.	.
1443	980.39	219.20	.	172.24	.	.	.	186.09	.	.	.	.	.
1444	98.95	227.00	.	188.76	.	.	.	186.48	.	.	.	.	.
1445	.	.	.	189.87	.	47.38	.	195.88	.	.	.	.	.
1446	.	.	.	192.13	.	49.50	.	199.28	.	.	.	.	48.30
1447	.	.	.	195.44	.	54.41	.	214.82	.	.	.	.	50.47
1448	.	.	.	187.08	.	57.18	.	215.47	.	.	.	.	55.46
1449	.	.	.	88.35	.	.	.	179.56	.	.	.	.	58.29
1450	.	.	.	.	.	.	.	.	.	.	.	.	.
1451	.	.	.	.	.	.	.	107.73	.	.	.	.	.
1452	.	.	.	.	.	.	.	215.47	.	.	.	.	.
1453	.	.	.	.	.	.	.	218.96	.	.	.	.	.
1454	.	.	.	.	.	.	.	218.96	.	.	.	.	.
1455	.	.	.	.	.	.	.	208.94	.	.	.	.	.
1456	.	.	.	.	.	.	.	.	.	.	.	.	.
1457	.	.	.	.	.	.	.	.	.	.	.	.	.
1458	.	.	.	.	.	.	.	.	.	.	.	.	.
1459	.	.	.	.	.	.	.	.	.	.	.	.	.
1460	.	.	.	.	.	.	.	.	.	.	.	.	.
1461	.	.	.	.	.	.	.	.	.	.	.	.	.
1462	.	.	.	.	.	.	.	.	.	.	.	67.71	.
1463	.	.	.	.	.	.	.	.	.	.	.	60.77	.
1464	.	.	.	.	.	.	.	.	.	.	.	101.57	.
1465	.	.	.	.	.	61.92	.	.	.	.	.	186.21	.
1466	.	.	.	.	.	385.90	.	.	.	.	.	304.71	66.46
1467	.	.	.	.	.	391.13	.	.	.	.	.	271.53	.
1468	.	.	.	.	.	130.54	.	.	.	.	.	212.45	393.40

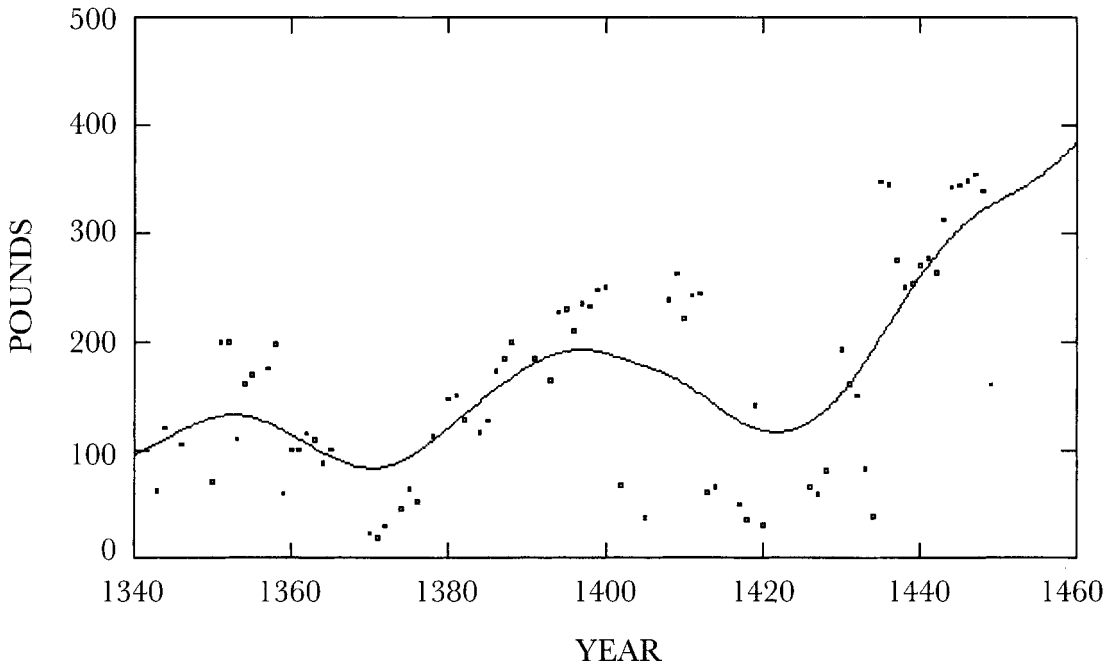
1469	.	.	.	.	.	130.54	.	.	.	.	.	398.73
1470	.	.	.	.	.	176.94	.	.	.	.	161.33	399.40
1471	.	.	.	.	.	304.15	.	.	.	.	143.89	414.72
1472	.	.	.	.	.	382.49	.	.	.	.	221.59	364.76
1473	.	.	.	.	.	422.83	.	.	.	.	187.57	586.28
1474	.	.	.	.	.	441.29	.	.	.	.	228.87	433.04
1475	.	.	.	.	.	454.19	.	.	.	.	211.95	451.87
1476	.	.	.	.	.	441.78	.	.	.	.	279.32	453.03
1477	.	.	.	.	.	364.01	.	.	.	.	279.32	451.37
1478	.	.	.	.	.	456.66	.	.	.	56.49	279.32	373.08
1479	.	.	.	.	.	389.56	.	.	.	.	.	422.88
1480	.	.	.	.	.	285.60	.	.	.	180.76	203.65	397.07
1481	.	.	.	.	.	282.01	.	.	.	180.76	186.21	291.14
1482	.	.	.	.	.	288.82	.	.	.	180.76	186.21	287.48
1483	.	.	.	.	.	287.24	.	.	.	180.76	186.21	294.30
1484	.	.	.	.	.	215.19	.	.	.	180.76	203.14	293.80
1485	.	.	.	.	.	277.92	.	.	.	180.76	203.14	219.35
1486	.	.	.	.	904.80	294.08	.	.	.	180.76	203.14	283.31
1487	.	.	.	.	.	263.87	.	.	.	180.76	203.14	.
1488	.	.	.	.	.	143.94	.	.	.	180.76	203.14	.
1489	.	.	.	.	.	232.16	.	114.39	.	45.19	203.14	.
1490	.	.	.	.	.	154.58	.	235.06	.	45.19	203.14	.
1491	.	.	.	.	.	142.49	.	245.31	.	45.19	203.14	140.57
1492	.	.	.	.	.	142.49	.	192.75	.	112.97	203.14	145.24
1493	.	.	.	.	.	242.75	.	202.54	.	138.39	203.14	247.34
1494	.	.	.	.	.	295.88	.	238.94	.	138.39	203.14	301.63
1495	.	.	.	237.30	.	221.71	.	238.91	.	245.72	203.14	84.28
1496	.	.	.	237.85	.	295.72	.	212.20	.	245.72	246.31	301.47
1497	.	.	.	249.44	.	185.45	.	215.47	.	223.13	246.31	301.47
1498	.	.	.	237.85	.	247.36	.	215.47	.	237.25	246.31	252.17
1499	.	.	.	249.44	.	206.84	.	261.17	.	237.25	270.86	252.17
1500	.	.	.	267.65	.	206.84	.	235.06	.	220.30	270.86	281.15
1501	.	.	.	251.09	.	274.31	.	251.38	.	164.10	270.86	281.15
1502	.	.	.	250.54	.	272.84	.	264.44	.	169.63	305.56	278.15
1503	.	.	.	245.57	.	150.31	.	293.82	.	234.42	305.56	278.15
1504	.	.	.	237.85	.	300.62	.	293.82	.	225.95	305.56	306.46
1505	.	.	.	.	.	300.62	.	293.82	.	56.77	160.99	306.46
1506	.	.	.	222.95	.	162.56	.	.	.	232.02	.	306.46
1507	.	.	.	221.29	.	325.12	.	.	.	240.07	.	331.45
1508	.	.	.	221.84	.	325.12	.	.	.	178.36	.	331.45
1509	.	.	.	220.74	.	335.25	.	.	.	200.53	.	331.45
1510	.	.	.	242.82	.	345.55	.	.	.	200.53	.	352.27
1511	.	.	.	224.05	.	345.55	.	.	.	203.35	.	352.27
1512	.	.	.	.	.	338.21	.	.	.	203.35	.	352.27
1513	.	.	.	.	.	331.01	.	.	.	203.35	.	337.44
1514	.	.	.	.	.	332.15	.	.	.	203.35	.	337.44

<i>Year</i>	<i>Zutphen</i>		<i>Delft</i>		<i>Gouda</i>		<i>Leiden</i>		<i>Schoonhoven</i>		<i>Rotterdam</i>	<i>Schiedam</i>	<i>Gouda</i>
	Beer	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Gruit	Hops	Hops
1515	333.29	.	143.87	.	.	183.58	.	339.77
1516	343.42	.	228.66	.	.	183.58	.	339.77
1517	353.55	.	293.82	.	.	169.94	.	360.43
1518	356.49	.	293.82	.	.	135.85	.	360.43
1519	359.43	.	293.82	.	.	135.85	.	366.42
1520	343.59	.	270.97	.	.	101.88	.	366.42
1521	327.74	.	270.97	.	.	160.99	.	334.11
1522	306.83	.	270.97	.	.	160.99	.	334.11
1523	268.27	.	19.91	.	.	160.99	.	270.99
1524	299.96	.	235.06	.	.	48.47	.	298.30
1525	312.23	.	241.59	.	.	50.84	.	313.29
1526	315.65	.	241.59	.	.	50.84	.	321.79
1527	313.20	.	241.59	.	.	50.84	.	321.79
1528	310.75	.	261.17	.	.	50.84	.	316.79
1529	294.59	.	261.17	.	.	50.84	.	316.79
1530	278.56	.	261.17	.	.	50.84	.	283.98
1531	266.81	.	284.03	.	.	53.66	.	283.98
1532	255.20	.	284.03	.	.	53.66	.	260.16
1533	255.85	.	284.03	.	.	53.66	.	260.16
1534	236.90	.	303.62	.	.	53.66	.	224.85
1535	245.07	.	303.62	.	.	53.66	.	224.85
1536	253.24	.	303.62	.	.	53.66	.	258.16
1537	271.39	.	.	.	.	316.33	.	258.16
1538	304.07	.	.	.	.	316.33	.	295.14
1539	243.45	.	.	.	.	316.33	.	231.51
1540	246.70	.	.	.	.	268.32	.	251.50
1541	251.78	.	.	.	.	268.32	.	256.66
1542	265.82	.	.	.	.	268.32	.	270.99
1543	249.50	.	.	.	.	355.87	.	254.33
1544	208.80	.	.	.	.	355.87	.	212.86
1545	226.79	.	.	.	.	355.87	.	231.18
1546	146.08	.	.	.	.	378.47	.	148.90
1547	12044.3	195.24	.	.	.	.	378.47	.	199.03
1548	3622.62	202.12	.	430.94	.	.	378.47	.	206.03
1549	12376.9	200.63	.	430.94	.	.	341.75	.	204.53
1550	11444.8	190.39	.	430.94	.	.	341.75	.	194.04
1551	11507.7	186.60	.	597.76	.	.	341.75	.	190.21
1552	9867.99	159.98	.	934.29	.	.	341.75	.	163.06
1553	7681.32	124.50	.	783.52	.	.	341.75	.	126.92
1554	6777.18	109.81	.	783.52	.	.	341.75	.	111.93
1555	6535.08	105.89	.	610.95	.	.	273.96	.	107.93
1556	7494.39	1215.75	.	620.71	.	.	273.96	.	123.92
1557	5108.96	83.99	.	594.56	.	.	273.96	.	85.61

1558	.	.	.	.	7489.61	121.40	.	639.91	.	.	240.07	.	123.75
1559	.	.	.	.	7429.15	120.42	.	780.68	.	.	240.07	.	122.75
1560	.	.	.	.	7635.72	123.70	.	835.96	.	.	240.07	.	126.08
1561	.	.	.	.	7779.32	126.13	.	836.28	.	.	350.22	.	128.58
1562	.	.	.	.	7340.97	118.96	.	835.79	.	.	350.22	.	121.25
1563	.	.	.	.	8472.10	125.01	.	809.87	.	.	350.22	.	127.42
1564	.	.	.	.	6958.06	112.74	.	731.49	.	.	327.63	.	114.92
1565	.	.	.	.	6030.99	97.72	.	666.19	.	.	327.63	.	99.60
1566	.	.	.	.	5680.82	92.01	.	659.66	.	.	327.63	.	93.77
1567	.	.	.	.	5867.24	95.10	.	656.50	.	.	327.63	.	96.94
1568	.	.	.	.	5585.09	90.52	.	688.95	.	.	327.63	.	92.27
1569	.	.	.	.	5028.34	81.53	.	760.80	.	.	327.63	.	83.11
1570	.	.	.	.	5272.70	85.46	.	885.22	.	.	338.92	.	87.11
1571	.	.	.	.	5323.09	86.27	.	414.61	.	.	338.92	.	87.94
1572	.	.	.	.	2881.98	46.73	.	829.23	.	.	338.92	.	47.63
1573	.	.	.	.	1483.81	24.03	.	414.61	.	.	330.62	.	.
1574	.	.	.	.	1254.57	20.26	.	277.99	.	.	330.62	.	.
1575	.	.	.	.	1209.22	19.61	.	134.31	.	.	330.62	.	.
1576	.	.	.	.	896.84	14.54	.	326.47	.	.	186.41	.	79.95
1577	.	.	.	.	1143.72	18.48	.	134.05	.	.	.	.	18.82
1578	.	.	.	.	1108.45	17.97	.	156.93	.	.	.	.	.
1579	.	.	.	.	1294.87	20.94	.	163.23	.	.	.	.	39.64
1580	.	.	.	.	1753.37	28.43	.	163.23	.	.	.	.	.
1581	.	.	.	.	629.80	21.57	.	163.23	.	.	.	.	39.31
1582	.	.	.	.	.	30.40	.	215.47	.	.	.	.	24.82
1583	.	.	.	.	.	.	.	215.47	.	.	.	.	24.82
1584	.	.	.	.	.	28.10	.	215.47	.	.	.	.	24.82
1585	.	.	.	.	.	28.10	.	339.53	.	.	.	.	28.65
1586	.	.	.	.	.	28.10	.	339.53	.	.	.	.	.
1587	.	.	.	.	.	28.59	.	339.53	.	.	.	.	.
1588	.	.	.	.	.	28.59	.	496.23	.	.	.	.	.
1589	.	.	.	.	.	28.59	.	496.23	.	.	.	.	.
1590	.	.	.	.	.	23.20	.	496.23	.	.	.	.	.
1591	.	.	.	.	.	23.20	.	620.29	.	.	.	.	.
1592	.	.	.	.	.	23.20	.	620.29	.	.	.	.	.
1593	.	.	.	.	.	26.14	.	620.29	.	.	.	.	.
1594	.	.	.	.	.	26.14	.	528.88	.	.	.	.	.
1595	.	.	.	.	.	26.14	.	528.88	.	.	.	.	.
1596	.	.	.	.	.	26.96	.	528.88	.	.	.	.	.
1597	.	.	.	.	.	26.96	.	476.64	.	.	.	.	.
1598	.	.	.	.	.	26.96	.	476.64	.	.	.	.	.

Sources: A. R. A. Archief van de Grafelijkheids-Rekenkamer of Rekenkamer der Domeinen van Holland, #1696-1826, #197-264; G. A. Gouda, Aantekeningen A. v. d. Poest Clement; Dick E. H. De Boer, *Graaf en Grafiek Sociale en economische ontwikkelingen in het middeleeuwse 'Noordholland' tussen ±1345 en ±1415* (Lciden, 1978), pp. 276, 282, 287, 289, 292; R. Wartena, *De Stadsrekeningen van Zutphen 1364-1455/6* (Zutphen, 1977).

Figure II-1

Hop Tax Income at Delft, 1343-1460

Source: Dick E. H. De Boer, *Graaf en Grafiek Sociale en economische ontwikkelingen in het middeleeuwse 'Noorholland' tussen ± 1345 en ± 1415* (Leiden, 1978), p. 276

average from that series for those 30 years and that yielded an index of the tax income for the entire period covered by surviving data.

Though the tax data indicate the shift in technology and the change to a new type of beer they do not necessarily show in absolute terms the volume of production. Since all of the taxes were typically farmed the income from the tax indicates expectations of hops or *gruit* sales rather than the exact amount. Total annual production of the three biggest producing towns, Gouda, Delft and Haarlem, may have already reached more than 11,000,000 litres at some point during the fourteenth century.³⁹ Though the income from the farm of the taxes may at best be only a surrogate for production figures still the data indicate trends in the development of the industry.

³⁹ Florike Egmond, "De Strijd om het dagelijks bier Brouwerijen, groothandel in bier en economische politiek in de Noordelijke Nederlanden tijdens de zestiende eeuw," in *Ondernemers en Bestuurders Economie en Politiek in de Noordelijke Nederlanden in de Late Middeleeuwen en Vroegmoderne Tijd* edited by Clé Lesger and Leo Noordegraaf (Amsterdam, 1999), p. 159.

At Delft, for example, production grew in the 1350s until 1359 when civil war led to a siege of the town. Fighting followed by heavy taxes and then a visit by the Black Plague in 1369 all combined to handicap the local economy for much of the rest of the century. From about 1400 production seems to have been relatively stable. Since such a large proportion of sales were outside of the town sharp variations in the returns from the hop tax would be expected and there were some sudden increases on occasion. There was a fall off in production in the years from 1437 to 1440 which can be explained by troubles in the local textile industry created by difficulties in the English export market. It appears that when employment in the textile sector rose, beer consumption went up.⁴⁰ One of the impressive things about the record of tax income is its wide variation from year to year. Even so, the long term trend at Delft, despite the fluctuations, was up.

At Gouda there was a rapid rise in tax income in the 1360s, possibly from success in replacing declining production at Delft. It may also have been a result of improvements in local waterways which made transportation easier. The rise then was interrupted by the Plague of 1369 and floods in 1374 and 1375. After that, production rose steadily with only some minor temporary setbacks.

At Leiden, production of *gruit* beer seems to have continued and at high levels longer than elsewhere. A large share of output was for local consumption in that industrial town and so the beer did not need to travel far. From around 1390 beer output tended to fall off partly because of imports from other towns replacing local production. In a number of smaller towns like Schiedam and Rotterdam, production also seems to have fallen as beers from Gouda, Haarlem and Delft took over at least the market for more expensive beer.⁴¹

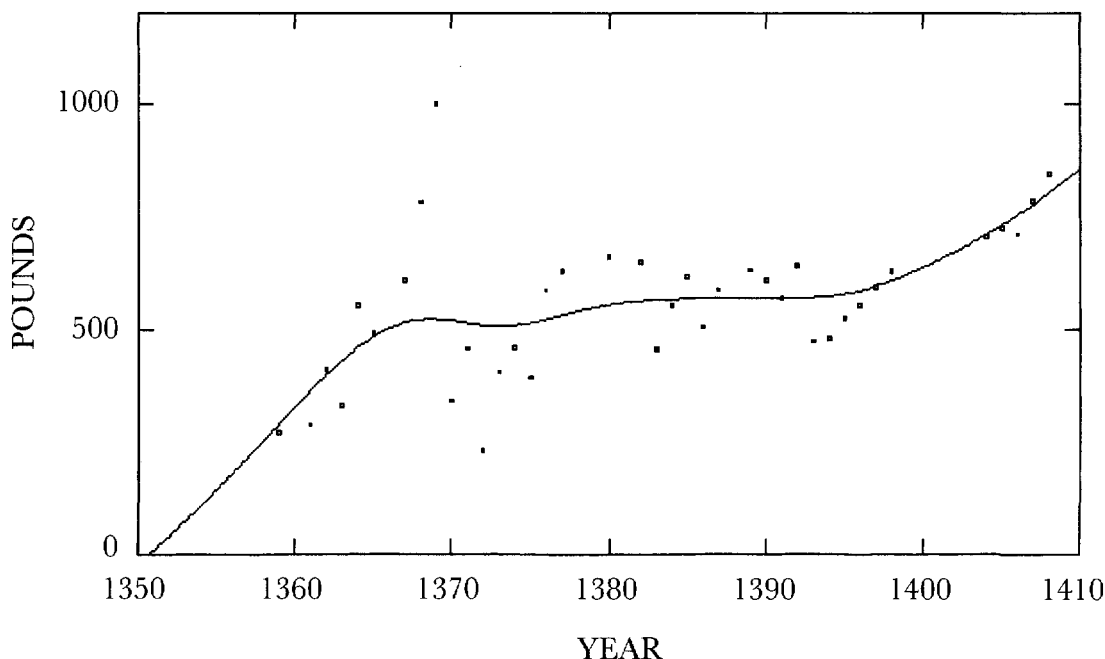
In Haarlem the number of brews produced was relatively high in the 1430s with an upward trend to mid century. Then output levelled off. There followed a depression in the 1480s and 1490s followed in turn by a revival at the close of the century. The production figures for the fifteenth century show a long term decline in the second half, saved only by two remarkably good years at the start of the sixteenth. There are difficulties with the estimates for the fifteenth century because of inconsistencies in assessment and enforcement. The size of the brew most likely rose in the period but by how much is uncertain.⁴² No matter the difficulties with the data the tendency seems generally clear. The industry had some serious troubles in the closing years of the century, though the difficulties may well have been less than the figures suggest.

⁴⁰ A. J. Vis, "Iets over Delftse accijnzen in de 15e eeuw," pp. 12-14, 16.

⁴¹ De Boer, *Graaf en Grafiek*, pp. 275, 279, 283, 287-294.

⁴² van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 45-46, 73-74; Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 39-42.

Figure II-2

Hop Tax Income at Gouda, 1359-1408

Source: Dick E. H. De Boer, *Graaf en Grafiek Sociale en economische ontwikkelingen in het middeleeuwse 'Noorholland' tussen ± 1345 en ± 1415* (Leiden, 1978), p. 282

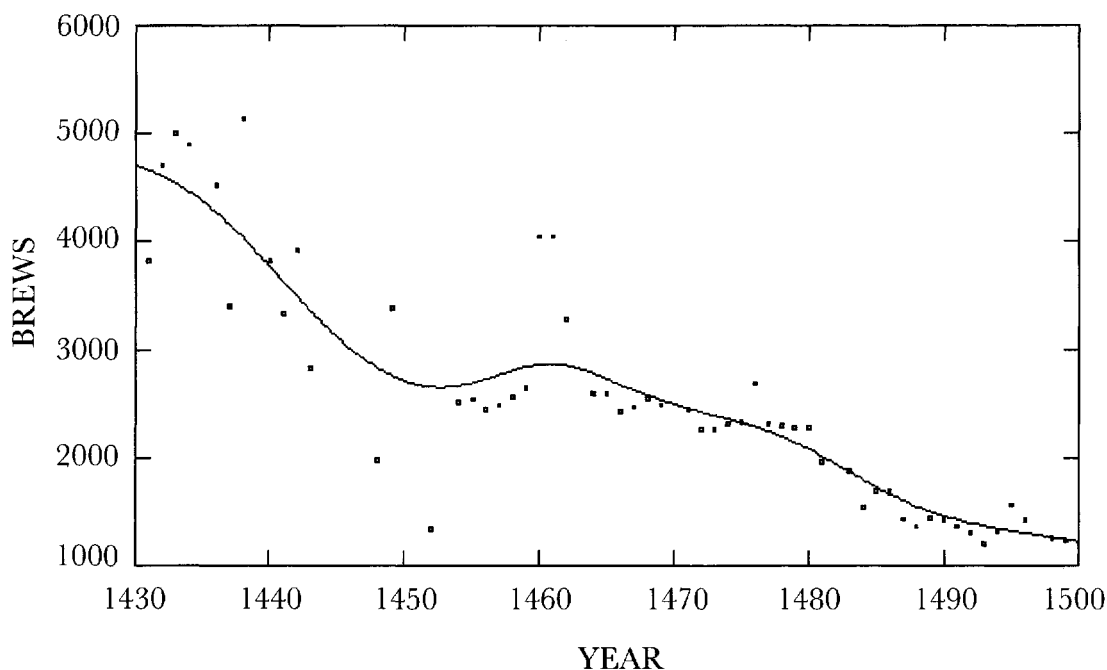
The principal growth in brewing at Haarlem did not come until 1430 to 1443. The years of greatest output were 1432-1433 and 1437-1438. While for most of the century Haarlem brewers produced about 50 brews in a year, about one a week on average, in the boom years that average rose to around 100.⁴³

In the Bishopric of Utrecht just to the east of Holland output grew dramatically once brewing with hops became common. In the town of Utrecht itself production in the closing years of the fifteenth century was about 7,500 litres per week, a level some five times that of the 1370s. The growth was by no means uniform and always expanding through the more than one hundred years, but the overall trend was clear. One direct result of increasing output was a sharp drop in beer imports in Utrecht, down to 3% of the 1380 level in 1450. Brewers were able to increase the quality as well as the quantity of beer they made,⁴⁴ the

⁴³ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 12-13, 21.

⁴⁴ L. Alberts, *Van Gruit tot Kuit De brouwenring in het Nedersticht tussen 1300 en 1500* (Amersfoort, 1995), pp. 13, 35-36, 51.

Figure II-3

Production at Haarlem, 1431-1499

Source: Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), pp. 45-47

better beer undoubtedly contributing to increased sales. Utrecht did not achieve the levels of output of nearby Amersfoort, long considered a threat to Holland brewers and also Holland tax collectors.

By the fifteenth century what emerged in Dutch towns was a system of excise taxes, first on production and second on consumption of beer. The excise taxes grew out of the earliest levies on beer production. Decline in the use of *gruit* left many towns with declining tax incomes so the change in brewing technology may have actually played a role in the expansion of the use of excise taxes. In 1340 at Delft the fee the brewers paid to the count or his deputy was set at 12 Holland pence for each 10 barrels of beer brewed. Generally the monopoly of the supply of *gruit* evolved into an excise on *gruit* which had to be paid on beer produced and then ultimately on any kind of beer produced with *gruit* or without or even with hops. The transformation was most obvious at Dordrecht⁴⁵ but

⁴⁵ H. Halbertsma, *Zeven Eeuwen Amersfoort* (Amersfoort, 1959), p. 45; Jensma, "Bronnen tot de geschiedenis van het recht van de gruit...", p. 170; Paul Heinrich Kampeter, *Die wirtschaftliche*

went on in many towns in Holland. The system would only become more complex over time as town authorities reacted to growing needs for income.

In the 1274 grant to Haarlem from Count Floris V of a right to levy excises for a period of ten years included was the right to charge 12 pence for each brew. In 1422 the brewers in the town asked that the fee, now up to 7.5 stuivers for each brew, be abolished. By that time it was called *brouwgeld*. The brewers' request must have been denied since they were still paying the tax and at a higher rate at the end of the fifteenth century. An excise at Dordrecht may well have predated the one at Haarlem. It appears that such early taxes were often temporary but they were renewed, revived and then often made permanent. They did not have to be only on beer or on wine either. The 1274 grant from Floris V included a wide variety of goods such as herring, grain, textiles, salt and even services such as carpentry work on boats. Amsterdam charged excise taxes on wine and beer as early as the mid fourteenth century, based on a grant made by Count William V in 1351 that allowed the town to set taxes at a level it judged proper. Amsterdam did not typically farm the tax but instead had city officials, the *accijnsmeesteren*, collect it. It came to be called the big excise (*grootte excijs*) in the following century, when new excises were levied, because those old taxes on beer and wine brought in by far the most income for the town. The Count of Holland in 1401 went so far as to set the maximum excise tax that could be charged on beer by Amsterdam or any town in the county at 6 grooten for each barrel. That confirmed a temporary grant of 1398 which had allowed six towns in Holland, including Amsterdam, to levy an excise on each barrel of beer. Presumably the count set a maximum because he wanted to prevent unlimited taxation and the use of excises for the protection of local industries at the expense of the more efficient producers in the exporting towns. The count often authorized towns to adjust excise, but always subject to the maximum.⁴⁶

The excise on beer at Leiden long predated the general permission of 1401. As early as 1350 the town got from the count the power to levy an excise tax on a number of items and though taxes on meat and salt might later be lifted that on

Entwicklung des Rheinisch-Westfälischen Brauerei-Gewerbes unter besonderer Berücksichtigung des Bergischen Landes (Giessen, 1925), p. 12; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #324.

⁴⁶ Hans Bontemantel, *De Regeering van Amsterdam soo in 't civiel als crimineel en militaire (1653-1672)*, edited by G. W. Kernkamp. Werken uitgegeven door het Historisch Genootschap, third series, 7 (The Hague, 1897), 2, pp. 431-433; van der Laan, *Oorkondenboek van Amsterdam tot 1400*, p. 131; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 10-11; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #528; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 134, 171; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 3, 12-13; de Wal, "Accijnsbrief van Haarlem in 1274 door Floris V verleend of ontworpen," pp. 172-174, 176-187; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 2, p. 186.

beer became permanent. The town had virtually complete control of incidence and rates of taxation.⁴⁷ If the count had any hope of preventing the use of excises as a device for the protection of local brewers, he certainly failed in the case of Leiden. Excise taxes in the fifteenth century were urban taxes. The excise taxes would be through the ensuing centuries a constant source of difficulty between brewers and governments. Finding the correct level was a small part of the problem. Administering the collection of the tax would prove a productive field for bureaucratic experiment and conflict.

Despite the problems with tax records, their incidence, their rates, their avoidance and their being farmed it is still possible to say that output of beer in Holland rose in the fourteenth century and then rose sharply in the late fourteenth and through the fifteenth century. The tax records for *gruit* and hops suggest that the upward trend had already started some forty years before, but still it is clear that the great success of Dutch hopped beer did not come until a century or more after brewers in Holland began to make the new type of beer. There is no question that, by any measure, the process of change took a long time to complete. It is obvious that Dutch brewers did not rush into using hops. They did so only after getting information in one form or another about how to use them. The pace of collecting information and, with it, the pace of change was often, though not necessarily, slower the further east the town found itself in the northern Netherlands and thus the further from competition from imports of Ham-burg beer.

The output of beer increased to such a degree that by 1450 brewing was by any measure of the day a big business and one of the great contributors to the rapid economic growth which Holland enjoyed, in contrast to so many other parts of Europe, in the fourteenth and the first half of the fifteenth century. The economy of Holland went through a broad range of structural changes in the fourteenth century. The use of drainage ditches in a massive number of often small reclamation projects undertaken over centuries meant that the peat bogs of the province had been extensively reclaimed and now were filled with dozens of settlements. Distinctions developed between smaller agricultural towns and the larger ones which relied on long distance trade and industry.⁴⁸ "...in the period 1350-1400 Holland was completely transformed from a largely agrarian and rural society to an urban, commercial, and industrial one..."⁴⁹ The most important export industry in that transformation was textile manufacturing, but beer brewing was undoubtedly in second place. The brewing industry was a significant

⁴⁷ Marsilje, *Het financiële beleid van Leiden...*, pp. 114-116, 268-269.

⁴⁸ De Boer, "Delft Omstreeks 1400," p. 92; TeBrake, *Medieval Frontier...*, p. 185.

⁴⁹ H. P. H. Jansen, "Holland's Advance," *Acta Historiae Neerlandicae* 10 (1978), p. 16.

contributor as well as participant in the emergence of Holland in the fifteenth century, as the most important province in the northern Netherlands and in the rising income of the region.⁵⁰

The growth in output of Dutch breweries in the century and a half to 1450 depended on the production of beer of high quality, or at least of a quality equal to that of beer coming from Hanse ports. Once Dutch brewers could match their German competitors, they could dominate their domestic market. Imports into Holland declined and with that came the decline of the Amsterdam toll on Hamburg beer. The opening of the Frisian War in 1396 caused troubles with the Hanse. Holland attacked Frisia and the resulting piratical activity disrupted Hanse trade. There were other pirates who soon joined in, transplanted from the Baltic or even Frisia. So the war that began in 1396 ushered in a period of unrest and on-again-off-again wars in the North Sea involving Holland, Friesland, England and Scotland which continued well into the second decade of the fifteenth century. Those wars led to a decline in the Frisian carrying trade along the North Sea coast, especially the trade in beer. Despite a second period of disputes between Holland and Hamburg in the early 1420s an Amsterdam alderman in a letter of 1421 still talked about the group of Hamburgers in the town who carried on a lively trade in beer. After 1437 imports of beer at Haarlem fell off and the explanation seems to have been transportation difficulties in the Baltic which constricted supplies. The succession of the Duke of Burgundy to the county of Holland in 1428 and his successful conclusion of the war against the principal Hanse towns in 1441 finally brought a period of stability and peace along the trading routes of the North Sea.⁵¹

During that Wendish War which ended in 1441, the Estates of Holland had issued a blanket prohibition of the import, sale, or dispensing of any beer brewed in any of the enemy towns. They included, among others, beers from Lübeck, Rostock, Stralsund, Wismar and even Hamburg. It would prove difficult for German beer exporters to recover from that complete closing of the market since by 1441 competition from Holland beer producers had largely supplanted Hamburg beer in Dutch markets. By 1445, with peace restored, the income from the Amsterdam toll was nil. The tax was to continue for over a century, though at a very low level, and it was farmed so the count did not have to bother with it. Hamburgers blamed civic excise taxes in a number of Holland towns which dis-

⁵⁰ Jansen, "Holland's Advance," pp. 6, 12, 16-17; M. M. Postan, "The Trade of Medieval Europe: the North," in *The Cambridge Economic History of Europe*, vol. 2, edited by M. M. Postan & E. E. Rich (Cambridge, 1952), pp. 122, 251-256.

⁵¹ Berkenvelder, "Friesland's Handel in de late Middeleeuwen," pp. 168-169; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 76-77; Smit, *De Opkomst van den Handel van Amsterdam...*, pp. 161, 184-185, 193-194, 223, 317-318.

criminated against imported beer for the decline of the toll, that at a meeting in Utrecht to discuss trade in 1473-1474. Behind all the discussion lay the most important reason for the decline of the toll: effective competition from hopped beer brewed in Holland. As the quality of Dutch beer improved the quality of export beer from Hamburg and from Wismar went down, if consumer complaints from Flanders are to be believed.⁵² That decline helped Holland beer makers both at home and outside the county.

Dutch brewers conquered a series of markets in the fourteenth and fifteenth centuries. The first success came in towns in Holland. By 1391 at Hoorn on the Zuider Zee brewers were making beer and not long after that beer from places like Amsterdam, Haarlem, Delft and Gouda found a market in the town. Next it was the turn of towns just to the east, like Deventer where Holland beer was sold at fairs already by the mid fourteenth century. Next it was the turn of markets just to the north in Groningen and Friesland where there was little commercial brewing to compete with imports⁵³. Frisian traders began to carry beer not from Hamburg to Holland as they had for a century or more but in the opposite direction from Haarlem to towns in Friesland and further east along the North Sea coast. That was to become more common as the century wore on and town governments in Friesland began to negotiate with Haarlem about such issues as the size of barrels. Brewing at Haarlem, as tax records for production and consumption in the town show, was principally an export industry. In the 1430s about 55% of output was shipped out of the town.⁵⁴

The next and biggest markets for Dutch brewers were the ones just to the south. Just as Flanders and also Brabant had been the logical goals of Hamburg exporters in the years around 1300, those were the logical places for Dutch beer makers to find buyers for the better beers they produced. Flanders would remain the most important market for exports from Holland into the sixteenth century. For Gouda, Flanders was always the largest market although some beer went to Zeeland, to Overijssel and across the North Sea to England. In 1392 the towns of Flanders suggested that Hansards had been selling Dutch hopped beer and passing it off as their own so that it would be subject to their privileges. That was

⁵² Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 40-41; Hunte-mann, *Das deutsche Braugewerbe...*, pp. 12-13, 20; Ketner, *Handel en Scheepvaart van Amsterdam in de Vijftiende Eeuw*, pp. 124-125; Smit, *De Opkomst van den Handel van Amsterdam...*, p. 225; Pinkse, "Het Goudse Kuitbier...", pp. 114, 121; Techen, "Das Brauwerk in Wismar," p. 200.

⁵³ Alberts and Jansen, *Welvaart in Wording*, pp. 135-136; J. A. van Houtte, *An Economic History of the Low Countries 800-1800* (New York, 1977), p. 93; Raimond van Marle, *Hoorn au Moyen-Age. Son Histoire et ses institutions jusqu'au début de 16e siècle* (The Hague, 1910), p. 140.

⁵⁴ Berkenvelder, "Friesland's Handel in de late Middeleeuwen," pp. 168, 176-184; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 55, 59-62.

the same year that the Counts of Holland gave Haarlem and Gouda permission to brew beer in the Hamburg style. The Dutch imitation at the end of the fourteenth century must have already been good enough to pass for the real thing. In 1392 two representatives sent by the Hanseatic League to Ghent met with the officers of the brewers' organization there to complain about beer from Holland being shipped to the town in casks from north Germany and sold in Ghent as "eastern" beer, much to the detriment of Hanse merchants and traders. The Hanse representatives asked the brewers and the Ghent town council if they had thought about the problem of counterfeit beer entering the town and the answer in both cases was a clear and unequivocal "no".⁵⁵ Dutch success in Flemish markets was not immediate, and Hanse exporters did hold on to a share of the market. That share declined markedly, however, in the first half of the fifteenth century. The Dutch were closer so enjoyed lower transport costs. They also did not have to pay a number of tolls that Hanse shippers did when they brought their beer through Holland. In 1392 the Count of Flanders set a maximum excise that could be charged on Hamburg beer and subsequently lowered the import duty as well. This must have lowered the price of Hamburg beer making it better able to compete with Dutch beer. A Scheldt toll in Zeeland of 1444 still included beer imported from the East and the levy was one-third less than the duty to be paid on other beers. So imports from Germany may have enjoyed a slight tax advantage by that time over Holland beer, at least if it was brought by sea and up the Scheldt avoiding inland waterways.⁵⁶

Holland shippers had been carrying Hamburg beer from Amsterdam to Flanders before domestic production of hopped beer began so presumably it was easy for them to replace the north German product with locally produced beer in their holds. In Antwerp, presumably the goal of shippers coming up the Scheldt, local brewers in 1418-1419 produced only 25% of the beer drunk in the town. Of the remaining three-quarters, 97% of the imports came from the town of Haarlem, a quantity of more than 1,500,000 liters. Already by 1408 the nearby town of Lier imported about three-fourths of its beer and the imports came almost exclusively from Haarlem. In 1388 Bruges imported some 1,400,000

⁵⁵ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, pp. 227-228; Konstantin, Höhlbaum, Karl Kunze, Walther Stein *et al.*, eds., *Hansisches Urkundenbuch* (Halle, Weimar and Leipzig, 1876-1916), 5, #16; Pinkse, "Het Goudse Kuitbier..." pp. 112, 120-121; G. Frhr. von der Ropp, Dietrich Schäfer, Gottfried Wentz *et al.*, eds., *Hanserecesse Die Recesse und Andere Akten der Hansetage* (Leipzig and Cologne, 1870-1970), 4, #134.

⁵⁶ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, pp. 219, 227-228; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 37-38; Pinkse, "Het Goudse Kuitbier..." p. 113; W. S. Unger, ed., *De Tol van Iersekeroord, Documenten en Rekeningen 1321-1572* (The Hague, 1939), pp. 10-11, 14.

liters of Delft beer, three times the amount of mead and beer from Hanse ports combined. By 1397 there was even a broker for Holland beer at the port of Calais. In 1385-86 Dunkirk imported more than 270,000 liters of hopped beer, mostly from Haarlem. In 1439-1443 the ratio of imports of Holland to Hamburg beer at Dunkirk was almost 11 to one.⁵⁷

In the second half of the fifteenth century Amsterdam increased taxes on Hamburg beer that was sold in the town and when Hamburg threatened to move their trade, now very much in decline, no other town in Holland showed interest in offering them tax advantages. On three separate occasions between 1479 and 1504, Amsterdam even prohibited the import of Hamburg beer altogether. As late as 1507 the most important commodity the 33 ships in the Amsterdam-Hamburg trade carried was beer. The great period of growth in the Hamburg beer trade though was over.⁵⁸

Across the North Sea the English market took Dutch beer already in the early fourteenth century. Then the exchange of beer was on a somewhat equal basis. If anything English exports to Holland exceeded the flow in the other direction. Lynn was apparently a center for such exports which went on throughout the fourteenth century. The exports were of ale, made with no hops. Many ships coming from the northern Netherlands to a broad range of ports on the east coast of England through the later fourteenth century seem to have carried beer almost incidentally.⁵⁹ The port of Great Yarmouth alone in the twelve months starting on 1 May, 1398, saw the import of 65 lasts of hopped beer, that is some 860 barrels or 103,200 liters. That was an average of some 8,000 liters per month. Imports seem to have fallen off in the 1410s, perhaps a first sign of the development of an ability to produce hopped beer in England. Some Dutch shippers found themselves in trouble with English authorities for failing to pay

⁵⁷ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, p. 227; Prevenier and Blockmans, *The Burgundian Netherlands*, p. 87; van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," pp. 335-336, 340; van Uytven, "Oudheid en middeleeuwen," p. 39; Herman van der Wee, *The Growth of the Antwerp Market and the European Economy in the Fifteenth and Sixteenth Centuries* (The Hague, 1963), 1, pp. 228-229.

⁵⁸ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, pp. 230-233; Daenell, *Die Blütezeit der Deutschen Hanse*, 1, p. 383; P. A. Meilink, "Rekening van het Lastgelt in Amsterdam, Waterland en het Noorderkwartier van Holland in 1507," *Bijdragen en Mededeelingen van het Historisch Genootschap* 44 (1923), pp. 188, 202-203.

⁵⁹ van der Feijst, *Geschiedenis van Schiedam*, p. 24; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #611; H. J. Smit, ed. *Bronnen tot de Geschiedenis van den Handel mit Engeland, Schotland en Ierland, 1150-1585* (The Hague, 1928, 1942, 1950), 1, 1, #148, #162, #208, #252, 161 n. 2, #363-365, #372, #379, #486, #489, #557, #576-577, #589, #603, #724, #732, #736, #842, #859; W. S. Unger, ed., *Bronnen tot de Geschiedenis van Middelburg* (The Hague, 1923-1931), 3, #15, #32, #33, #45.

the import duties levied on Dutch beer by the English crown. Some got into trouble with English sailors who seized their goods.⁶⁰

Import substitution in Holland combined with increasing exports meant that the brewing industry enjoyed higher levels of production. That in turn led to more frequent and more extensive experimentation to improve the product and to get the use of hops exactly right. There also existed a potential for savings to producers in a larger scale of production. The doubling of the number of brews annually at Haarlem in good years could be achieved with virtually no increase in fixed costs, at least in the short term. The investment in the brewery but also in the maltery could be spread across a greater volume of production. When sales rose and returns to investment increased brewers also discovered a potential for greater capital investment.

By the close of the fourteenth century Dutch brewers could make the new type of beer as well as even the experts, the brewers of Hamburg. As a result they were able to expand the scope of their market. Hopped beer cost more than *gruit* beer. Hopped beer brewers were helped by changing real incomes in the late fourteenth century in the wake of the Black Death. Falling grain prices not only reduced brewers' costs and allowed the shift of food grains to industrial production from the making of bread but also increased the disposable income of many potential beer consumers. Though the gains in real income might be eroded over time at least in the second half of the fourteenth and through the first half of the fifteenth century brewers could count on the price structure working to their advantage. Dutch brewers, because of their location, their skill at accommodating themselves to the production of the new type of beer and because of the character of government regulation, proved especially adept at exploiting the advantages.

One of the immediate results of the transformation to hopped beer brewing was a sharp increase in the importance of beer to the finances of Dutch towns. First, the income of towns shifted from relying on taxes on *gruit* to taxes on hops. Second, the share of income which came from all taxes on beer increased. That was especially true in places which became centers of an export industry. At Bruges, taxes on locally made *gruit* beer supplied 18.3% of town income in 1332-33 but by 1391-92 the share was down to 5.5%. The tax on hopped beer, both local and imported from Delft, on the other hand made up 24.6% of town income by the later date.⁶¹ At Leiden all excise taxes, as in so many other towns,

⁶⁰ Nelly Johanna Martina Kerling, *Commercial Relations of Holland and Zeeland with England from the late 13th Century to the Close of the Middle Ages* (Leiden, 1954), pp. 110-111, 114, 216-220; Smit, *Bronnen tot de Geschiedenis van den Handel mit Engeland...*, 1,1, #867, #908, #1257.

⁶¹ Raymond De Roover, "Les comptes communaux et la comptabilité communale à Bruges au XIVe siècle. Finances et Comptabilité Urbaines Du XIIIe au XVIe Siècle," *Colloque International Blakenberge 6-9-IX-1962* (Blankenberge, 1964), pp. 94, 100-1.

made up the largest share of income. In the fifteenth century it ranged from 70% to 90%. In the 1420s and 1430s between 42% and 59% of total income came from excise taxes on beer alone.

Table II-2

Share of Income from Beer Excise: Leiden, 1391-1449

<i>Year</i>	<i>Share in %</i>
1391/1392	17
1399	47-53%
1412-1413	22
1413	58
1426	42
1427	53
1433/1434	59
1449	78

Source: G. A. Leiden, *Secretarie Archief 1273-1575*, 511, 513, 573-644, *Rekeningen van de Treasoriers*; A. Meerkamp van Embden, *Stadsrekeningen van Leiden (1390-1434)* (Amsterdam, 1913-1914) 1, pp. 56-59, 2, pp. 63-65, 156-163, 364; Jannis Willem Marsilje, *Het financiële beleid van Leiden in de Laat-Beierse en Bourgondische periode 1390-1477* (Hilversum, 1985), pp. 267, 276 n. 172.

Though the trend was not unbroken it was clearly an upward one and one which would continue after 1450. In 1429 the Dordrecht government got almost 15% of its income from the beer excise, a figure which dropped slightly to just over 13% by 1450.⁶² The share was smaller than elsewhere in Holland, perhaps consistent with a town more devoted to trade than to industry. Direct taxes on brewers' production at Haarlem yielded enough to cover from 5.5% to 12.2% of expenses at Haarlem in the first half of the fifteenth century. Taking all beer excises together, Haarlem got more than half of its income from beer in the mid fifteenth century, the share rising to as much as 88.5% in 1437/1438.⁶³

The greater importance of beer and brewing to the budgets of Dutch towns yielded a greater interest on the part of urban governments in beer and brewing. One obvious and ever more prominent result was greater town regulation of more and more aspects of everything that brewers did. The 1407 bylaws for

⁶² G. A. Dordrecht, *De Grafelijke Tijd 1200-1572*, #433, #436.

⁶³ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 12-13.

brewing instituted at Haarlem were the first of a long series. The rapid growth of an export industry undoubtedly gave the town government a sense of urgency. That is why they recognized two types of brewers, those for the local market and those for export. That is also why they prescribed how much beer could be produced each time a brewer, no matter the category, made beer. The frequency depended on the floor area of the brewer's attic and so on his capacity to malt grain.⁶⁴ An expansion of regulations in 1440 did allow more frequent brewing but only for those shipping the beer out of town immediately and under certain other conditions. Those two topics of maximum size of brew and frequency of brewing which already turned up in the fourteenth century at Gouda and Delft became an essential part of regulations down to the Revolt and beyond. Another common topic, raised in the 1411 regulations at Leiden, was the requirement that beer, after it was brewed, remain in the brewery for a fixed period of time before it could be sold. The aging process was to last for seven days in the summer but 10 days in the winter. The town even had two minor officials who were to make sure that proper practice was followed in the trade like the two mentioned in the 1366 Gouda bylaws. In 1392, those Gouda officials were required, as part of the development of brewing in the Hamburg style, to put a seal on beer when it was put in barrels. If the brewer wanted to export the beer he had to let it sit for eight days before calling in the city agent to seal the beer again, guaranteeing it had aged fully. Only then could he send it off over the Maas River. Delft had a similar rule in the fourteenth century about beer having to sit for a specified time before it could leave the brewery.⁶⁵ Despite the regulation, by the standards of even the nineteenth century the beer was drunk very young, before the yeast had had a chance to work fully through a secondary fermentation. The result presumably was both a weaker but also a sweeter beer than the beverage of even the late eighteenth century.⁶⁶

At Dordrecht in 1401 the town laid down a series of regulations covering another important and recurring issue, the supply of barrels. The casks, they said, had to be of the correct standard size and had to have the town brand burned into them.

⁶⁴ J. De Brouwer, "Quantiteit van de productie te Haarlem uit Huizinga's Rechtsbronnen van Haarlem," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #64 (1935), #13-#17; Johan Huizinga, ed., *Rechtsbronnen der stad Haarlem* (The Hague, 1911), pp. 115-116; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 64-67.

⁶⁵ Blok, *Geschiedenis eener Hollandsche Stad*, 1, p. 187; Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, pp. 46-47; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, pp. 49, 87; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #668; Pinkse, "Het Goudse Kuitbier...", p. 105.

⁶⁶ E. Aerts and E. Put, "Jezuïetenbier Bierhistorische beschouwingen bij een brouwhandleiding uit 1627," *Volkskunde* 93, 2 (1992), p. 126.

Those same rules set limits on the number of brews that a brewer could produce and included requirements for payment of a producers' tax which had emerged in place of the old *gruitrecht*. Schiedam brewers received a set of regulations on the size and use of beer barrels as part of a general revision of bylaws in 1434. The barrel of Delft became a standard and other towns, such as Hoorn, insisted that brewers use local barrels with local marks but of the same size as those of Delft.⁶⁷

Another essential part of legislation was restrictions to guarantee that all excise taxes due on beer were in fact paid in full. Town after town in the course of the fifteenth century added bylaws insisting that no beer could be sold without paying excise and they were to be repeated many times in the future. So too were rules on smuggling in beer without paying tax and on serving beer outside the town walls, the effective city limits. That was already illegal in Amsterdam in the mid fifteenth century, under a regulation handed by the Duke Philip the Good in 1452, since doing so was rightly considered just a way to avoid paying excise tax. Legislation on selling beer outside the legal limits of towns would have a long history. There were also rules to be sure that brewers paid any production taxes based on their use of hops, rules which dated back to the bylaws covering *gruitrecht*, like those of 1323 from Dordrecht. Brewers were typically prohibited from selling directly to consumers so that officials could be sure that all excises got paid. Brewers were allowed to keep a small portion of the beer they made tax free, but that was only for their own consumption.⁶⁸

At Amsterdam in 1408 and again 1416 the town allowed export of beer only if a quantity of rye or wheat was imported which would produce the same amount of beer. A similar 1437 regulation said the purpose was to keep as much grain as possible in the country. In the following year rules handed down said that brewers had to have on hand more than a three month supply of grain for their business. From 1437 to 1441 when the Wendish War disrupted grain imports, Count Philip the Good required that only so much beer be exported from Holland as could be made with the quantity of grain imported. Such limitations on brewing during periods of grain shortage led to conflict between public authorities and brewers, especially in towns like Gouda with a large export sector.⁶⁹

⁶⁷ van Dalen, *Geschiedenis van Dordrecht*, 1, p. 390; Hallema and Emmens, *Het bier en zijn brouwers*, p. 133; K. Heeringa, ed., *Rechtsbronnen der Stad Schiedam* (The Hague, 1904), pp. 247-248.

⁶⁸ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 92; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 74-75; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, p. 315; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, pp. 18, 171-172; Ter Gouw, *Geschiedenis van Amsterdam*, 2, p. 357.

⁶⁹ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," p. 54; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 60-61; Unger, "De Hollandsche Graanhandel en Graanhandelspolitiek in de Middeleeuwen," p. 484; W. S. Unger, *De Levenmiddelenvoorziening der Hollandsche Steden in de Middeleeuwen* (Amsterdam, 1916), pp. 67-68, 85.

Holland brewers rarely had official organizations. At Delft, beer brewers did set up an association but membership was voluntary and the group never enjoyed any public power. The same may have been the case with the Amsterdam brewers' trade group, possibly established in the fifteenth century. When formal guilds did not exist then it was the town government which both made and enforced the rules for brewing⁷⁰ and brewers' organizations acted as lobby groups to put their collective case before the town council. It was as if brewing and the tax income from it was too important to be left to guilds for supervision.

The few Dutch brewers' guilds made their first appearance in the fourteenth and early fifteenth century. Dordrecht was the earliest town to get an extensive guild regime in Holland. In 1367, the count of Holland granted a general regulation for as many as 44 Dordrecht guilds. The privilege required anyone practising a trade in the city to be a member of a trade or craft. The brewers were included. In the same year, as part of guild legislation, the sale of beer was limited to members of a guild and to certain market days. The power of the Dordrecht guilds increased with grants made in 1373 and again in 1386 and in 1409 and 1437, though the brewers' guild seems to have disappeared or at least lost any force in the first half of the fifteenth century.⁷¹ The brewers of Gouda agreed to laying down the tools of their trade in 1371 but what came of that attempt to strike is not known. There as well, in a period when the industry faced hard times in the short run, joint actions by the members of the trade could at the very least be discussed. Leiden brewers did not get a guild until 1461 but that still made it one of the earliest in the town. The brewers' was also one of the oldest guilds at Haarlem, existing already in the fourteenth century and possibly associated with an altar to Saint Martin in the largest church of the town which dates from 1401. The guild may have been a product of government initiative rather than that of the brewers themselves. The 1407 bylaws show the guild did have officers who served as inspectors to make sure rules were followed. Those men even had the power to enter any brewery at any time, to control the sale of hops, and to watch to be sure that excise taxes were paid.⁷²

⁷⁰ Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 1-2, 5; J. E. Siebel *et al.*, eds., *One Hundred Years of Brewing A Complete History of the Progress made in the Art, Science and Industry of Brewing in the World, particularly during the Nineteenth Century. Historical Sketches and Views of Ancient and Modern Breweries. Lives and Portraits of Brewers of the Past and Present* (Chicago and New York, 1903), p. 19; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 8, p. 226.

⁷¹ G. A. Dordrecht, Afdeling Gilden, #244, #246; Alleblas, "Nieuw Leven in een Oud Brouwerij?...", p. 1; Matthys Janszoon Balen, *Beschryvinge der stad Dordrecht* (Dordrecht, 1677), 1, p. 512; Blok, *Geschiedenis eener Hollandsche Stad*, 1, pp. 176-177; van Dalen, *Geschiedenis van Dordrecht*, pp. 378-380; Niermeyer, *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*, #499; Rijswijk, *Geschiedenis van het Dordtsche Stapelrecht*, pp. 49-50; van Vollenhoven, *Ambachten en Neringen in Dordrecht*, pp. 5-8.

⁷² De Boer, *Graaf en Grafiek*, pp. 283-284; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 107-108, 110-111.

Amsterdam might not have a brewers' guild but by 1437 there were certainly a guild for the porters who delivered beer. They were together with other draymen then but those who dealt with alcoholic beverages would eventually separate from others who made their living from transporting goods along the city streets.⁷³ Such separate organizations of porters, and most notably that in Amsterdam, served to keep a careful watch on the proper delivery of beer to public houses and to homes. They helped prevent brewers avoiding excise taxes. Just as with the guilds and their rules, many such roles in the taxing and regulation of brewing would become more formal and more strictly specified in the sixteenth and seventeenth centuries.

Citizenship began to appear as a prerequisite for carrying on the trade of brewer and the guilds were often the vehicles for enforcing such a policy. In many instances, though, towns relied on the officials in charge of brewing to look after the requirement. Entry was typically not difficult, especially in towns like Haarlem where the guild was not autonomous and ultimate authority lay with the town government. Even there, though, in 1407 the town required that any brewer had to have been a citizen for at least five years before entering the trade.⁷⁴

The great flood of legislation on brewing was still to come but in the first half of the fifteenth century the topics and the pattern for regulation were already clear. Governments would set the size of the brew, the frequency of brewing, the size and marking of the casks, the arrangements for delivery of beer, the use of grain in brewing in type and quantity, and the ability to enter the trade. They would also legislate the methods for making sure that the regulations on brewing and on taxation were enforced. That included setting out and in some case controlling the choice of the officials responsible for enforcing the rules. For the governments of Holland, county and urban, regulation was driven by the desire to maintain the quality of beer for the sake of consumers and to keep export markets, by the desire to maintain food supplies at home to avoid distress, but above all by the desire to maintain income from the various taxes levied on beer.

In the fifteenth century growth in Dutch brewing came principally from increases in output in the most important exporting towns. Haarlem, and Gouda along with Delft in Holland and nearby Amersfoort were the beer towns of the northern Low Countries in the fifteenth century. Delft and Gouda were on the

⁷³ I. H. van Eeghen, *Inventarissen der Archieven van de Gilden en van het Brouwerscollege* (Amsterdam, 1951), p. 21.

⁷⁴ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 108, 110; Leo Noordegraaf, "Nijverheid in de Noordelijke Nederlanden," p. 19; Albertus Teltling, ed., *Stadboek van Groningen* (The Hague, 1886), p. 73.

edge of extensive peat bogs which supplied them with cheap sources of heat energy. All of those towns were on waterways, giving them low cost transportation of raw materials and of finished products.⁷⁵ Other towns may not have had as large a brewing industry but did have individual brewers who produced mainly for export. In consuming centers, such as Amsterdam, in the fifteenth century local producers enjoyed a market for their goods and might even export a small amount of beer. Additional supplies, especially of higher quality beers, came not from Hamburg and Wismar as in the past, but from Haarlem, Gouda and Amersfoort.⁷⁶

Imports of Amersfoort beer were always a great problem for Holland legislation. As part of the same general policy on beer imports the count in 1326 had made an agreement with the town of Amersfoort that beer brewed within the walls of the town could be shipped to Amsterdam toll free. Amersfoort must have already been a significant producer of beer and Holland an important market for that beer. Beginning in 1388 Amersfoort made a lump sum payment to the Count of Holland to cover any outstanding debts and any beer tolls which might be owed. The count after that allowed Amersfoort beer into Holland free of tolls, making it competitive there. In exchange for the payment Count William V lifted the prohibition against the import of Amersfoort beer of the year before, one which he instituted, he said, because of the success of the product on the Holland market.⁷⁷ Amersfoort repeatedly went to the counts to gain exemption from prohibitions of imports, based on the 1388 privilege, and got such concessions in 1398, 1413, 1417, 1422 and 1523. In each case some arrangement was made to tax Amersfoort beer with the count of Holland being the beneficiary. From 1398 Amersfoort had paid a fee to the count of Holland for each brew of 12 barrels that was shipped into the county but that reverted soon thereafter to a fixed annual payment. In 1425 the count, perhaps because the payment was in arrears or perhaps because of pressure from Haarlem to get rid of competition, prohibited all imports of Amersfoort beer. The dispute was eventually resolved and the heavily hopped product from just to the east returned to Holland markets. When

⁷⁵ De Boer, *Graaf en Grafiek*, pp. 273, 279; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 60; Noordegraaf, "Nijverheid in de Noordelijke Nederlanden," p. 20; Pinkse, "Het Goudse Kuitbier...," pp. 95, 106-109, 115-116; J. Schouten, *Gouda vroeger en nu* (Bussum, 1969), p. 67.

⁷⁶ J. F. Niermeyer, *De Wording van Onze Volkshuishouding. Hoofddlijnen uit de Economische Geschiedenis der Noordelijke Nederlanden in de Middeleeuwen* (The Hague, 1946), p. 74; Smit, "De Registers van den Biertol te Amsterdam," p. 5; Ter Gouw, *Geschiedenis van Amsterdam*, 3, p. 254.

⁷⁷ G. A. Amersfoort, #192a, 1388; van Bommel, *Beschrijving der Stad Amersfoort...*, 2, p. 857; Halbertsma, *Zeven Eeuwen Amersfoort*, p. 44; Klop, "De Amersfoortse Brouwneringen tot de 19e eeuw," pp. 6-7; van der Laan, *Oorkondenboek van Amsterdam tot 1400*, #21; Ter Gouw, *Geschiedenis van Amsterdam*, 1, p. 226.

Amersfoort went to Emperor Charles V in his capacity as count of Holland in 1523, they repeated all past concessions hoping, justifiably, that he would reaffirm the old privilege. Even as late as that year they complained that Amersfoort beer was being treated like eastern beers and so subject to the heaviest of tolls equal to three times the price of their beer. As hoped, Charles V agreed again to established practice, saying that no town in Holland could tax Amersfoort beer at a rate higher than the one they charged on Gouda, Haarlem or Delft beer.⁷⁸ Again and again the counts blocked town efforts at protection in the case of Amersfoort beer. They did so because political and fiscal circumstances suited freer trade or the granting of privileges.

In the beer towns, the scale of the brewing industry by 1450 was in sharp contrast to what had existed before, what existed elsewhere, and what would exist in the future. While around 1350 most Holland towns had both a brewing and a textile industry, over the course of the next one hundred years the tendency was for one to become more successful and in so doing undermine the position of the other. In places like Gouda where brewing expanded rapidly in the years from around 1355 to around 1370 to supply export markets, the textile industry all but disappeared. The opposite happened at Leiden where brewing took a distant second place to cloth making. At Delft it was not until about 1390 that the brewing industry began to expand rapidly and from about 1400 the position of the textile industry, both relatively and absolutely, declined.⁷⁹ The inability of the two to thrive side-by-side may have been due to demands made by both on certain critical raw materials, the most important of which was clean water.

The increase in production in the late fourteenth century was due not to breweries producing more beer but to there being more breweries. Gouda in 1367 had at least 26 breweries and probably more. Between 1367 and 1370 at least 85 different individuals were charged with violations of brewing bylaws so there were probably more than 85 breweries. All of them, no matter how much the figure would grow in the coming years, were small firms. Records from 1370 suggest an annual level of production at Gouda of some 5,000 brews. It is difficult to convert that to liters but production was probably something over 7,000,000 liters already. From around 1400 Delft produced typically about 130,000 barrels of beer which may well have been more than 15,000,000 liters.

⁷⁸ van Bemmelen, *Beschrijving der Stad Amersfoort...*, 2, pp. 775, 879-882, 899-901; Klop, "De Amersfoortse Brouwningen tot de 19e eeuw," p. 9; W. F. N. van Rootselaar, *Amersfoort 777-1580* (Amersfoort, 1878), 1, pp. 304, 422-423, 434-435, 450; W. F. N. van Rootselaar, *Amersfoort, Sprokkelingen* (Amersfoort, 1898-1899) p. LXXIII; Smit, *De Opkomst van den Handel van Amsterdam...*, pp. 251-252.

⁷⁹ De Boer, *Graaf en Grafiek*, p. 284; De Boer, "Delft Omstrecks 1400", pp. 95-96; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 24.

Haarlem in the 1430s produced about 5000 brews annually, which put the number of brewers at around 100.⁸⁰

By 1450 brewing was a *trafiek*, a transforming industry which brought into Holland raw materials, combined them with indigenous raw materials and local labor, and exported a significant share of the finished product, the proceeds from sales going in part to pay for the import of raw materials. The pattern established by brewing as it shifted from using *gruit* to using hops and to making a stronger beer for export was a pattern which a number of industries, and not just Dutch industries, would follow in the future. After the transformation to making hopped beer, brewing proved itself to be a critical feature of the economy of Holland. By 1450 it was clear that not just the economy depended on the success of beer making. The politics of towns and also of the county were bound up in the performance of brewing, in large part because of the ever greater reliance on income from beer taxes. Regulations were already numerous. Towns in the later Middle Ages took more seriously the oversight of trades and especially food trades but brewing was an extreme case and could serve as the example for expansion of government control and guidance.

The clustering together, especially in the export centers, of a large number of producers introduced greater efficiency through, if nothing else, easier access to raw materials. The brewers used middlemen or agents to handle the distribution of their products and could rely on specialists for raw materials as well. Working close to one another the transfer of information, technical and commercial, was easier and even difficult to prevent. The competition among those brewers and in Holland among the towns which were so close to each other did yield ever higher levels of quality. The brewers who experimented with hops in the fourteenth and early fifteenth centuries and finally figured out how to get the most from the new way of making beer proved the source for the golden age of Dutch brewing which continued through the sixteenth and into the mid seventeenth century. From around 1380 through the middle of the fifteenth century the Dutch brewing industry grew rapidly in the wake of the at first gradual and then almost complete adoption of hopped beer brewing. Producers in Holland replaced imports, substituted their own product for German supplies. It would be a process followed in the future in other parts of northwestern Europe. The growth in production in Holland, the replacement of beer from Bremen and Hamburg, together with the establishment of an extensive trading network supplying raw materials and giving access to markets for sale laid the basis for the mature, large, growing and highly competitive industry of the years from 1450 to around 1650.

⁸⁰ De Boer, *Graaf en Grafiek*, pp. 278, 283-284; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 56, 204; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 21; Pinkse, "Het Goudse Kuitbier....," p. 108; Schouten, *Gouda vroeger en nu*, p. 67.

CHAPTER THREE

THE SCALE OF THE INDUSTRY IN ITS GOLDEN AGE, 1450-1650

Neither 1450 or 1650 marks a great change in Dutch brewing. Neither is the signpost of a break in the pattern of development. The two together, however, do indicate the period when the industry enjoyed its greatest success, a success distinguished by technical sophistication, a large and typically growing scale of production, and evolving limits of action set by government regulation. It was in the second half of the fifteenth century through the sixteenth and into the first decades of the seventeenth that brewing made its greatest contribution to the economy of Holland. It was then that brewing laid the foundations for the expansion of many other industries and trades in subsequent years. That was also the period in which the problems of the industry, the inherent contradictions and the strains of joint action with government became apparent. Though it was not obvious in 1600 or 1620 that brewing had passed its zenith and was on the slope of an incessant and irreversible decline, it was obvious to most brewers that the industry would not maintain the strong position it had enjoyed for so long.

Some towns were centers for supplying customers over a wide area, reaching beyond Holland and even beyond the Low Countries. Observers in and outside those towns recognized the degree to which brewing was the basis for any prosperity enjoyed. Brewers became important citizens who participated in the economic life of those towns especially through investment in trade and the fishery, for example, as well as brewing. Another sign of the importance of the industry as well of the source of its political power was the continued heavy reliance on beer as a source of income for towns and for the county. In Amsterdam the big excise (*grootte excijs*) which fell on beer, wine and grain was the greatest single source of income for the town and in 1552 70% of that excise came from the tax on beer.¹ That meant the beer excise produced 55% of town government income. Haarlem had reached that level a century before. By the 1437-1438 tax year levies on beer and brewing brought in more than half of town revenues.

¹ R. Bijlsma, "De opkomst van Rotterdams Koopvaardij," *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde* fifth series, 1 (1913) p. 59; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 9; Ter Gouw, *Geschiedenis van Amsterdam*, 3, pp. 412-413, 4, pp. 15-16, 5, p. 356; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 2, pp. 369-370.

The fortunes of civic finances rose and fell thereafter with the brewing industry. The direct tax on brewers for the grain they used at Haarlem, the *brouw- en schrijfgeld*, was not as lucrative as the simple excise on the sale of beer. Direct charges on brewers, like the *brouwambacht* at Rotterdam, typically brought in a much smaller amount than the beer excise.² From 1430 to 1443 the Haarlem beer excise made up 29.1% of total town income, the direct fees just 6.0% of the total. The fees rose to an average of 25.8% of total income in the years from 1510 to 1549, but then declined. From 1556 to 1560 the town got on average almost 65% of its income from a combination of the beer excise, a tax on imported beer and the brewers' fees. The last from 1595 through 1599 supplied only 3.9% of town income and the combination of all beer taxes just 23.3%. There was a slight recovery in the next decade when the average income from all beer taxes was 27.2% of town income and the brewers' fees made up 4.9% of the total income.³ At Leiden excises were the most important source of town income too (See Table II-2). By the mid fifteenth century the proportion was up to about half. From 1448 to 1475 in the years for which data survive, the average share of Leiden receipts from beer excises was 43.7%. In only one year, 1471-1472, did the proportion drop below 34%. It was typically above or near 50%. At Leiden from 1497 to 1574 in the 54 cases where data survive the excise tax on beer consumption made up on average more than 31% of the total income of the town. The share coming from the beer excise ranged between 15% and 56%.⁴

Towns typically were careful to keep the right to tax beer sales wherever they had that right. Dordrecht and Gouda engaged in a lengthy battle from 1519 to 1525 over who could collect proceeds from taxes at a site between the two towns. For Dordrecht in 1429 beer taxes only brought 14.8% of total income and in 1450 just 13.2%. But by 1502 it was up to 39.9% and in 1522 39.3%. Tax increases and presumably increased sales combined to keep that proportion above a third in the first quarter of the sixteenth century. The figures for 1556, 1557 and 1558 were 37.7%, 36.7% and 39.0% respectively. For 1610, 1611 and 1612 the figures were 27.5%, 33.1% and 25.9%.⁵ The decline was a sign of a long term trend. In consuming towns, like Amsterdam and Leiden, in producing

² Hallema and Emmens, *Het bier en zijn brouwers*, pp. 42-45, 54; J. H. W. Unger, and W. Beze-mer, eds., *Bronnen voor de Geschiedenis van Rotterdam*, volume 3, *De Oudste Stadsrekeningen van Rotterdam* (Rotterdam, 1899), pp. 10-11, 85-86, 143-144, 147-148, 151-152.

³ G. A. Haarlem, *Thesauriersrekeningen*, 136-140, 175-184; van Loenen, *De Haarlemse Brouwin-dustrie voor 1600*, pp. 13, 15-18.

⁴ G. A. Leiden, *Secretarie Archief 1253-1575*, 513, 522-551, 573-644.

⁵ G. A. Dordrecht, *De Grafelijke Tijd, 1200-1572*, #433, #436, #441-445, #451-453, #574, #2624-2626.

towns, like Dordrecht and Gouda, and, after 1542, for the province as a whole taxes on beer production and sales then made up a very large proportion of government income.

The wars which marked much of the golden age of Dutch brewing had their effects on raw material supplies, prices, distribution and taxes paid. Higher authorities were always after the counties and the towns to increase their contributions to war efforts. The towns usually found the money by taxing, among other things, their most important single source of income, beer. The Revolt against Hapsburg rule starting in 1568 and the 80 Years War between Spain and the Dutch Republic which followed meant a doubling of the tax on beer in Holland, another increase in 1576 and the establishment of a general tax on beer in the seven provinces of what would be the Dutch Republic in 1579. That general tax for the entire county remained in place through the seventeenth century. At least in one case, at Leiden, brewers used the general system of taxation as a reason to stop paying an old and well-established tax, the *gruitrecht*. One advantage of the wars and especially of the Revolt was that some brewers had a large single market in the army.⁶ The Revolt, the wars which followed, the emergence of the Dutch Republic and the sudden establishment of the new state as a major force in European international politics disturbed the economy. What is surprising, however, is the continuity in levels of production, consumption, and organization of the brewing industry. The Revolt, like the other wars of the period with their short term effects in the Netherlands and their disruption of traffic at sea, did not leave permanent scars, except perhaps in the burden of tax on beer production and consumption.

The continuity of taxation yields evidence on the production tendencies over the entire golden age of Dutch brewing. By the seventeenth century the surviving body of evidence is overwhelming and more complete than for virtually any other Dutch industry. The data are not always easy to interpret. Rises in income from beer taxes were caused by some combination of increasing consumption, rising rates of taxation and the introduction of new types of beer subject to different levels of tax. Imports and exports were typically taxed differently. The system got so complex that in some cases taxes would be "composed," that is the brewer and tax collector would strike a deal, the tax collector getting a lump sum payment based on what the brewer might have to pay for the period. The brewer got a discount for saving all parties a lot of trouble. Now and again town governments urged agreement between brewers and tax farmers to make collection eas-

⁶ G. A. Leiden, *Archieven van de Gilden*, #183; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 68, 101-102; P. Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1935), p. 32.

ier.⁷ The income from beer taxes may indicate the general tendency of production but the data do not yield a statement of the exact amount of beer brewed or drunk.

The most common reason given for new rules on brewing by any public authority was to stop tax fraud. With more extensive taxation came more extensive avoidance of taxes on beer. Since there were different levels of tax on different beers, misrepresenting beer as being of lesser value could sharply reduce the incidence of tax. Some beers were free of tax and some people, because of their office or their circumstances or the occasion were free of excise tax on the beer they drank. Nobles typically enjoyed tax freedom for the purchase of beer. Similarly, beer of very low quality was free of tax. So too was beer produced for and drunk by shipbuilders at Amsterdam. The exempt amount depended on the size of the ship they built, lengthened, repaired or caulked, and that by the sixteenth century was an old and well-established tradition. Delft shipbuilders enjoyed tax freedom too but only for beer consumed on board ships they built or rebuilt.⁸ Beer drunk on board ships was free of tax, that is unless the ship was anchored permanently and individuals lived on board. At Schiedam the monks, the beguines and other religious along with the inmates of the house for lepers joined shipcarpenters building ships in being free of excise. The town school teacher, as part of his pay, got a quantity of beer annually tax free. At their annual meetings, guilds were also free from paying taxes on the beer they enjoyed. At the popinjay society, a guild of *schutters* or marksmen, each member got eight barrels tax free plus a bonus of beer for the member who hit the stuffed popinjay used as a target.⁹ Students at Leiden University, like their counterparts in many other towns in Europe, got special consideration when it came to the preferred drink of young scholars. The repeated regulation of tax freedom and the numbers and variety of people who were able in one way or another to shake the burden of paying some or all of the excise on beer throws even more into doubt the reliability of tax records as an indicator of actual beer production. Even so general trends are clear from government receipts and other forms of both statistical and anecdotal evidence.

⁷ G. A. Leiden, *Archieven van de Gilden*, 197; Paul De Commer, "De Brouwindustrie te Ghent, 1505-1622," *Handelingen der Maatschappij voor Geschiedenis en Oudheidkunde te Gent* nieuwe reeks, 35 (1981) pp. 107-109, 112; Hallema and Emmens, *Het bier en zijn brouwers*, p. 140.

⁸ J. G. van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam [1512-1632]*, 1 (The Hague, 1929), #240; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 34; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, p. 181; Philipsen, "De Amssterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 15; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 2, p. 460; E. M. A. Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," *De Economist* (1920), p. 420.

⁹ van der Feijst, *Geschiedenis van Schiedam*, pp. 36-37, 50, 67, 69, 225.

The production figures or rather their proxies for the period from 1450 to 1650 reflect the general prosperity of the industry, the long term development and expansion of the industry, the temporary setbacks created by violent disturbances at home and abroad and the varying fortunes of different towns. In the second half of the fifteenth century, the greatest centers of beer production in Holland were Delft, Haarlem, and Gouda. By standards of the Low Countries and of Europe the principal brewing towns of Holland produced beer at impressive levels. In the late 1470s brewers in the three towns made beer something like 32,000 times a year on average which would have generated perhaps as much as 928,000 barrels. In 1514 total production may have been up to about 955,000 barrels or at least 110,000,000 litres and probably more. Of that only some 7% was consumed in those towns. The rest of the beer was made for export.¹⁰

Gouda enjoyed her highest levels of production and of exports in the 1480s. The records of the hop excise, a charge on production with surviving accounts from 1360 to 1585, fail to show the sharp rise in that decade and even suggest that beer production remained at about the same high level throughout the last quarter of the century or more. There are records of the total number of brews for the 1480s. Unfortunately not all brews produced the same amount of beer so a conversion to liters involves estimation which introduces an error of unknown size. In 1480 Gouda brewers put out 11,929 brews, on average each being of 31 barrels and a barrel being about 120 liters. Output then was in excess of 44,000,000 liters, up from over 31,000,000 liters around 1477. The same tax indicates 10,397 brews produced in 1514 and that may be an underestimate. Incidentally, by 1544-1545 in a twelve-month period the figure was down to 5,555 brews or some 17,000,000 liters. Exports were critical. Around 1500 volume was such that only 1 in 10 barrels of beer brewed in Gouda was consumed there. That put exports at better than 15,000,000 liters. If the proportion was about the same in the 1480s, the export total was more than two and a half times as much.¹¹ The export markets for Gouda were just to the south.

At Antwerp in 1531, 1532 and 1538 imports were more than 75% of production in the town and in 1543 the proportion was up to 86%. That peak appears to coincide with the sixteenth century peak of beer consumption in western Flanders. The port of Sluis in the first nine months of 1478 produced almost 300,000

¹⁰ Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 58-60; Richard J. Yntema, "Een kapitale nering De brouwindustrie in Holland tussen 1500 en 1800," in: *Bier! Geschiedenis van een volksdrank*, R. E. Kistemaker and V. T. van Vilsteren, eds. (Amsterdam, 1994), p. 73.

¹¹ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 202-204, 213-214; Noordegraaf, "Nijverheid in de Noordelijke Nederlanden," p. 19; Pinkse, "Het Goudse Kuitbier...", pp. 91, 114; van Uytven, "Oudheid en middeleeuwen," p. 39; Yntema, "The Brewing Industry in Holland, 1300-1800...", p. 32.

litres but imported about 550,000 liters of beer. In 1485 all Flemish harbors imported at an annual rate of 1,960,000 liters. From 1487 to 1488 the small port of Nieuwpoort took an annual average of more than 1,700,000 liters of Holland beer of all sorts. Residents of the rural district around Bruges consumed about 1,400,000 litres of beer from Holland in 1485 while all other foreign sources generated only 7,500 litres. In the 1540s Holland beer exports to the region were up to around 3,000,000 litres each year with all other foreign sources sending between 4% and 12% of that figure. Imports from Holland into that district, at Dunkirk, Nieuwpoort and at the harbours along the Zwin, dwarfed those from Germany and England in the 1470s and 1480s as well as through the first half of the sixteenth century.¹²

Using records from a Gouda excise tax for the years 1437 through 1553 which indicate beer sales in the town and Gouda hop tax records which indicate levels of output, the two proxies for consumption and production can be compared.¹³ When consumption in the town went up production tended to be going down and vice versa, not surprising for a great center of beer export. Even more in the bad years where war disturbed consumption exports brewers looked to sales at home to compensate for losses in markets elsewhere. Whichever market was buoyant, home or foreign, Gouda brewers catered to it.

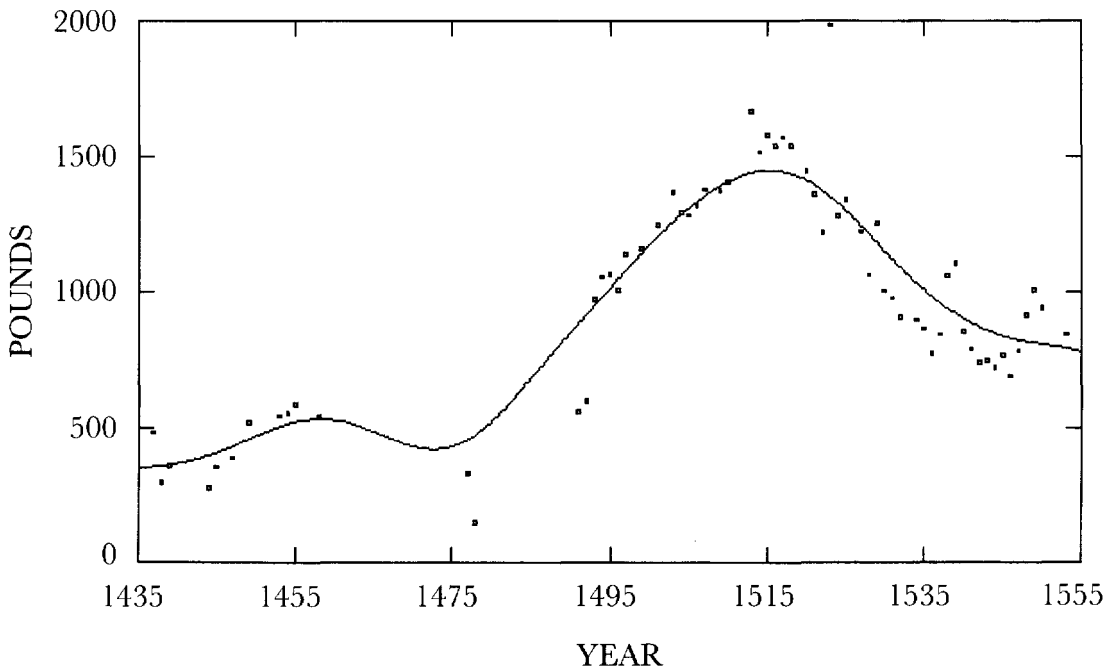
Figures from before 1491 are not strictly comparable since there was a currency change in that year and the exchange rate between the old and new currencies probably does not accurately reflect relative values over the long run. Still there is after 1491 clear evidence of rising consumption into the 1520s and then decline to and through mid century. The domestic market may have helped to compensate at least into the second quarter of the sixteenth century for what was an apparent fall in exports.

Output certainly fell in the first half of the sixteenth century. The record level of average production of the 1480s of some 26,400,000 liters was within reach as late as the mid 1540s when annual production could still on occasion approach 30,000,000 liters. After that decline was sharp. For the 1550s the average was around 13,800,000 liters. The Revolt then had a disastrous effect on the industry. The combination of fighting, higher taxes and the closing of export markets in large towns to the South meant a fall in production of better

¹² Hugo Soly, "De Brouwerijenonderneming van Gilbert van Schoonbeke (1552-1562)," *Revue Belge de Philologie et D'Histoire* 46 (1968), p. 346; R. van Uytven, "Het Bierverbruik en de Sociaal-Economische Toestand in het Brugse Vrije in de Zestiende Eeuw," *Handelingen van het Genootschap voor Geschiedenis gesticht onder de benaming "Société d'Emulation" te Brugge*, 131 (1994), pp. 12, 17; van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," pp. 340-341.

¹³ G. A. Gouda, *Aanteekeningen v. d. Poest Clement, Hopaccijn 1360-1584, Bieraccijn from Stadsrekeningen*, #1125-1200.

Figure III-1

Income from Consumption Taxes: Gouda, 1437-1553

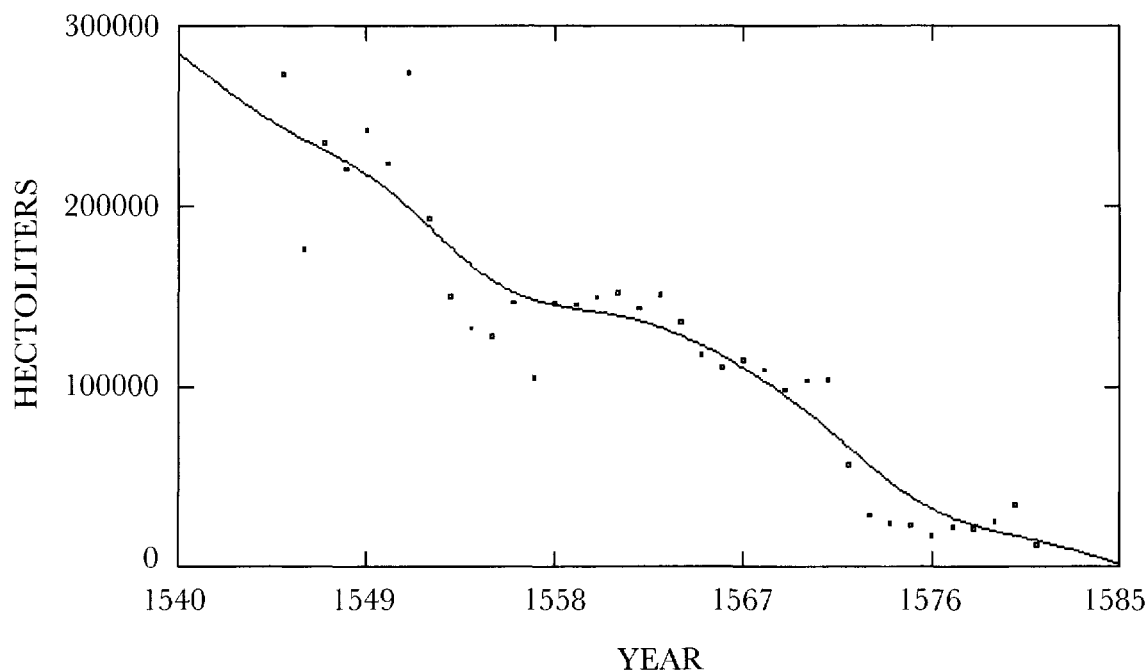
Source: A. van der Poest Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," incomplete and unpublished doctoral dissertation (1959) — G. A. Gouda

than 90% between 1560 and 1580. Instead of the more than 15,000,000 liters of 1560 brewers were producing only about 10,000,000 in 1570 and 120,000 liters in 1580.¹⁴ All the data agree on the general trends: a long term increase in production through the fifteenth century reaching a peak in the 1480s and then a longer period of stable output at a lower plateau followed a steep decline from 1560.

The fortunes of the industry in Haarlem depended heavily on exports too but the pattern of change was different. Records on beer production from the town show wide swings both in total output and in the share of output consumed elsewhere. 55% of Haarlem production was sold outside the town in the 1430s, down to around 30% by the 1460s. In the 1590s Haarlem exports were back up to about 65% of output. Data for the sixteenth century for the number of brews

¹⁴ Pinkse, "Het Goudse Kuitbier...", pp. 112, 114, 128; Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 31-33; Yntema, "Een kapitale nering De brouwindustrie in Holland tussen 1500 en 1800," p. 73.

Figure III-2

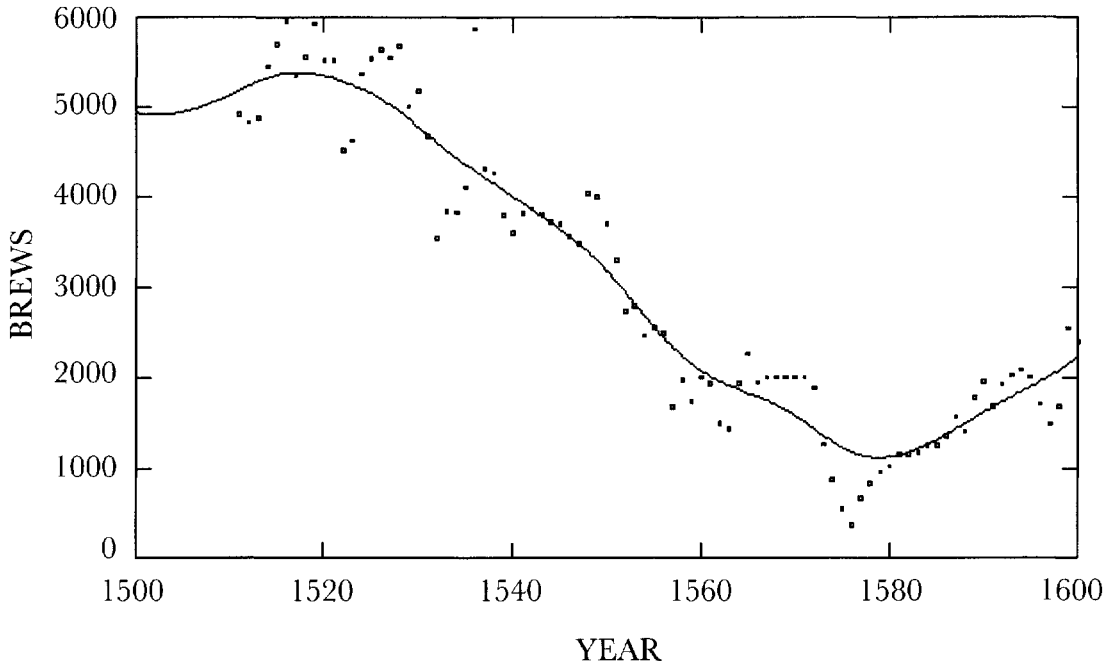
Production at Gouda, 1545-1581

Source: A. van der Poest Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," incomplete and unpublished doctoral dissertation (1959) — G. A. Gouda

do not come from the same sources or sources consistent with those of the fifteenth century. Still they do give a reliable picture of the general development, of a sharp fall in the years before and during the early years of the Revolt and then a significant recovery. If there were 32 barrels to the brew, which was the legal limit though one often exceeded, then production was over 9,000,000 liters each year in the middle of the fifteenth century and in some years 50% or even above that figure. By the middle of the sixteenth century annual production was at least 11,000,000 liters. After that the number of brews declined through the early years of the Revolt. If in 1514 output reached about 20,000,000 liters and rose by more than 30% to 1544, then in 1576, certainly not a good year, it was down to 1,730,000 liters. By 1594 it was back up to 12,700,000 liters and in the following year about the same at 11,000,000 liters.¹⁵

¹⁵ A. Houwen, "De Haarlemsche Brouwerij 1575-1600," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1932), pp. 4, 9, 11, 16, 19-20, 27;

Figure III-3

Production at Haarlem, 1510-1600

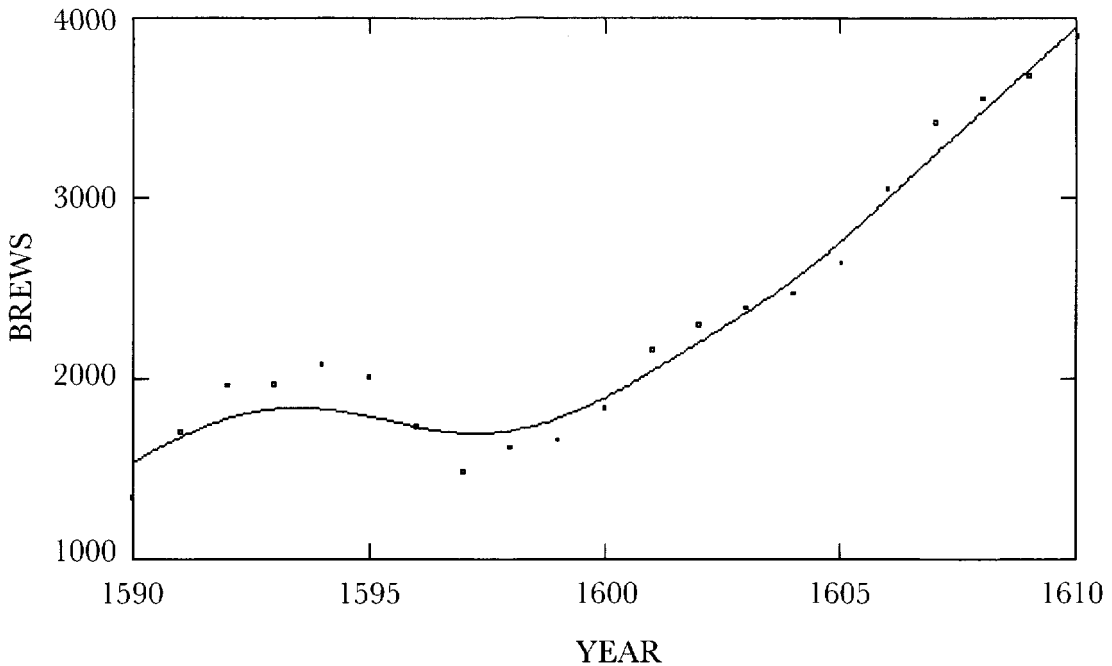
Source: Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), pp. 45-47

The recovery in the closing years of the sixteenth century was even more dramatic than shown by the rise in the number of brews since brewers undoubtedly were raising the barrels filled each time they produced beer. In the years from 1590 to 1610 the turnaround in total production was dramatic. Weekly data converted and normalized as annual data show a steep and dramatic climb from 1596. By 1610 Haarlem brewers were brewing a total of almost 4,000 times in a year.

In the first 20 years of the seventeenth century, total output recovered from a low level of about 2,000 brews each year to over 6,000 brews of 80 barrels each. That put the level at something like a very impressive 57,000,000 liters a year. Average production per brewery rose as well throughout the sixteenth century. In 1514 the average output was 75 brews per firm. That went down to 57 in

van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 45-47, 55, 59, 64-65; Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 39-41; Yntema, "Een kapitale nering De brouwindustrie in Holland tussen 1500 en 1800," p. 73.

Figure III-4

Production at Haarlem, 1590-1610

Source: G. A. Haarlem, *Archief van het Brouwersgilde*: 27, "Brouwboekjes"

1574, in the middle of the Revolt, but was up to 85 in 1578, 112 by 1596 and an average of 111 in the years 1623-1645. The success in the first half of the seventeenth century showed the resilience of the industry and the resilience of consumption levels.¹⁶ To what degree problems in the southern Netherlands where there was more fighting during the Eighty Years' War contributed to the success is difficult to assess. Disruptions in Brabant and Flanders may well have given brewers in Holland less to fear from imported beer. The position of Haarlem relative to Gouda changed dramatically. Haarlem became the more important producer in the early fifteenth century but was then supplanted as the primary exporting town by Gouda in the later part of the century. Haarlem enjoyed a recovery and prospered early in the sixteenth century as did Gouda. The latter did not reach earlier levels of success which the former, on the other hand, far exceeded.

There are no comparable production figures for Delft, the other major export

¹⁶ P. Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 3-5; Yntema, "The Brewing Industry in Holland, 1300-1800...," p. 42.

center, so it is not possible to track the fortunes of that town compared to the other two. Annual production in the early fifteenth century is said to have been about 130,000 barrels. In the years before 1477 it is possible that production reached 10,500 brews or 304,500 barrels a year with the level declining in the last two decades of the century. Contemporary comments suggest that Delft was not as important an exporter of beer in the sixteenth century as she had been in the fifteenth. In the middle of the sixteenth century one estimate puts annual production at Delft at 500,000 barrels or, assuming barrels of 120 litres each, 60,000,000 liters per year. The town had a population of only 15,000 and that was enough beer to supply the needs of 200,000 people so much of it must have been exported. In 1554-1555 over twelve months production at Delft was 511,200 barrels. It had fallen a little by 1562-1563 but after that output increased reaching a peak of 630,000 barrels or almost 75,000,000 liters in 1569-1570. Tax avoidance would make such figures minima. The years up to and at the start of the Revolt then proved to be the best ones for the Delft industry.¹⁷

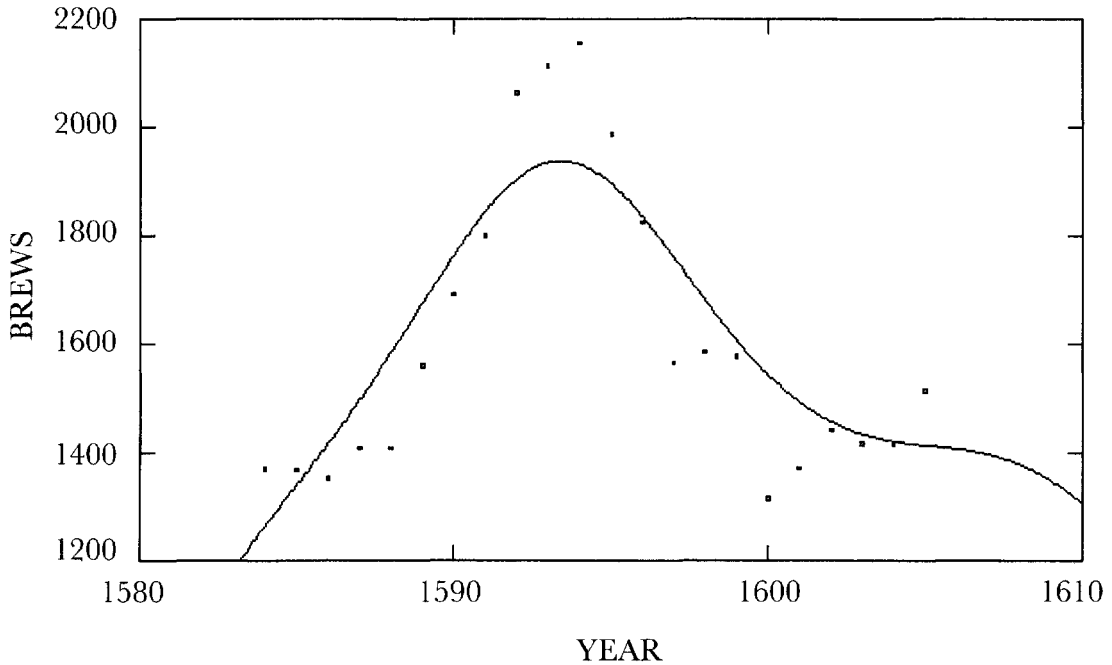
The shortage of data on production extends to a number of other towns such as Rotterdam. Lying between Gouda and Delft, Rotterdam was long an importer of beer from those towns. Something like 685 brews per year was the average production for the period 1511-1517 but that had risen to annual levels of 1,100 brews by mid century. By 1561 output was 1,240 brews, in 1621 more than 5,000 and in 1631 more than 8,000. That peak of something like 480,000 barrels or better than 70,000,000 liters transformed the town into a major producer by European standards, something it was far from being in the sixteenth century.¹⁸

In Leiden, similarly, the total tax collected on beer rose in the fifteenth century. It seems likely, therefore, that both consumption and production rose. For the sixteenth century in twelve months in 1544 and 1545 Leiden brewers made over 64,000 barrels of beer indicating a sizeable industry but one still smaller than that of, for example, Delft. There is one return for one quarter of 1567 which indicates an annual production of about 5,250,000 liters, a sharp drop from the 1540s. Presumably that was a bad year, in the middle of a grain shortage and the beginnings of the Revolt, and so not representative. Another report for a quarter, in this case the third of 1590, gives output from a total of nine brewers at 2,926,950 liters. Production was different in each quarter, but if it were the same, that would imply Leiden brewers could have made as much as about

¹⁷ J. J. Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," in: *De Nederlanden in de late middeleeuwen* (Utrecht, 1987), pp. 261, 268; Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 34-37; Yntema, "Een kapitale nering De brouwindustrie in Holland tussen 1500 en 1800," p. 73.

¹⁸ R. Bijlsma, "Rotterdams Welvaren in den Spaanschen Tijd," *Rotterdamsch Jaarboekje* 8 (1910), p. 79; Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 46-47, 118.

Figure III-5

Production at Leiden, 1584-1606

Source: G. A. Leiden, *Secretaire Archief na 1574*: #4337, Rapport door Jan van Hout betreffende de ontduikingen der accijnzen door brouwers, biestekers, biestragers en tappers, 1606, fol. 6r

11,000,000 liters. A report on excises submitted in 1606 to the town government gives the number of brews for each year from 1584 through 1605. Taking a conservative estimate of 50 barrels for each brew and a barrel at 155 liters average production for the period was almost 12,500,000 liters.¹⁹ The sketchy beer production figures when compared to those of export centers like Gouda and Haarlem confirm the lesser role of Leiden. Even so, output approaching 10,000,000 liters per year was still significant.

Amsterdam saw her production of beer grow too, but from a small base and the total amount is, as with many other towns, unknown. Production of beer in 1543 was about 25,000 barrels. Amsterdam, like Rotterdam, benefited from the great boom in international trade at the close of the sixteenth and start of the seventeenth century. Production at Amsterdam in the first six years of the seven-

¹⁹ G. A. Leiden, *Archieven van de Gilden*, #279; *Archief der Secretaire 1253-1575*, #977; *Secretaire Archief na 1574*, #4337; Marsilje, *Het financiële beleid van Leiden in de Laat-Beierse en Bourgondische periode 1390-1477*, p. 274; Yntema, "The Brewing Industry in Holland, 1300-1800...", p. 61.

Table III-1

Output of Beer by Town

<i>Town</i>	<i>Year</i>	<i>Quantity in Liters</i>
Gouda	1480	44,376,000
Gouda	1480s (avg.)	26,400,000
Gouda	1545	29,303,400
Gouda	1550s (avg.)	13,800,000
Gouda	1560	15,193,000
Gouda	1570	10,396,000
Gouda	1580	1,230,000
Haarlem	1514	20,000,000
Haarlem	1576	1,730,000
Haarlem	1592	8,700,000
Haarlem	1594	12,700,000
Haarlem	1595	11,000,000
Haarlem	1600-20 (avg.)	57,000,000
Leuven	1372	4,600,000
Leuven	1434	3,625,500
Leuven	1472	4,740,000
Leuven	1500	3,600,000-4,700,000
Leuven	1524	4,533,000
Leuven	1560s	7,400,000
Ghent	1511	17,770,000
Ghent	1527	11,924,000
Ghent	1562	12,400,000
Ghent	1567	11,787,000
Ghent	1572	12,217,000
Ghent	1578	12,460,500
Ghent	1583	16,127,000
Ghent	1587	3,370,000
Ghent	1593	7,926,000
Ghent	1600	8,866,000
Antwerp	1531	10,620,000
Antwerp	1537	13,800,000
Antwerp	1543	13,407,000
Antwerp	1565	26,373,000
Antwerp	1570	36,425,000
Antwerp	1575	29,237,000
Antwerp	1577	28,356,000
Antwerp	1580s	45,000,000
Bruges	1482	7,844,000
Bruges	1580	15,836,000
Brussels	c. 1500	20,868,000
Brussels	1617	35,520,000
Hamburg	1350	25,000,000
Hamburg	1401-1450	30,000,000 (avg.)
Hamburg	1451-1500	25,000,000 (avg.)
Hamburg	1501-1550	20,000,000 (avg.)

<i>Town</i>	<i>Year</i>	<i>Quantity in Liters</i>
Wismar	1351-1400	17,500,000 (avg.)
Wismar	1401-1450	12,000,000 (avg.)
Wismar	1451-1500	6,000,000 (avg.)
Wismar	1560-1600	8,500,000 (avg.)
Wismar	1600-1618	11,000,000 (avg.)
Lübeck	1401-1450	10,000,000 (avg.)
Lübeck	1451-1500	8,000,000 (avg.)
Lübeck	1501-1550	7,000,000 (avg.)
Gdansk	1401-1500	25,000,000 (approx. avg.)
Gdansk	1501-1550	20,000,000 (avg.)
Gdansk	1551-1600	14,500,000 (avg.)
Elblag	1580	5,000,000 (approx.)
Malbrok (Marienburg)	1580	4,000,000 (approx.)
Göttingen	1401-1450	3,000,000 (avg.)
Göttingen	1470	2,500,000
Göttingen	1555	3,200,000
Schweidnitz	1451-1500	5,500,000 (avg.)
Schweidnitz	1501-1550	4,500,000 (avg.)
Schweidnitz	1610	2,500,000
Hannover	1600	6,000,000
Munich	1600	6,500,000
London	1574	51,060,000
London	1585	106,158,000

Sources: A. R., *Papiers de l'Etat et de l'Audience*, 1665/1; W. Abel, *Stufen der Ernährung Eine historische Skizze* (Göttingen, 1981), pp. 52-53; Paul De Commer, "De Brouwindustrie te Ghent, 1505-1622," *Handelingen der Maatschappij voor Geschiedenis en Oudheidkunde te Gent* nieuwe reeks, 37 (1983), pp. 113-114, 118 (for Ghent the year in which the tax year ended is given); A. Houwen, "De Haarlemsche Brouwerij 1575-1600," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1932), pp. 4, 9, 11, 14, 16, 19-20, 27; Hans Hunte-mann, *Das deutsche Braugewerbe vom Ausgang des Mittelalters bis zum Beginn der Industrialisierung. Biererzeugung — Bierhandel — Bierverbrauch* (Nuremberg, 1971), pp. 11, 48; Andrzej Klonder, *Browarnictwo w Prusach Krolewskich [2 Polowa XVI-XVII W.]*, Polska Akademia Nauk Instytut Historii Kultury Materialnej (Warsaw, 1983), p. 160; August Löhdefink, *Die Entwicklung der Brauergilde der Stadt Hannover zur heutigen Erwerbsgesellschaft (Ein Beitrag zur Lehre von den Unternehmungen)* (Hannover, 1925), p. 19; Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), pp. 45, 47; V. C. C. J. Pinkse, "Het Goudse Kuitbier, Gouda's Welveren in de Late Middeleeuwen 1400-1568," *Gouda Zeven Eeuwen Stad* (19 July, 1972), pp. 112, 114, 128; Hugo Soly, "De Brouwerijenonderneming van Gilbert van Schoonbeke (1552-1562)," *Revue Belge de Philologie et d'Histoire* 46 (1968), pp. 347, 1198; Hugo Soly and A. K. L. Thijs, "Nijverheid in de Zuidelijke Nederlanden," *Algemene Geschiedenis der Nederlanden*, volume 6 (Haarlem, 1979), p. 47; R. van, Uytven, "Bestaansmiddelen," *Arca Lowanensis Jaarboek* 7 (1978), pp. 155, 157.

teenth century was on average almost 50% greater than for the last decade of the previous century. The rapid increase in population in the most favored coastal towns meant a bigger market for brewers. Output of Amsterdam brewers by 1630 may have been as high as around 90,000 barrels²⁰ so in the middle of the seventeenth century Amsterdam seems to have been flirting with levels of production similar to those recorded by the export centers in the late fifteenth and sixteenth centuries.

A less reliable and less accurate measure of the level of output is the number of breweries at different sites in Holland. Average production per brewery varied both from place to place and over time so the data suggest more about capacity and capital investment than about output. There are few figures of the number of breweries from before the closing years of the fifteenth century. In 1494 and again in 1514 Holland authorities carried out surveys to establish the available tax base. One thing often mentioned in the returns was the number of breweries. The returns show without question that some towns such as Hoorn, Dordrecht, Rotterdam, Oudewater, and others produced just for themselves and the area near them while some towns such as Gouda, Delft and Haarlem produced for export. In 1494 Gouda had 157 and Haarlem 112 breweries, down from earlier levels. Even so that still meant that there was about one brewery for every 100 Haarlem inhabitants. The figure of 350 for the number of breweries in fifteenth century Gouda comes from a pastor, Ignatius Walvis, who published a history in 1713 giving that inflated figure. Tax accounts are clear that in 1479 there were 223 breweries active and in 1480 172 so there is no basis whatsoever for Walvis' number. By 1510 the total in Gouda was still 152. In 1514 Gouda had 148, Delft 98 and Haarlem still had 75 breweries. The sheer number made a deep impression on the physical appearance as well as the economies of the towns. The tendency more than ever was for brewers and breweries to be concentrated in a single neighborhood or along a single stream.²¹ By 1610 Amsterdam, for example, had a canal where it was expected that brewers would live, the *Brouwersgracht*, in a part of the town which was being rapidly developed. The 1494 and 1514 figures for the number of breweries may be misleading for a number of reasons. There could be, especially in the export centers, sharp swings in the number of breweries.²²

²⁰ G. A. Amsterdam, Archief van de Thesaurieren Ordinaris, 'Rapiamus'; R. Bijlsma, "De Brouwerij 'De Twee Witte Klimminde Leeuwen'," *Rotterdamsch Jaarboekje* 9 (1911), p. 127; Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 48-49.

²¹ A. R. A., Archief Grafelijksheidsrekenkamer, Rekeningen, #1722; De Boer, "Delft Omstreeks 1400," p. 96; Bijlsma, "Rotterdams Welvaren in den Spaanschen Tijd," pp. 77-78; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," box 1, p. 199.

²² H. Brugmans, *Opkomst en Bloei van Amsterdam* second edition, A. L. Cosquino de Bussy and N. W. Posthumus, eds. (Amsterdam, 1944), p. 96; E. C. G. Brünner, *De order op de buitenmering van*

Table III-2

Number of Breweries in Holland Towns c. 1450-1650¹

Alkmaar	1514	0	Haarlem	1490	114*
	1494	120			
Amsterdam	1505	9		1495	115
	1543	14		1496	112
	1545	10		1503	95
	1557	11		1504	91
	1585	16		1510	87
	1617	14*		1511	84
	1620	15		1512	81
	1620	17*		1513	77
	1621	18		1514	77
	1622	17		1519	78
	1625	20		1538	53
	1640	22		1548	45
	1664	22		1563	20
	1576	7			
Delft	15thC	200		1579	11
	1494	100		1589	15
	1510	138		1590	19
	1513	77		1596	19
	1514	98		1599	20
	1539	40-50		1600	22
	1568	100		1605	28*
	1600	82		1607	30
	1645	25		1608	33
	1679	17		1610	37
	1612	44			
Dordrecht	c. 1490	30		1623	54
				1629	54
	1504	28-30		1634	50
	1514	21-22		1640	49
	1555	15		1650	55
	1594	23			
	1606	27	Hoorn	1514	3
				1607	28
					(winter only)
	1618	9*		1616	30*
	1618	29			
	1623	24	Leiden	1477	23
	1624	20		1500	20-22*
	1635	20		1502	16
	1633-1657	17-20		1528	16
Enkhuizen	1560	2	Rotterdam	1477	25
				1494	16
	1646	2		1504	15-18
	1514	9			
Gouda	1480	172		1540	12
	1494	157		1609	16
	1504	156-157		1623	30
	1509	141		1630	30
	1510	152*		1648	28
	1514	148			
	1515	152*	Schiedam	1494	8
	1539	115*		c. 1514	6
	1543	113*			

*Number of brewers

1545	97*	Schoonhoven	1470	15
	(85* active)		c.1514	6
1580	120	1622	9	
1588	120			
1609	14	Weesp	1631	10
1616	14		1637	8

*Number of brewers

Sources: A. R., *Papiers de l'Etat et de l'Audience*: 1665/1; G. A. Haarlem, *Archief van het Brouwersgilde*, #27; G. A. Hoorn, #336, 1134-1135; Jan Alleblas, "Nieuw Leven in een Oud Brouwerij? Geschiedenis en Toekomst van De Sleutel," *Kwartaal & Tekens van Dordrecht Gemeentelijke Archiefdienst Dordrecht* 9, 2 (1983), p. 2; Anon., Where the ale brewers and beere brewers of this realm of England have used and daye doo use for their owne singular luere profite... (n. d.), p. 11; R. Bijlsma, *Rotterdams Welvaren 1550-1650* (The Hague, 1918), pp. 102-103; R. Bijlsma, "Rotterdams Welvaren in den Spaanschen Tijd," *Rotterdamsch Jaarboekje* 8 (1910), p. 77; Dirck van Bleyswijck, *Beschryvinge der Stadt Delft* (Delft, 1667), pp. 735-736; P.J. Blok, *Geschiedenis eener Hollandse Stad*, second edition (The Hague, 1910-18), 2, p. 241; Dick E. H. De Boer, *Graaf en Grafiek Sociale en economische ontwikkelingen in het middeleeuwse Noordholland' tussen ±1345 en ±1415* (Leiden, 1978), p. 288; Geeraerd Brandt, *Historie de Vermaerde Zee- en koopstadt Enkhuizen*,... (Enkhuizen, 1666), p. 120; J. C. Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid, II Bierbrouwerijen," *Nederlands Fabrikaat Maandblad der Vereniging Nederlands Fabrikaat* (1921), p. 75; H. Brugmans, *Amsterdam in de Zeventiende Eeuw*, volume 2, *Handel en Nijverheid te Amsterdam in de 17e Eeuw* (The Hague, 1904), pp. 209-210; A. van der Poest Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," incomplete and unpublished doctoral dissertation (1959) — G. A. Gouda, pp. 67, 199-200; J.L. van Dalen, *Geschiedenis van Dordrecht*, (Dordrecht, 1931-1933), 1, pp. 388-389; J. G. van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildeleven van Amsterdam [1512-1632]* (The Hague, 1929-1974), 2, #608 [1620]; G. Doorman, *De Middeleeuwse Brouwerij en de Gruut* (The Hague, 1955), p. 59; S. A. C. Dudok van Heel, "Vroege Brouwerijen aan de Amstel in de Vijftiende en Zestiende Eeuw," *Amstelodamum, Jaarboek* 28 (1990), p. 60; I. H. van Eeghen, "De Brouwerij de Hooiberg," *Jaarboek van het Genootschap Amstelodamum* 58 (1958), p. 46; Florike Egmond, "De Strijd om het dagelijks bier Brouwerijen, groothandel in bier en economische politiek in de Noordelijke Nederlanden tijdens de zestiende eeuw," in: Clé Lesger and Leo Noordegraaf, eds., *Ondernemers en Bestuurders Economie en Politiek in de Noordelijke Nederlanden in de Late Middeleeuwen en Vroegmoderne Tijd* (Amsterdam, 1999), p. 158; J. A. Faber, H. A. Diederiks and S. Hart, "Urbanisering, Industrialisering en Milieuaantasting in Nederland in de Periode van 1500 tot 1800," *A. A. G. Bijdragen* 18 (1973), p. 264; Robert Fruin, ed., *Informacie up den staet, faculteyt ende gelegentheyten van de steden ende dorpen van Hollant end Vriesland om daenae te reguleren de Nieuwe Schiltale, Gedaen in de Jaere MDXIV* (Leiden, 1866); P. Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1935), pp. 1-2; A. Houwen, "De Haarlemsche Brouwerij 1575-1600," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1932), pp. 26-27; R. Ladan, "Leidse Brouwers Anno 1500," *Leids Jaarboekje* (1989), p. 40; Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), pp. 61-62; J. P. W. Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1937), p. 4; L. J. C. J. van Ravesteyn, "Rotterdam voor de 19e Eeuw. De Ontwikkeling der Stad," *Rotterdamsch Jaarboekje*, third series, 8 (1930), pp. 141, 149; J. Schouten, *Gouda vroeger en nu* (Bussum, 1969), pp. 67-68; J. Ter Gouw, *Geschiedenis van Amsterdam* (Amsterdam, 1879), 5, p. 437; E. M. A. Timmer, *De Generale Brouwers van Holland Een bijdrage tot de geschiedenis der brouwening in Holland in de 17de, 18de en 19de Eeuw* (Haarlem, 1918), pp. 1-3; E. M. A. Timmer, "Uit de nadagen der Delftsche brouwening," *De Economist* (1916), p. 741; W. S. Unger, "De Economische en Sociale Structuur van Dordrecht in 1555," *De Economist* (1915), p. 961; Jan Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen, voorregten, koophandel, Gebouwen, kerkenstaat, scholen, schutterye, Gilden en Regeeringe* (Amsterdam, 1760-1768), 8, pp. 227-228; E. Wiersma, *De Archieven der Rotterdamsche Gilden* (Rotterdam, 1926), p. 4; J. J. Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," in: *De Nederlanden in de late middeleeuwen* (Utrecht, 1987), p. 268; Richard J. Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," Unpublished Doctoral Dissertation, The University of Chicago, March 1992, pp. 44, 47.

The 1514 survey came just before a general improvement in the brewing industry so may understate the condition of beer making.

The number of breweries at Rotterdam grew dramatically in the early years of the seventeenth century. The absolute number is not reported but from 1600 to 1614 there were 11 new breweries set up in the town, the last five of the 11 set up in 1614 alone. From 1614 to 1621 another 10 new breweries were added. The growth explains why Rotterdam had some 30 breweries in 1623 putting it, for the first time, among the leaders in Holland. A poem of the early seventeenth century that glorifies beer making and the town gives a total of 33 breweries for Rotterdam and a later poem mentions 22 breweries, though in neither case is there an exact date. The growth was certainly a result of the growth in shipping. Rotterdam brewers developed a reputation for making a high quality beer, better than that of Delft. The new breweries at Rotterdam were all outside the old diked area of the town, in the harbor and it may be that the water there was the source of the good name of the beer. The philosopher Leibnitz, in a letter of 1694, praised Rotterdam beer and attributed its sweetness not to the water but to brewers' use of buckwheat.²³

Dordrecht had a brewery founded in 1433 which survived into the middle of the twentieth century but such longevity was rare. Breweries came and went, often reorganized, closed in some cases to be reopened at some later date.²⁴ The slump in sales at Haarlem in the 1570s is the only explanation for the sharp decrease in the number of breweries and then the dramatic rise over the following four decades. The character of the breweries changed, though, as only the larger survived. By the end of the sixteenth century only two Haarlem brewers produced less than about 300,000 liters per year. The survival of many breweries depended not just on the character of the market and the value of property but on the willingness of individuals — often family members — to keep the enterprise going. The number of new brewers entering the trade each year, even in a brewing center like Delft, was always small.

In smaller towns it was only with the initiative of some one or two people that

1531. *Bijdrage tot de Kennis van de economische Geschiedenis van het Graafschap Holland in den Tijd van Karel V* (Utrecht, 1918), p. 111.

²³ Anon., "Twee Lofliederen op de Rotterdamsche Bierbrouwerijen," *Rotterdamsch Jaarboekje* 5 (1896), pp. 215-222; Bijlsma, "De Brouwerij 'De Twee Witte Klimminde Leeuwen'," pp. 127-129; R. Bijlsma, *Rotterdams Welvaren 1550-1650* (The Hague, 1918), pp. 103, 105-106; Gottfried Wilhelm Leibnitz, *Allgemeiner Politischer und Historischer Briefwechsel*, first series, volume 10, 1694, Gerda Utermöhlen, Günter Scheel and Kurt Müller, eds. (Berlin, 1979), p. 641.

²⁴ G. A. Dordrecht, *Archief Brouwerij De Sleutel*; Alleblas, "Nieuw Leven in een Oud Brouwerij?..." ; van Dalen, *Geschiedenis van Dordrecht*, 1, pp. 103, 649; P. K. Dommissie, *Register van Merkwaaardige Panden binnen Vlissingen* (Vlissingen, 1909), pp. 14-15.

Table III-3

Average Number of Brewers Entering the Citizenship of Delft, 1536-1629

<i>Decade</i>	<i>Number of observations</i>	<i>Avg. number of entrants</i>
1530s	2	3
1540s	7	4.7
1550s	8	3.6
1560s	9	5
1570s	2	5.5
1580s	10	3.5
1590s	7	3.7
1600s	8	3.1
1610s	6	3.3
1620s	7	2

Source: G. A. Delft, Oud Archief, Eerste Afdeling, #404

commercial brewing began at all. That explains the very small number of breweries in some towns. It does not explain the small number of brewers in Amsterdam. As late as 1585 only 39 of the 1397 individuals in the town who reported their trades during a tax assessment said they were brewers. There were only some 16 breweries, and one merchant reported that he owned a brewery, presumably having someone else operate it for him. Even in 1620 Amsterdam still had only 20 breweries, a number well below that of other much smaller towns and well behind Rotterdam where brewers had taken advantage of the rapid growth in shipping and commerce in the early seventeenth century. In at least one case a beer importer in Amsterdam became a partner in a Rotterdam brewery so that he could be sure of having supplies. At Amsterdam beer imports in general rose. In 1621 new and larger facilities were designated for where beer would come into the town.²⁵

Only Amersfoort in the province of Utrecht, a centre of beer exports since the fourteenth century, could compare in number of breweries to the most successful

²⁵ Brugmans, *Opkomst en Bloei van Amsterdam*, p. 100; J. G. van Dillen, *Amsterdam in 1585, Het Kohier der Capitale Impositie van 1585* (Amsterdam, 1941), p. xxxviii, fol. 17; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam [1512-1632]*, 2, #740 [1621], #813 [1622]; I. H. van Eeghen, "De Brouwerij de Hooiberg," *Jaarboek van het Genootschap Amstelodamum* 58 (1958), pp. 46-47; Houwen, "De Haarlemsche Brouwerij 1575-1600," pp. 25-26.

of Holland towns. In 1614 a now-lost record mentioned that Amersfoort once had 350 brewers. The reference was apparently a general one and may have reflected the number of people who earned their living from brewing in the late fifteenth century rather than the numbers of breweries. Annual output in the fifteenth century could never have reached a level to employ that many breweries. Despite the lack of evidence and the impossible numbers, the reputation of Amersfoort for having very many breweries has survived. By 1602 there were still 31 breweries in the town,²⁶ certainly a sharp fall from 150 years before but how sharp simply can not be known.

Overseas, in Dutch colonies there was some growth in brewing too. New Amsterdam got its first brewery in 1629, very soon after its foundation. The beer was said to be as good as that made in Holland. The ingredients were produced locally including the hops which grew in the woods near the settlement. By 1637 the town had a second brewery and a third was ordered to stop brewing in 1646. The governor, Pieter Minuit, opened a public brewery where anyone could come and brew in 1633 but shut it down in 1638 because private breweries were fulfilling local demand. The commercial brewers' production was supplemented by that of publicans who made their own beer, and by home brewers. In 1638 New Amsterdam had 17 licensed taverns. Before 1644 the government of the colony had already levied an excise tax on beer and in that year it imposed a charge of two guilders but on each half barrel, not each barrel brewed as in the Netherlands. Along with the excise came the well established elaborate system of enforcement. When the Dutch seized the Swedish colony on the Delaware they introduced a brewery there, that in 1661. The pattern of promotion of brewing, regulating of consumption public and private and the taxation of beer production already well established at home was transferred holus bolus to the New World along with the methods and equipment of beer making. At another Dutch colony, the one at the Cape of Good Hope beer production started on 5 October, 1658. The principal function of the brewer was to supply East India Company ships on their way going out or coming back from the Far East. Success at cultivating vines in the colony soon led to replacement of beer with wine for both local consumption and for supplying ships.²⁷

Consumption levels when combined with population data and figures for exports and imports can give some indication of levels and trends in production

²⁶ Halbertsma, *Zeven Eeuwen Amersfoort*, pp. 43, 49; van Rootselaar, *Amersfoort, Sprokkelingen*, LXXI.

²⁷ Stanley Baron, *Brewed in America: A History of Beer and Ale in the United States* (Boston, 1962), pp. 19-25, 26, 29; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 148-150; Siebel, *One Hundred Years of Brewing...*, pp. 159-161; John Watney, *Beer is Best A History of Beer* (London, 1974), p. 156.

in Dutch brewing. Data for per capita beer drinking are, however, just as sparse as for production and for the number of breweries. Figures are sometimes derived from known sales and population data — not always reliable — and sometimes from unique circumstances such as practices in hospitals or monasteries. Since the sales figures are based on tax records, they run the risk of missing consumption by tax exempt groups. At the very least, though, consumption figures do give an impression of the importance of beer to the people of sixteenth century northern Europe and of what kind of market brewers faced.

Even in the early sixteenth century the Dutch were well-known to be heavy drinkers. The reputation stuck in many ways such as comments about Dutch courage. In the reign of Elizabeth I, Thomas Nashe complained about the “superfluity in drink,” something he classed as a sin. He blamed this sin on political involvement in the Low Countries and so association with Dutchmen. In describing the effects of each successive glass of beer, he said that the eighth got the guzzler drunk as a Dutchman.²⁸ Beer was certainly the most common drink, that is other than water, in the Netherlands. The sparse data show Dutch drinkers to have been much the same as their counterparts just to the south, and less avid than German beer drinkers. Prices, levels of employment and the size of the industrial sector dictated beer intake. Industrial workers in the sixteenth century were already renowned as beer drinkers.

Though a figure for per capita consumption in Holland as high as 400 liters/person/year has been suggested for the fifteenth and sixteenth centuries,²⁹ in the light of the pattern elsewhere in the Low Countries and in Germany that appears to be excessive. It is possible, though, that where beer was easily available and where large quantities of low quality of beer were always at hand, at least adults did drink more than four liters a day on average. That was true apparently on board ship through the sixteenth and seventeenth centuries, that is so long as there was beer to be had. In theory, crew members on warships were to have as much beer as they wanted. The facts may have been different. Sailors on ships of the Hanseatic League were to have 5 litres each per day. The ration for sailors in the English navy in 1565 was 4.6 liters per day and for the Danish navy in the 1570s about 4 liters per day. Those figures were relatively high compared to consumption on land but much of the difference can be explained in the relative quality of the beer. Even so, a significant share of daily calories for

²⁸ Grolsche Bierbrouwerij, *Merckwaerdighe Bierolgie zijnde het verhaal van een plezierige birreïs door meer dan vijftig eeuwen elk op zijn of haar manier beleefd door een geschiedschrijfter en een reclameman, een tekenaar en een oudheidkundige, een bronnenspeurder en een genealoog...* (Amsterdam, 1966), pp. 119-121; Frederick W. Hackwood, *Inns, Ales, and Drinking Customs of Old England* (London, 1910), p. 164; Simon Schama, *The Embarrassment of Riches: An Interpretation of Dutch Culture in the Golden Age* (New York, 1987), p. 190.

²⁹ Hallema and Emmens, *Het bier en zijn brouwers*, pp. 35-36.

Table III-4

Consumption of Beer Per Person Per Year In Liters

<i>Town</i>	<i>Date</i>	<i>Population</i>	<i>Estimate of Consumption Level</i>
Leuven	1372	16,500	277
Antwerp	1418	10,000	210
Leuven	1434	18,000	210
Hamburg	c1450		250 (hospital inmates)
Leuven	1472	17,000	271
Haarlem	1475	11,000	250
Hamburg	c1475	20,000	310
Alkmaar	c1475		237
Leuven	1500		275 (for adults)
Hamburg	c1500	25,000	320
Leiden	1514	14,000	228
Haarlem	1514	11,000	158
Leuven	1524	17,000	273
Hamburg	c1525	25,000	285
Antwerp	1526	39,000	369
Diest	1526		253
Ninove	1526		c300
Antwerp	1531	50,000	369
Leiden	1543	13,000	269
Hamburg	1550	20,000	400
Bruges	c1550	35,000	263
Lier	c1550		c310
Antwerp	c1550		550 (adults only)
Lübeck	c1550	25,000	400
Nuremburg	1551	30,000	300
St. Omer	c1560		56
Antwerp	1567		295
Antwerp	1568		346
Leiden	1571	12,500	267
Ghent	1580	50,000	202
Haarlem	c1590		300
Wismar	1600		1095 (hospital inmates)
Bruges	c1600	29,000	158
Ghent	1607		156
Antwerp	1612	54,000	259

<i>Town</i>	<i>Date</i>	<i>Population</i>	<i>Estimate of Consumption Level</i>
Hamburg	c1615		700 (all types of beer)
Leiden	1621	45,000	301

Sources: Paul De Commer, "De Brouwindustrie te Ghent, 1505-1622," *Handelingen der Maatschappij voor Geschiedenis en Oudheidkunde te Gent* nieuwe reeks, 37 (1983), p. 143; Robert S. DuPlessis, *Lille and the Dutch Revolt: Urban Stability in an Era of Revolution 1500-1582* (Cambridge, 1991), p. 123; M. J. Eykens, "De brouwindustrie te Antwerpen, 1585-1700," *Bijdragen tot de Geschiedenis, bijzonderlijk van het aloude hertogdom Brabant* 56 (1973), p. 90; Hans Huntemann, *Das deutsche Braugewerbe vom Ausgang des Mittelalters bis zum Beginn der Industrialisierung. Biererzeugung — Bierhandel — Bierverbrauch* (Nuremberg, 1971), pp. 28, 58-60; Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), pp. 55, 58-59; Walter Prevenier and Wim Blockmans, *The Burgundian Netherlands* (Cambridge, 1986), pp. 45, 87; Hugo Soly, "De Brouwerijenonderneming van Gilbert van Schoonbeke (1552-1562)," *Revue Belge de Philologie et d'Histoire* 46 (1968), pp. 349-351; Hugo Soly and A. K. L. Thijs, "Nijverheid in de Zuidelijke Nederlanden," *Algemene Geschiedenis der Nederlanden*, volume 6 (Haarlem, 1979), p. 47; R. van Uytven, "Bestaansmiddelen," *Arca Louvanesis Jaarboek* 7 (1978), pp. 155, 157; R. van Uytven, "Het Bierversbruik en de Sociaal-Economische Toestand in het Brugse Vrije in de Zestiende Eeuw," *Handelingen van het Genootschap voor Geschiedenis gesticht onder de benaming "Société d'Emulation" te Brugge*, 131 (1994), p. 26; R. van Uytven, "Oudheid en middeleeuwen," in: *De economische geschiedenis van Nederland*, J.H. van Stuijvenberg, ed. (Groningen, 1977), p. 39; R. van Uytven, *Stadsfinanciën en Stadseconomie te Leuven van de XIIIe tot het einde der XVIe Eeuw* (Brussels, 1961), pp. 327-335; C. Vandenbroeke, *Agriculture et alimentation*, Centre belge d'histoire rurale 49 (Ghent and Leuven, 1975), pp. 535-536; Richard J. Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," Unpublished Doctoral Dissertation, The University of Chicago, March 1992, p. 95.

men at sea came from beer. The Dutch States-General in 1636 estimated per capita consumption on board merchant ships at 1.6 liters a day in the winter and 2 liters a day in the summer. Those figures would be misleading for long voyages. When an East Indiaman set out for the Far East from Holland in 1614 there was unlimited beer to drink for the first month but the ration was reduced and when two months had elapsed the beer barrels were empty so the regulations on the daily ration were meaningless.³⁰

Averages are somewhat deceptive in that they suggest beer was the drink of

³⁰ C. S. L. Davies, "Les rations alimentaires de l'armée et de la marine anglaise au XVIe siècle," *Annales ESC*, 18, 1 (1963), pp. 139-140; A. T. van, Deursen, *Plain Lives in a Golden Age Popular culture, religion and society in seventeenth-century Holland*, Maarten Ultee, trans. (Cambridge, 1991), p. 101; Kristof Glamann, "Beer and Brewing in Pre-Industrial Denmark," *The Scandinavian Economic History Review*, 10, 2 (1962), p. 129; Konrad Pilgrim, "Der Durst auf den Weltmeeren Das Problem der Versorgung des Seeleute met Getränken im 16., 17. und 18. Jahrhundert," *Jahrbuch 1969 Gesellschaft für Geschichte und Bibliographie des Brauwesens te Berlin* (1969), p. 81; Yntema, "The Brewing Industry in Holland, 1300-1800...", pp. 91-92.

the people. Many people drank no beer or only extremely weak beer. Averages also are deceptive because skilled workers and laborers, in order to keep the average up, drank a good deal more beer than the poor or the rich. They are also deceptive because beer consumption could take other forms. Beer was used in the preparation of many dishes. In Dutch towns an average consumption figure of about one liter for each person each day was more typically the case in the sixteenth century. There could be wide fluctuations from one year to the next, but the general trend was stability or a slow decline through much of the sixteenth century, indicating no improvement and probably some deterioration in the welfare of urban residents.³¹ Even if there was some decline in per capita beer drinking still at the levels which prevailed as late as the 1600s and 1610s and with the increase in population, Dutch brewers could count on a sizeable market for their product.

Brewers and bakers always competed with each other for supplies of grain. The requirement for a man working in a climate like that in Holland would have been around 2400 calories each day. The figure would have been lower for women and higher for male labourers. A kilogram of wheat, taking account of a milling loss of 10%, would supply 3150 calories if used to make bread. A liter of grain, then, after milling would have generated about 2700 calories at most. A liter of beer would have produced a much lower level of nutrition. Weight loss during malting could be from 15% to 25% and possibly even higher if the job was done poorly. In the twentieth century, each liter of beer will be from 300 to 450 calories. If that figure was higher in the sixteenth century, as it probably was, and if it took about a liter of grain to make a liter of beer then the nutritional loss in brewing compared to bread-making was over 75%. The loss could be decreased by thinning the beer, making more beer from the same quantity of grain. That, indeed, was done through the fifteenth and sixteenth centuries for certain types of beers like that used on ships. In addition to the nutritional loss from making grain into beer instead of bread, there were also the much greater requirements of farm land and of transportation for grain if the choice was to produce drink rather than bread.³² The continued and increasingly common restrictions on beer brewing in periods of grain shortage or high grain prices

³¹ van Uytven, "Het Bierverbruik en de Sociaal-Economische Toestand in het Brugse Vrije in de Zestiende Eeuw," pp. 31-32.

³² E. Aerts, and E. Put, "Jezuïetenbier Bierhistorische beschouwingen bij een brouwhandleiding uit 1627," *Volkskunde* 93, 2 (1992), pp. 120-122; Jean De Clerck, *A Textbook of Brewing*, two volumes, Kathleen Barton-Wright, trans. (London, 1957-1958), 1, p. 533; Davies, "Les rations alimentaires de l'armée et de la marine anglaise au XVIe siècle," p. 139; Dyer, *Standards of Living in the Later Middle Ages...*, pp. 134, 153; Hough, *The Biotechnology of Malting and Brewing*, pp. 153-154; Andrzej Klonder, *Browarnictwo w Prusach Krolewskich [2 Polowa XVI-XVII W.]*, Polska Akademia Nauk Insty-

show that without question contemporary politicians and the public at large understood the relationship between bread and beer.

Restrictions on the grain trade had a direct effect on brewers. At times brewers did find themselves unable to produce beer because of the constraints on their supplies. In the last quarter of the fifteenth century Haarlem, for example, found that sporadic shortages of grain forced local brewers to curtail exports. In 1556, an especially bad year, brewers in Holland were prohibited from making high quality beer. The government ordered them to water down the beer and also surprisingly to use wheat instead of barley since the latter they said would make more nutritious bread. By the end of the year the county government told malters that they could use only wheat which was not fit to eat. The crisis was a real one, though, since early in 1557 in Delft poor people were so desperate that they were eating the garbage thrown out by brewers.³³

The land in Holland was not especially well-suited to the production of food grains. Oddly enough it did enjoy certain advantages in the production of grains most used in beer. North of the River IJ in the sixteenth century the principal crops were oats and hemp. To the south of the river, the popular crops were rye and barley. On the islands of the southwest and in Zeeland some wheat was grown. The land was so low lying that the seed of hard grains such as wheat and rye, sown in winter and harvested the following July or August, ran great risk of rotting in the ground before germination. Barley and oats, planted in the spring and harvested some months later, did better in the heavy wet soil. Local agricultural production, then, tended to suit the needs of brewers since soft grains like barley and oats tended to find their way into mash tuns. Holland brewers also got wheat and barley from the Baltic as well as wheat, barley and oats from northeastern France, long a supplier of grain to all of the Low Countries, and from the province of Utrecht just to the east of Holland. Imports from France were typically wheat so more intended for bread with beer being shipped southward in exchange for the grain. There can be little question that the brewing industry had an effect on the character and size of the grain trade between the southern Netherlands and France. Since the largest share of exports from East Anglia to Holland in the fifteenth and sixteenth centuries was oats and barley it is fair to say that brewing had a major effect on the grain trade with England.³⁴ When Baltic supplies were interrupted, as in 1521-1522

tut Historii Kultury Materialnej (Warsaw, 1983), p. 160; R. W. Unger, "Beer, Wine and Land Use in the Late Medieval Low Countries," *Bijdragen tot de Geschiedenis*, LXXXI (1998), 329-337.

³³ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 60-61; Unger, *De Levenmiddelenvoorziening der Hollandsche Steden in de Middeleeuwen*, pp. 71-73.

or by the war with Denmark in 1531-1537, there could be serious hunger in Low Countries towns or at least disruption of the brewing industry. Grain from the East could be less expensive than grain from northern France. A Venetian in Gdansk in the summer of 1591 reported the arrival of 200 Dutch ships, all in poor condition, to carry away grain of second quality for use in brewing.³⁵ Probably more important to Dutch brewers than the price of grain from Poland was the presence of alternative suppliers. That increased their chances of getting what they needed to make beer.

Estimating grain needs for the Dutch brewing industry is extremely difficult. Production is hard to estimate and the amount of grain brewers used in making beer varied widely, both in type and in volume and over time and from town to town. Individuals consumed on average somewhere around 300 liters of grain each year. If 250 kilograms each year per person can be called the subsistence minimum, then per capita consumption in Holland should have been at least 300 liters. An estimate from earlier in this century of only about 100 liters of grain for each person each year for Hollanders in the first half of the sixteenth century is much too low. A figure for Lille in mid century of some 210 to 300 liters is most likely a minimum as is one of 250 liters for northern Europe around 1600.³⁶ A common estimate of consumption levels for England for the sixteenth and seventeenth centuries is 1 quarter, that is 294 liters, of grain per person per year for supplying bread. When beer making and horse fodder among other things are added the total comes to some 580 liters. For London around 1300 and for late medieval England in general, consumption of grain from all sources and in all forms is estimated at about 370 liters for each person.³⁷ A figure of 300

³⁴ Brünner, *De order op de buitennering van 1531*, pp. 55, 66; Milja van Tielhof, *De Hollandse Graanhandel, 1470-1570 Koren op de Amsterdamse molen* (The Hague, 1995), pp. 34-36, 38, 53-55; Herman van der Wee, *The Growth of the Antwerp Market and the European Economy in the Fifteenth and Sixteenth Centuries* (The Hague, 1963), 2, pp. 24, 313, n. 21.

³⁵ W. Abel, *Agricultural Fluctuations in Europe from the thirteenth to the twentieth centuries*, Olive Ordish, trans. (London, 1980), p. 108; Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, Sian Reynolds, trans. (London, 1972), pp. 189-190; Commer, "De Brouwindustrie te Ghent, 1505-1622," p. 114; Niermeyer, *De Wording van Onze Volkshuishouding...*, p. 89; Pinkse, "Het Goudse Kuitbier...", p. 112; van Uytven, "Oudheid en middeleeuwen," pp. 39-40.

³⁶ Brünner, *De order op de buitennering van 1531*, pp. 56-57; Colin Clark, and Margaret Haswell, *The Economics of Subsistence Agriculture* (London, 1964), p. 49; Robert S. DuPlessis, *Lille and the Dutch Revolt: Urban Stability in an Era of Revolution 1500-1582* (Cambridge, 1991), pp. 5, 132, 340 n.3; Jan De Vries, *The Dutch Rural Economy in the Golden Age, 1500-1700* (New Haven and London, 1974), pp. 170-172.

³⁷ Phyllis Deane and W. A. Cole, *British Economic Growth 1688-1959 Trends and Structures*, second edition (Cambridge, 1967), pp. 63-64; J. A. Galloway and M. Murphy, "Feeding the City: Medieval London and its Agrarian Hinterland," *The London Journal* 16, 1 (1991), p. 3.

liters for bread then would seem to be a minimum, easily exceeded in more prosperous regions and by those better off.

To that consumption has to be added the amount of grain for making beer. If beer produced only one-fourth the calories that bread did out of the same amount of grain, and if the share of calories that Dutch consumers got from beer was about 20%, then the amount of grain needed for making beer approached 300 liters per person. That estimate should be taken as a maximum, however. The guess that brewing nearly doubled the grain requirements for a town is supported by an Antwerp magistrate who, in 1557, said that some 43% of grain used in the town went to the brewers.³⁸ An estimate of somewhat in excess of 600 liters per person for sixteenth century Holland for the amount of grain needed for all purposes would seem to be reasonable.

By the end of the sixteenth century, the population of Amsterdam was over 100,000. At 300 liters per person per year the town would have needed better than 30,000,000 liters of grain for bread making, that is about 25,000 tonnes. Assuming brewers got between 150 to 200 liters of beer from each 100 liters of grain by the end of the sixteenth century at Amsterdam, and that the some 105,000 Amsterdammers drank about 250 liters of beer on average each a year, then total consumption was above 25,000,000 liters of beer. This meant the town needed from 12,500,000 to 16,000,000 liters, or 12,000 tonnes, of grain to supply drinkers. The grain could have entered in raw form or refined, that is as malt or as beer, and a significant portion would have been imported.

Assuming no export of grain in solid or liquid form, Haarlem with just 10,000 inhabitants in the early sixteenth century would have been able to get by with 3,000,000 liters of 2,400 tonnes. But Haarlem brewers used anywhere from 6,810,000 to 11,500,000 liters of grain annually to produce beer between 1510 and 1535. If the average was 10,000,000 liters, that was 1,000 liters of grain for each resident of Haarlem each year for brewing alone. In that period the share of the grain imported into the town used in brewing varied from 53% to 68%. If that was the case then per capita grain consumption for all other purposes was about 650 liters. In the early seventeenth century when the town population was perhaps 40,000 Haarlem brewers used about 5,600 tonnes of grain a year,³⁹ something on the order of 7,000,000 liters or the bread requirement of about 2,300 people. The some 30% decrease in grain used in the face of a rising popu-

³⁸ Hugo Soly, "De economische betekenis van de zuidnederlandse brouwindustrie in de 16e eeuw. Problematiek," *Handelingen van het Colloquium over de economische geschiedenis van België. Behandelingen van de Bronnen en Problematiek* (Brussels, 1972), pp. 105-106.

³⁹ Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 14; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 117, 120.

Table III-5

Output of Beer for Fixed Inputs

<i>Town</i>	<i>Date</i>	<i>Grain/brew</i>	<i>Beer Produced</i>	<i>Ratio</i>
Delft	c1340	3174	3725	1.17
Gouda	1366	644	1660	.39
Utrecht	1404	1857	3100	1.67
Haarlem	1407	1698	1790	1.05
Utrecht	1433	2302	2480	1.08
Utrecht	1433	2418	2800	1.16#
Utrecht	1433	1842	2480	1.34
Utrecht	1447	2302	3100	1.35
Amsterdam	15thC	2104	3100	1.47
Utrecht	1451	1381	2480	1.80@
Amersfoort	1484	2698	2480	.92
Amersfoort	1484	1188	1920	1.60#
Gouda	1488	1140	1220	.94
Gouda	1488	2603	3820	1.47
Haarlem	c1490	2600	3720	1.43
Utrecht	1491	2188	2480	1.13
Utrecht	1491	2417	3725	1.54
Amsterdam	1497	1750	2600	1.48
Leiden	1497	1830	5120	2.80
Leiden	1497	1569	4350	2.77
Hamburg	1500			1.45
Haarlem	1501	1698	1850	1.09
Haarlem	1501	2202+	c 3600	1.63#
Gouda	1513	1210	1450	.83
Gouda	1513	2500	3950	1.58
Zutphen	1515	2435	3100	1.27
Zutphen	1515	1991	4970	2.50#
Haarlem	1544	1237+	c 4200	3.40
Hamburg	1550			1.50-2.00
Haarlem	c1590	4600	3720	0.81
Holland	1633			2.58
Holland	1773			4.50-5.51
[Buys]	1799	1250	720*	.58

N. B.: Assume 1 liter of grain weighs 800 grams.

Ratio = liters of beer per liter of grain

@ Thin beer

* Water added in liters to the grain which is reported in kilograms of grain and water added

+ Extensive substitutions possible which would alter the total

koyt

Sources: Jakobus Buijs, "De Bierbrouwer of Volledige Beschrijving van het Brouwer der Bieren; Midsgaders van het Mouten der Graane, tot het Brouwen van Bier Gebruikt Wordende," in: *Volledige Beschrijving van Alle Konsten, Ambachten, Handwerken, Fabrieken, Trafieken, Derzelwer Werkhuizen, Gereedschappen, enz. ten deele overgenomen uit de Beroemdste Buitenlandsche Werken... Zestiende Stuk* (Dordrecht, 1799); Jean De Clerck, *A Textbook of Brewing*, two volumes, Kathleen Barton-Wright, trans. (London, 1957-1958), 1, p. 157; G. Doorman, *Techniek en Octrooiwezen in Hun Aanvang* (The Hague, 1953), pp. 57, 96-98; H. Halbertsma, *Zeven Eeuwen Amersfoort* (Amersfoort, 1959), pp. 42-44; A. Houwen, "De Haarlemsche Brouwerij 1575-1600," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1932), p. 30; Hans Huntemann, *Das deutsche Braugewerbe vom Ausgang des Mittelalters bis zum Beginn der Industrialisierung. Biererzeugung — Bierhandel — Biervverbrauch* (Nuremberg, 1971), pp. 13, 75; J. P. W. Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1937), p. 7; V. C. C. J. Pinkse, "Het Goudse Kuitbier, Gouda's Welveren in de Late Middeleeuwen 1400-1568," *Gouda Zeven Eeuwen Stad* (19 July, 1972), pp. 100, 105, 108; Richard J. Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," Unpublished Doctoral Dissertation, The University of Chicago, March 1992, pp. 175-176.

lation reflects harder times for brewing. The Haarlem figures suggest that the aggregate grain consumption figures for Holland, based on a requirement of 300 liters/person/ year for bread supplies, should be seen as minima.

The total quantity of grain used to produce different types of beer varied and there were changes in quantities over time as well. Figures for the fifteenth and early sixteenth centuries come from the bylaws of Low Countries towns. The rules were subject to both change and evasion. The regulations show output of between .39 and 2.80 liters of beer for each liter of grain used. Both extremes appear to be exceptional with figures from 1.05 to 1.80 being more characteristic. There was wide variation in the rules on grain requirements with some values, like that for Leiden of 1497 or Haarlem of 1544, lying well outside the range of the other figures. There was undoubtedly a tendency to increase the amount of beer made with each unit of grain as grain prices rose and beer prices remained virtually fixed. An average figure of 1.20 litres of beer made from each liter of grain is a conservative estimate.

For the entire province of Holland with a population of 275,000 around

1500⁴⁰ the grain need would have been a minimum of 82,500,000 liters or 66,000 tonnes. If beer consumption averaged 250 liters per person per year and if brewers got on average 1.20 liters of beer for every liter of grain, then the total demand for grain from brewing was 57,292,000 liters or 46,000 tonnes. If the consumption estimate is correct, and it seems to be if anything conservative, then brewing increased the grain needs of the province of Holland by some 70%. Since that does not include net exports, the actual figure was undoubtedly higher. For Haarlem, which did have a large export sector, beer production raised the town grain requirement by 250% in the early sixteenth century. By 1622 the population of Holland more than doubled to over 670,000.⁴¹ Brewers made thinner beer too. So by then the annual grain requirement would have probably been between 60,000 and 70,000 tonnes. Brewers used about 40% of the total grain consumed in the province around 1500 and the share was probably not a great deal smaller 100 years later.

Around 1300 English farmers could expect to get an average of 360 liters of wheat to market from each hectare that they farmed, that is after all deductions. Output per hectare in the early fifteenth century Low Countries was perhaps even below that. Increases in agricultural productivity would have led to a higher figure for Holland in the early sixteenth century, as much as 50% higher. If around 1500 farmers in the Netherlands needed a hectare for each 450 kilograms of wheat, then the land needed to supply Dutch brewers in 1500 was about 105,000 hectares. Brewers used grains such as oats and barley where output per hectare was typically higher, for example by 50% in eighteenth century England so the land area estimate should be taken as a maximum.⁴² Though agricultural productivity rose through the sixteenth century and brewers were using less wheat in their brews, still by 1600, assuming no changes in per capita beer consumption, the land requirement for Dutch brewing probably approached 200,000 hectares.

The area of Holland in the fifteenth century has been estimated in the range of 375,000 hectares.⁴³ That figure grew in the sixteenth and early seventeenth centuries as massive land reclamation projects were carried out. By the late twentieth century the area was approaching double the fifteenth century level. Much of

⁴⁰ B. H. Slicher van Bath, "Historical Demography and the Social and Economic Development of the Netherlands," *Daedalus* 43, 2 (1968), p. 609.

⁴¹ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 117, 120; De Vries, *The Dutch Rural Economy in the Golden Age*, p. 86.

⁴² Deane and Cole, *British Economic Growth 1688-1959*, p. 66; Galloway and Murphy, "Feeding the City...", p. 11; Prevenier and Blockmans, *The Burgundian Netherlands*, p. 58; De Vries, *The Dutch Rural Economy in the Golden Age*, pp. 152, 170.

⁴³ Prevenier and Blockmans, *The Burgundian Netherlands*, pp. 29-30.

the agricultural land in Holland was used for dairy herds. Much of the grain from the rest of the land went for making bread. Even so in good years around 1500 Dutch farmers should have been able to meet brewers' grain requirements for domestic consumption by using about 40% of land under cultivation. The proportion of land in arable crops fell through the sixteenth century and demand rose with rising population. That would have led to an even larger share of the needs of brewers coming from overseas.

The brewing industry must, from its sheer size, have had a deep effect on Dutch shipping. Even in 1500 the demand for grain by brewers may have kept as many as 100 cargo ships of average size employed bringing grain from the Baltic and elsewhere. By the end of the century that figure would have risen by some 60-70%. Population rose faster than brewers' grain requirements. The size of ships grew as well. Still with the total tonnage of the sea-going merchant fleet of the Dutch Republic at about 300,000 tons at the end of the sixteenth century brewers would have given employment to well over 10% of the total. Brewing played a role in increasing demand for grain through the sixteenth century. Domestic supplies could not keep up and an increasing portion of barley, rye and wheat had to be brought in from eastern Europe. The process of specialization in European agriculture which emerged in the sixteenth century⁴⁴ did owe something to the prosperity of Dutch brewing.

The grain, whether produced locally or imported into the principal grain harbors such as Amsterdam, Dordrecht and Middelburg,⁴⁵ still had to be moved to beer producing centers such as Haarlem, Delft and Gouda. Because of the shorter distances and frequent trips, the tonnage need for the vessels travelling on inland waterways was significantly less than the some 30,000 for sea-going ships. Unlike the large vessels going back and forth to the Baltic, few of the craft plying the inland waterways would have been devoted exclusively to carrying grain either for any period of time or for any single voyage. As a result it is virtually impossible to estimate how many inland vessels brewers kept busy bringing them grain. Moving the beer made from the grain also generated a significant demand for shipping. Gouda around 1500 exported some 15,000 tonnes of beer, mostly along inland waterways. Even if the vessels, probably on average about 20 tons, made multiple trips to Antwerp, Ghent and Bruges there still would have been employment for at least 100 and probably more than 200 vessels carrying beer

⁴⁴ Abel, *Agricultural Fluctuations in Europe from the thirteenth to the twentieth centuries*, pp. 108-109, 116.

⁴⁵ Anon., *De droghe, natte, ende langhe maten, als van coorenhaver, wijn, bier, harijne, zaut, peck, terre, smecolen, asschen, ende hoppe. Ende voort vender dyversiteyt vanden ghemigten. Zeer nersttelie ander weerf ghecorrigerd. Ghelye de Lezer hem dies verstaede, lichtelick bevinden zal* (Ghent, 1545), pp. 1-2.

alone. On the return trip those vessels would have tried to pick up a back cargo and the logical choice was grain for the brewers.⁴⁶ The existence of profitable trades created by the brewing industry contributed to the infrastructure and to other and at times unrelated trades.

Peat did not have to be imported but it did have to be moved from the bogs where it was dredged up and dried to the towns so brewers could burn it. The alternative sources of heat were wood and coal. In Holland, the rapid growth of energy-intensive industries, including brewing, combined with population growth to put an intolerable strain on declining supplies of wood. Wood and charcoal had to be imported from Germany and then after 1550 from Norway. The problem there was less pressing for brewers since they had long used peat rather than wood, but that only postponed the problem. As early as 1514 Delft, the great brewing center, consumed almost 22,000 tonnes of peat each year. The brewers of Haarlem in 1524 were so dependent on peat brought from the village of Weesp that their guild organized a levy on each brew to pay the taxes due on that peat. It took something on the order of 22 cubic meters of peat to make a brew and if that was so then shippers had to bring more than 80,000 cubic metres of peat into Haarlem in 1550 just for the brewers.⁴⁷

The other potential energy source, coal, came from Newcastle and Sunderland along the northeast coast of England, from Scotland or from Liege in the southern Netherlands. When in 1612 the Scottish staple moved to Rotterdam from Veere, the former became the largest center for the import of Scottish coal. The growth in imports was closely connected to the simultaneous growth in the number of breweries and in beer production there. Coal had the advantage of producing higher temperatures and more energy, about four times more heat for each unit of weight and volume, than peat. It took more than 20 kilograms of peat to make just 100 liters of beer and all the peat had to be loaded, unloaded and put in the fire by hand. Coal implied savings in time and also in labor to stoke the fires. If brewers used 14 tonnes of peat for each brew then a 75% decrease in the volume of fuel represented a considerable saving in effort. Over time breweries increasingly came to prefer coal. A process which started in the fifteenth century continued through the eighteenth as more and more brewers used coal, more of it and more often.⁴⁸ The shift to coal was helped by the rise in

⁴⁶ Schouten, *Gouda vroeger en nu*, pp. 67-68.

⁴⁷ G. A. Haarlem, *Archief van het Brouwersgilde*, #18; W. J. Diepeveen, *De Vervening in Delfland en Schieland tot het einde der Zestiende Eeuw* (Leiden, 1950), pp. 111-114; M. A. W. Gerding, *Vier Eeuwen Turfwinning De verveningen in Groningen, Friesland, Drenthe en Overijssel tussen 1550 en 1950* (Wageningen, 1995), p. 320.

⁴⁸ Alberts and Jansen, *Welvaart in Wording*, p. 96; Bijlsma, *Rotterdams Welvaren 1550-1650*, p. 159; Jakobus, Buijs, "De Bierbrouwer of Volledige Beschrijving van het Brouwer der Bieren; Mids-

peat prices in the second half of the sixteenth century, a rise created in part by the increasing demand for heating fuel from brewers. New canals were built in the sixteenth century to open untapped sources of peat, for example in Friesland, and peat digging grew rapidly. Supplies could not keep pace with the rise in demand, however,⁴⁹ and so brewers increasingly experimented with using coal.

Brewers were expected and even required to use peat since that fuel was subject to excise tax. In winter, when the canals froze, the price of peat rose dramatically so brewers asked towns for permission to import coal from Britain in December, January and February. They succeeded by the first decade of the seventeenth century in Delft, Dordrecht, Rotterdam and Haarlem, though only sporadically in the last case. Haarlem brewers used the example of Dordrecht in 1608 when they tried to get authorization to stoke Scottish — synonymous with small — coal in place of peat. By 1621 the Haarlem brewers appear to have won the town over to their side.⁵⁰ At Dordrecht in November, 1615, the brewers argued that their counterparts in Rotterdam already got to use Scottish coal and that in the North from November through March their fellow brewers got to use coal. Moreover, they said no vessels with peat had arrived so that they would have to suspend brewing unless they could use coal. Six years later in 1621 the Dordrecht brewers claimed they needed to go over to using Scottish coal for the winter because frozen canals were keeping peat supplies from reaching the town. Prices of peat in the winter were typically about twice that of the summer anyway. The brewers got to use coal three days each week, but that was only on condition that the men who farmed the peat excise got a fixed payment for each unit of coal the brewers used, a levy which compensated for any losses in the income from taxing peat. Dordrecht brewers in 1621 wanted the permission extended, and pointed out that at Delft and Rotterdam industrialists could import coal and use it at any time of the year. That change was a recent one and the Dordrecht brewers won similar concessions. Rotterdam appears, at least in the 1620s, to have been more liberal about admitting coal for industrial uses but

gaders van het Mouten der Graane, tot het Brouwen van Bier Gebruikt Wordende,” in *Volledige Beschrijving van Alle Konsten, Ambachten, Handwerken, Fabrieken, Trafieken, Derzelver Werkhiuzen, Gereedschappen, enz. ten deele overgenomen uit de Beroemdste Buitenlandsche Werken...Zestiende Stuk* (Dordrecht, 1799), p. 29; Kerling, *Commercial Relations of Holland and Zeeland with England from the late 13th Century to the Close of the Middle Ages*, p. 122; R. W. Unger, “Energy Sources for the Dutch Golden Age: Peat, Wind and Coal,” *Research in Economic History* 9 (1984), p. 232; van Uytven, “Oudheid en middeleeuwen,” p. 40.

⁴⁹ J. A. Faber, *Drie Eeuwen Friesland. Economische en sociale ontwikkelingen van 1500 tot 1800* (Wageningen, 1972), pp. 294-295; Gerding, *Vier Eeuwen Turfwinning...*, pp. 115-120, 129-132; De Vries, *The Dutch Rural Economy in the Golden Age*, pp. 202, 204.

⁵⁰ G. A. Haarlem, *Archief van het Brouwersgilde*, #19; Hoekstra, “Het Haarlems Brouwersbedrijf in de 17e eeuw,” pp. 16-17.

typically in all towns the concessions were made because of shortages of peat created by shipping problems.⁵¹ By the seventeenth century for brewers then coal was a common fuel.

Towns resisted the use of coal. They feared damaging other industries through dirtying the air. They feared coal was more likely to cause fires in crowded urban surroundings. They feared loss of tax income from the significant levies on peat. Since coal cost about one-fifth as much as peat for making the same quantity of beer in Haarlem and presumably about the same throughout the rest of Holland, any development which assuaged government fears could mean considerable economic advantages to brewers. One obvious solution to losses of income from falling peat use was to tax coal. From 1605 and probably before the province of Holland levied an excise tax on all coal, whether from Liege, England or Scotland. The tax was farmed and by the 1620s there was an elaborate system of sworn agents to weigh the coal and make sure the province got the full amount due. Coal was long known as an air pollutant and as early as 1307 brewers in London, along with other industrialists, were forbidden from burning coal. The town government of Rotterdam in 1615 prohibited the use of Scottish coal in brewing and in other trades from 1 April to 31 October. Burning Liege coal was acceptable but no other, regardless of previous practice. The town was responding to complaints from the citizenry so Dutch towns and townspeople were conscious of the air pollution problems brewers could cause.⁵²

If used to dry malt coal could impart a foul taste. It may be that malters used wood much longer than brewers. The most common solution for Dutch brewers to the problem of potential contamination of their beer from coal was using a closed furnace under the kettles. The smoke was carried off through a chimney out of the brewery and away from the beer. Inventors were more interested in dealing with the problem of smoke and soot than in the improvements in the process of beer making, if the evidence of patents is any indication of their goals. Governments were pleased to support innovations which led to fuel savings, especially in the second half of the sixteenth century when wood prices rose dramatically. In 1581, for example, Philip II gave some Flemish brewers a patent for 10 years to use a new method of saving fuel which had proven successful in Delft and Leiden. Some patents were infringed. This suggests that the need was great for fuel conservation and that at least some inventors had profitable ideas. Savings could be sizeable. In 1595, one doctor said he got consumption of fuel down 50% in a Delft brewery using a Scottish method, though claims of precisely 50%

⁵¹ G. A. Dordrecht, Archief van de Gilden, #969, #971.

⁵² G. A. Haarlem, Archief van het Brouwersgilde, #19; Cau *et al.*, *Groot Placaatboek...*, 1, 1878-1881 [1605-1655]; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 16-17.

savings were typical. The ideas included ways to set kettles, and to design the furnace or the ovens to increase the amount of heat concentrated on the kettles. From 1594 to 1638 the States-General gave 14 patents for fuel saving and in them brewing was commonly mentioned as a great beneficiary. In the same period there were nine patents granted to deal with the problem of smoke through improvements in chimneys, both for homes and for industry. Regional and local governments took an active interest in promoting the use of the inventions. They must have realized the economic as well as the environmental advantages. How effective all the inventions and innovations were is impossible to measure. It may be that most potential gains for fuel saving had already been realized by the closing years of the sixteenth century.⁵³

The labor required to man the brewing industry was large, not because of the number of employees per brewery but because of the number of breweries. The workforce of each unit remained essentially static through the fifteenth and sixteenth centuries, even if the scale of output per brewery on average rose. Around 1600 each brewery at Antwerp would have had about 10 employees of whom two or three would have been women, often young women, and some eight would have been called *knechten* or simply workers, with the implication that they were more than just laborers but certainly less than skilled masters. In the fifteenth century, as in the sixteenth breweries were operated by a brewer or brewster, sometimes with an assistant brewer or brewster, a chief of the *knechten*, a few though rarely more than four or five *knechten*, and two or three younger women.⁵⁴ Work was sporadic, varying with the season and with demand for beer, so many of those in the breweries were underemployed. One solution was to work for more than one brewer, shifting from one to another when work became available. That was less likely in the bigger brewing centres.

The complexity of the work affected the wage rate as did the physical strength required to carry it out. The men who moved the beer in Haarlem in 1519 were paid more than twice the wage of the women who worked in the brewery. By 1550, though, the relationship had changed and women were getting a wage a bit more than 5% better than the men who shifted the beer. The man responsible for looking after the yeast and its proper action got only 20% of the amount paid to a woman worker in the brewery. That had fallen to 10%

⁵³ G. Doorman, *Octrooien voor Uitvindingen in de Nederlanden uit de 16e-18e Eeuw* (The Hague, 1940), pp. 68-69, 74, 76, 79-80, 94-95, 120, 123, 272-273, 282, 288; Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, p. 75; Tehen, "Das Brauwerk in Wismar," pp. 333-335.

⁵⁴ M. J. Eykens, "De brouwindustrie te Antwerpen, 1585-1700," *Bijdragen tot de Geschiedenis, bijzonderlijk van het aloude hertogdom Brabant* 56 (1973), p. 96; N. W. Posthumous, *De Uitvoer van Amsterdam 1543-1545* (Leiden, 1971), p. 33; Soly, "De Brouwerijenonderneming van Gilbert van Schoonbeke (1552-1562)," p. 1191.

by 1575 though all the other wages remained the same. Some of the women were typically responsible for overseeing the cooling of the beer. They were paid twice the amount earned by women who stirred the mash and the hot water with large oar-like paddles. Both relative wages and absolute wages were deeply affected by the prosperity of the industry. When brewing went through a time of contraction, as it did in Haarlem through the middle of the sixteenth century and the Revolt, wages were stable or falling.⁵⁵ Periods of expansion brought better times for workers and possibly improvements for the lowest paid and least skilled.

A maximum figure of 10 workers directly involved in making beer in a brewery is a reasonable estimate, as is a minimum of five. As the scale and income for each brewery increased there was a tendency toward greater specialization, members of the crew getting specific jobs and the master brewer became more of a businessman and less of a technician. Even so as late as 1748 the average number of employees in each brewery in the town of Haarlem was 12,⁵⁶ a figure perhaps double the average for the fifteenth century but still on a very small scale compared to other Dutch industries such as textiles or shipbuilding or even painting. If in 1514 breweries employed on average 10 workers and if the number of breweries for the major towns of Amsterdam, Delft, Dordrecht, Gouda, Haarlem, Hoorn, Rotterdam, Schiedam and Schoonhoven was about 377 then close to 4,000 individuals in those towns worked in breweries. Adding a guess for the other towns and breweries in the countryside, the total of brewery workers for all of Holland was undoubtedly well in excess of 5,000 in a population of 275,000. If half the population was employed, then brewing was the job for close to 4% of the workforce. For 1600, the number of breweries was lower and a figure for Gouda is problematic since the town was going through a rapid decline in the size of the industry. Even so, in Amsterdam, Delft, Dordrecht, Enkhuizen, Gouda, Haarlem, and Rotterdam there were still at the very least 183 breweries. The average number of workers in each brewery had gone up so a figure of 3,000 brewery workers for 1600 is a minimum estimate. While the total number of workers in the industry had gone down the population had grown dramatically so beer makers then made up not much more than 1% of all people employed.

The higher or at the least stable levels of output typical of Dutch brewing in the sixteenth and early seventeenth century implied an increase in the productivity of labor in the industry. The total number of workers fell throughout the

⁵⁵ Hallema and Emmens, *Het bier en zijn brouwers*, pp. 59-60; van Loenen, *De Haarlemse Brouwin-
dustrie voor 1600*, pp. 125-128.

⁵⁶ Hockstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 10.



5. Judith Leyster, *The Gay Cavaliers (The Last Drop)*, oil on canvas, c. 1628-9. The artist's monogram appears on the tankard. The figures communicate directly with spectators. The painting is filled with indicators of the frailty and transience of human life, the end of the supply of beer being only one such sign. The painter's father was a brewer and owned his own brewery so presumably she knew about the making as well as the drinking of beer. Source: The John G. Johnson Collection, Philadelphia Museum of Art.

province. The number of workers per brewery stayed much the same or rose slightly so while the number of workers in each brewery crept up slowly the rise in output was much greater. Productivity gains appear to have been in the breweries themselves rather than in malting or in grinding grain.

There were, of course, many other workers who relied on brewing for their livelihood and on whom brewing relied for its continued prosperity. Coopers found themselves in some cases working in the brewery itself supplying the operation directly and exclusively. Local delivery kept a number of men busy in each town as did delivery of raw materials to the brewers. A number of tradesmen including millers, smiths, carpenters and bricklayers among others sold their services to brewers.⁵⁷ There were shippers who counted on carrying raw materials to and finished products from brewers. Though all those individuals formed an additional portion of the workforce that depended on beer making it is impossible to estimate that share other than to say it was sizeable but less than the percentage working directly in the industry.

Despite various natural and man-made disasters and despite the development of hopped brewing industries elsewhere in northwestern Europe, the Dutch brewing industry still enjoyed a period of sustained prosperity from 1450 to 1650. Holland had the advantages of a growing population and a growing economy, both of which increased very rapidly after the Revolt. The general prosperity of the Netherlands in the entire period and the greater concentration of that prosperity in the provinces north of the great rivers after the 1580s gave Dutch brewers an expanding market at their doorsteps. From 1450 to 1650 the buying power, in terms of grain, of workers in Leiden, Haarlem and Alkmaar went through long term swings, falling from about 1465 to 1495, improving somewhat from 1515, though with a fall in the 1520s and 1530s, and then rising from about 1535 to 1565. Though the 1570s were bad for construction workers as were the 1590s the first two decades of the seventeenth century proved a time of marked improvement. In general through the sixteenth and early seventeenth centuries the workers in those Holland towns did better in terms of buying power than their counterparts in the rest of Europe. The improvement was especially marked after around 1580 when the fighting between Dutch and Spanish troops moved largely to the southern Netherlands and many people migrated northward into towns in Holland. The rise in population created more opportunities for work so though prices went up cash incomes rose even faster as laborers put in more hours. Increases in incomes of industrial and construction workers were the best possible turn of events for brewers since tradi-

⁵⁷ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 123-124.

tionally those men favored beer as a drink and as one thing on which to spend any spare cash.⁵⁸

The growth in the brewing industry in Holland in the years around 1400 had generated investment, both in physical and in human capital. Dutch brewing enjoyed the advantages of that investment through the sixteenth century with a supply of buildings and of experienced labor almost always available. Location was another advantage exploited by Dutch brewing. The same factors of geography which made Dutch towns centers of commerce helped brewing by giving brewers easy access to raw materials and to markets. Dutch brewers proved themselves capable of responding, often effectively to market changes. Changes in the kinds of beers they made and where they sold them came in the wake of competition from other industries, disruptions caused by wars, and the long term increase in grain prices through the sixteenth century. The pattern of rising prices finally abated in the first years of the seventeenth century⁵⁹ but for virtually the entire golden age of brewing year in and year out brewers saw the problem of paying for their principal raw material become more and more burdensome. Those same Dutch brewers in the period proved themselves capable of adapting the technology, embraced in the fourteenth century, and of continuing to make technical advances to raise productivity and improve quality. The process was a slow one and there were no dramatic signs of changes during the late fifteenth, the sixteenth or the first half of the seventeenth century. Dutch brewers over the long term adapted and acclimatized the imported technique of making hopped beer to their own economic, social and legislative environment. At the same time they adapted and acclimatized themselves to the now dominant way of making beer. They did so with the help, cooperation and collusion of the governments whose interest in a thriving, prosperous brewing industry was as great as that of the brewers themselves.

⁵⁸ A. E. Dingle, "Drink and Working-Class Living Standards in Britain, 1870-1914," *Economic History Review*, second series, 25 (1972), p. 617; Leo Noordegraaf, *Hollands welvaren? Levensstandaard in Holland 1450-1650* (Bergen (NH), 1985), pp. 170-183.

⁵⁹ Abel, *Agricultural Fluctuations in Europe from the thirteenth to the twentieth centuries*, p. 147.

CHAPTER FOUR

TECHNOLOGY, RAW MATERIALS, AND THE SEASONS OF BREWING

The technical changes made in brewing from 1450 to 1620 were slow and generally subtle. Evidence is less sparse than for the fourteenth and early fifteenth century, but even by the 1650s Dutch brewers had not started to write about what they did. Technical information about brewing was communicated more easily than ever before. Books devoted to estate management increasingly included advice about beer brewing. Treatises devoted exclusively to brewing and the handling of beer began to appear in the sixteenth century but such theoretical works were published in Germany and not in Holland. In the seventeenth century the scientist Constantijn Huygens could still say that the brewer had little understanding of what he did. Learning about brewing in Holland was through experience and not derived from any theoretical understanding. Technical developments have to be inferred largely from the rules and regulations laid down and from comments by brewers, often urging or reacting to some government action. The equipment used remained largely consistent,¹ though over the long term there were measurable changes most notably in the scale of operation. There were adjustments in the way brewers employed hops, treated yeast and in the grains they used. In those changes as in all others there were tax considerations.

Even if the essentials of design and construction of the gear of brewing remained much the same over time brewers found themselves in buildings of better quality and using kettles, troughs and other implements of better quality. One thing that did change was the kettles and the way in which brewers heated them. Dutch brewers may have borrowed from the experience of salt boilers along the Zeeland coast in improving their kettles in the fifteenth and early sixteenth century. By then the brewing kettle or copper sat on top of an iron grate with walls or platforms around it so that workers could stand over it and stir the wort. The efforts to save fuel and prevent contamination by smoke dictated the use of enclosed spaces for the fires. Kettles had to be in a fixed place so breweries took on the appearance of something more permanent but also more massive.

¹ Buijs, "De Bierbrouwer...", p. 45; H. S. Corran, *A History of Brewing* (Newton Abbot, 1975), p. 50.

Bricked ovens under large kettles with some plumbing in place to move water and wort to and from the kettles were now part of virtually all urban breweries.²

Those furnaces were limited in size by the space in the brewery but had to be big enough to hold the kettle. The shallower the copper the better it was. That in turn dictated the form of the furnace. In 1623, a man from Amsterdam urged that the kettles be moved down, placed not some eight feet but only three feet above the fire. He claimed this cut the time needed to boil water from around 10 hours to just three. Wooden vats for heating did not disappear though there were obviously problems with using them, as shown by patents granted in 1594 and 1595 to deal with those difficulties. The simplest solution was certainly to go over to iron and copper kettles. Iron had the advantage of being less expensive and also using less fuel to heat an equivalent quantity of liquid, or at least so claimed one inventor in 1619. Copper remained the best and most common choice as in the fifteenth century. The troughs and vats were typically of wood and certain types were preferred. At the end of the eighteenth century an experienced brewer recommended hard and dry oak which had been cut across the grain for the fermenting troughs. The preference was presumably a traditional one.³

Records of breweries being sold give some indication of the most important equipment brewers needed. A tun for mashing, a kettle for boiling the wort and possibly another for boiling water, a cooling trough, a fermenting trough and barrels along with hand tools — shovels for stoking and moving grain, rakes and paddles for stirring — made up the essentials of any brewery. The building itself, which was also a dwelling for the brewer and his family, could be equipped with a malting floor and kiln if the brewer made his own malt. The exact form, number, size and quality of the equipment of course varied widely. An Amsterdam house and brewery which sold in 1511 had two fires, two kettles, one of about 25 and the other of about 35 barrels or approximately 3000 and 4200 litres respectively, a mash tun, a yeasting tun of about 70 barrels or some 8400 litres, three troughs used to carry the beer to the three large cooling vats of some 7.25 meters by 3.9 meters or the small cooling vat of about half

² Boeknoogen and Snieder, "Bierbrouwen in middeleeuws Amersfoort"; Buijs, "De Bierbrouwer...", p. 18; Doorman, *Octrooien voor Uitvindingen in de Nederlanden uit de 16e-18e Eeuw*, p. 272; William Harrison, *A Description of England*, in: *Lothrop Withington, Holingshed's Chronicles* (London, 1876), p. 101; Herbert Langer, "Das Braugewerbe in den deutschen Hansestädten der frühen Neuzeit," in: *Hansische Studien IV Gewerbliche Produktion und Stadt-Land-Beziehungen*, Konrad Fritze, Eckard Müller-Mertens, Johannes Schildhauer, eds. (Weimar, 1979), pp. 70-71; John U. Nef, "The Progress of Technology and the Growth of Large-Scale Industry in Great Britain, 1540-1640," in: *Essays in Economic History*, volume 1, E. M. Carus-Wilson, ed. (London, 1954), p. 99.

³ Buijs, "De Bierbrouwer...", pp. 14-15, 16, 19-20; Doorman, *Octrooien voor Uitvindingen in de Nederlanden uit de 16e-18e Eeuw*, pp. 92-94, 143, 156.

that size. There were 13 racks, presumably for storing barrels. For hand work there were four shovels, four brooms, five branding irons, two funnels, two yokes, some shovels, and other assorted tools. In addition there were some troughs, poles, barrels and cooperage. There was a maltery as well with an apparatus, made from stone and cement, for storing and sprinkling water in the large malt attic. There were two grain attics, a kiln for roasting which was equipped with iron latticing and additional equipment. The building included a peat rack for storage, a loading stage at the side of the house and a flat-bottomed inland boat complete with masts and ropes for shipping water to the brewery. By the standards of the early sixteenth century, the property clearly involved a sizeable investment in fixed capital. Brewing differed from most contemporary economic activities in the relatively high ratio of capital to labor,⁴ a fact dictated by the technology and continuing efforts to exploit existing technology more effectively.

A loose or false bottom for the mash tun was a common feature for keeping spent grains separate from the wort and allowing the wort to be tapped through the bottom or pumped out without interference from the used malt. The other and laborious option, used earlier and continued in some breweries, was to bale the wort out using a bowl or ladles. In the fourteenth and fifteenth centuries Dutch brewers had used straw in the vat as a strainer but in the course of the sixteenth century it was replaced with a loose wooden frame with small openings and Haarlem brewers got permission to use such false bottoms in 1501. Straw in the mash tun became impregnated with nutrients in the process and so became valuable. The same was true of any materials used for filtering the wort as it came out of the mash tun but filtering either after mashing or after fermentation was not common in the Low Countries. Brewers tried to precipitate impurities and unprocessed vegetable matter from the wort instead, resorting to a number of different additives during boiling. A pig's or ox foot was considered good but burned salt, clean sand, lime, ground oak bark and the more modern option of dried fish membranes were also tried to make for a clearer beer.⁵ Hopped beer was typical of Dutch brewing already by 1450. There is only the slightest evidence of *gruit* still being in use in the Netherlands in the sixteenth century. It is possible, though, that in the countryside, beyond the scope of the surveillance of authorities, farmers held on to the older and now outmoded practice of using the

⁴ G. A. Amsterdam, *Willige Verkopen Boek*, nr. 3, 11 Jan., 1511; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 26; Pinkse, "Het Goudse Kuitbier...", p. 101; Hugo Soly, "Nijverheid en kapitalisme te Antwerpen in de 16e eeuw," *Studia Historica Gandensia* 193 (1975), p. 345.

⁵ Aerts and Put, "Jezuïetenbier...", p. 116; Frank A. King, *Beer Has a History*, (London, 1947), p. 55; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 27-28; H. A. Monckton, *A History of English Ale and Beer* (London, 1966), p. 77.

mixture of myrtle with other herbs. There were other additives in use such as sugar, honey and spices such as cinnamon and cloves and in one case even powdered bayberries to give some beers a specific taste. They were, it appears, used in combination with hops. Brewers had used hops long enough that they realized different quantities were needed, depending on the time of the year and how long the beer was to last. Brewers had also developed a sense of how long to boil the wort with the additive to get the most from hops without destroying the taste. The practice of boiling for 20 or 30 or even more hours to get a stronger beer did not disappear completely but a period of around three hours was found to be best.⁶

The price of hops fell over time, presumably because farmers found acceptable returns from growing the plant. Prices fluctuated widely from year to year but the long term trend through the fifteenth century was downward. The rise in the early sixteenth century, when other prices were rising was far from dramatic with periods of something like stability. The confusion before and during the Revolt caused hops prices to climb on the Brussels market but after the 1570s when fighting was more contained if no less violent hops prices started to move back down. Hops were then it appears easily available to brewers.

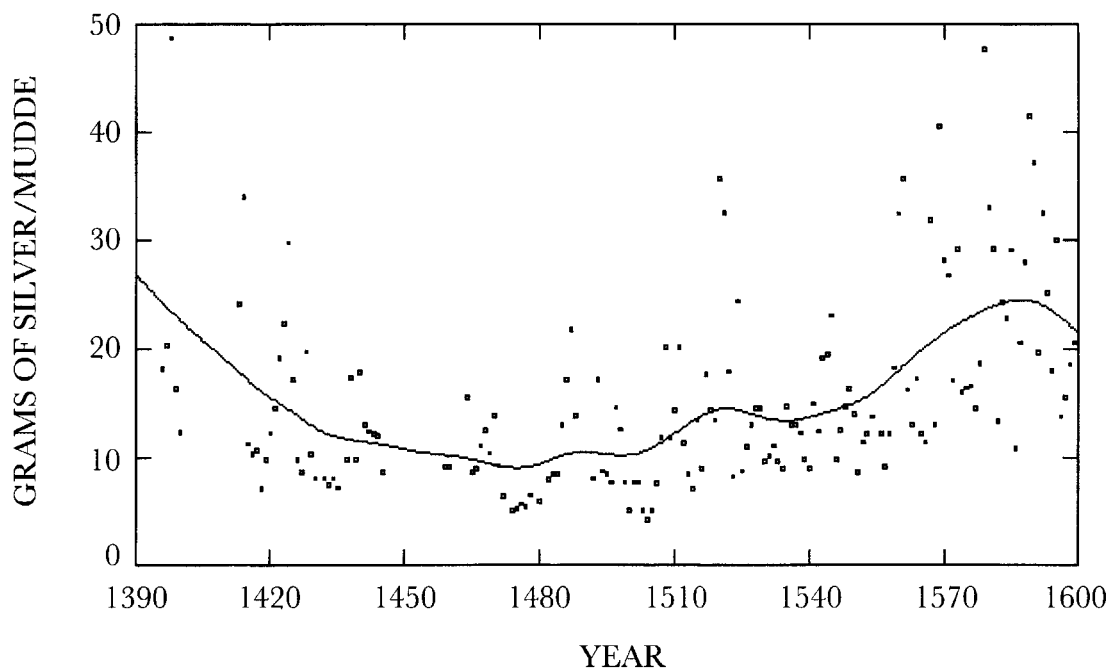
There are suggestions of small changes to improve the quality and appearance of beer. At both Haarlem and Delft, millers who ground malt for brewers were prohibited from grinding grain for bakers. At Leiden, with a less important brewing industry, millers could grind for either type of client but if the miller ground malt then he had to grind a sack of brewer's wheat before going back to grinding grain for bakers.⁷ Government interests in the grinding of malt were, in part, fiscal, but the rules did also tend to improve the quality of work done for brewers and to improve the chances of their getting the roughly ground malt they needed to act as a filter after mashing.

The way brewers dealt with yeast changed during the fifteenth and sixteenth centuries. The question of adding yeast rarely arose from the beginning of beer making through the high Middle Ages. Airborne yeasts would infect the hot wort if simply left alone after boiling. That was the way fermentation was carried out with wine, cider and mead. Brewers could add some beer from the previous brew to start the process along, a practice still known in the twentieth century, or they could add some bread in which yeast had been growing, or they could simply not clean the fermenting troughs very well so that there was some

⁶ Buijs, "De Bierbrouwer...", pp. 9, 34, 38; Harrison, *A Description of England*, pp. 100-101; Karl O. Herz, "Tabernaemontanus on sixteenth-century beer," *Wallerstein Laboratories Communications* 27 (1964), p. 112.

⁷ Unger, *De Levenmiddelenvoorziening der Hollandsche Steden in de Middeleeuwen*, p. 92.

Figure IV-1

Price of Hops in Brussels, 1396-1600

Source: Herman van der Wee, *The Growth of the Antwerp Market and the European Economy in the Fifteenth and Sixteenth Centuries* (The Hague, 1963), I, pp. 127-128, 228-232

yeast left over from the last use. Such methods, though they did work, were haphazard and ran a risk of infection from unwanted strains of yeast, strains which might give beer a bad taste or make it turbid or even make it undrinkable. Sixteenth century brewers were certainly not aware that there were some 350 species of yeast. Indeed, they probably were not even aware that yeast is a growing organism. They did, however, come to realize that there are two types of yeast, one which settles to the bottom of the fermenting vessel and the other which rises to the top of the wort. With spontaneous fermentation relying on airborne yeasts, there is virtually never a distinctly high or low fermentation but rather something mixed. The two types of yeast produce beers of very different characteristics. The typical yeast used in Europe in the golden age of Dutch brewing was the type that rose to the top. Regulations from Nuremberg suggest brewers used yeasts that fell to the bottom there already in the fourteenth century. It may be that the practice had started in Bohemia since before 1485 Bohemian workers came to Munich to brew beer in what was called the Bohemian manner. By the early seventeenth century it appears that brewers

used such yeasts in the winter but went back to those that went to the top in the summer.⁸

Brewers in the sixteenth century must have added yeast from cultures which they kept separate and which they controlled and maintained. They could not guarantee pure yeasts, as was possible by the end of the nineteenth century, but through selection and care in dealing with what they had, they could keep some control over the product. Such practices seem to have been already in use in the Low Countries by the late fifteenth century. A mid fourteenth century Flemish recipe book mentions adding yeast and it seems likely that already by 1300 brewers were using some of the foam skimmed off the top of the fermenting beer from the last brew to start fermentation with the next one. Regulations in Haarlem of 1519 and 1550 leave no doubt that brewers added yeast once the wort was in the fermenting troughs. The brewer did not understand the chemistry of yeast but he did know that the process of fermentation was far enough along to put the beer in casks when a candle brought close to the beer went out.⁹ Dutch brewers may well have exploited that property, created by the emission of carbon dioxide, earlier than the mid eighteenth century.

Bavarian brewers changed yeasts with the change of season because yeasts that fall to the bottom need colder temperatures, six to eight degrees C. The milder climate of the Low Countries made brewing with bottom yeasts more difficult. Such beers would get an unpalatable taste and would not last through the warm summer months even if kept in deep cellars. In Holland, where much of the land was already below sea level, such cellars were out of the question. Yeasts that fall to the bottom need more time to ferment. Letting beer ferment longer also increased the alcohol content, up to a limit of course. Brewers usually started work early, even before dawn so that they could get the wort into the fermentation troughs in the cool of the evening and night. Those troughs would be in a place open to breezes and later brewers even had hand-driven fans to push cool air across the top of the troughs.¹⁰ Once fermentation started, it was important to

⁸ Doorman, *De Middeleeuwse Brouwerij en de Gruut*, pp. 45-46; M. Hoffmann, *5000 Jahre Bier* (Nuremberg, 1956), pp. 111-113; Hough, *The Biotechnology of Malting and Brewing*, pp. 99, 104, 129; Pasteur, *Studies on Fermentation*, pp. 149, 183, 186-187; Ildefons Poll, *Des Brauwesen des Benediktinerklöster Metten* (Berlin, 1937), p. 30; Werner Schultheiss, *Brauwesen und Braurechte in Nürnberg bis zum Beginn des 19. Jahrhunderts. Nürnberger Werkstücke zur Stadt- und Landesgeschichte. Schriftenreihe des Stadtarchivs Nürnberg*, 23 (Nuremberg, 1978), pp. 13, 16.

⁹ Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 44; W. van Lis, *Brouwekunde of Verhandeling van het voornaamste dat tot een Brouwerij en Moutery en het Brouwen en Mouten behoort; alsmede een korte Beschryving van het Bier* (Rotterdam, 1745), p. 18; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 30; Pasteur, *Studies on Fermentation*, pp. 223-225, 337-338.

¹⁰ Buijs, "De Bierbrouwer...", pp. 38-39; Corran, *A History of Brewing*, p. 47; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 40; Hough, *The Biotechnology of Malting and Brewing*, pp. 122-124; Jos

prevent the wort from falling in temperature too quickly. Brewers had to give careful attention to the rate of cooling, trying to maintain a fairly constant temperature so that the yeast could grow.

Summer was the most dangerous time of the year for yeasts. One solution was to dry the dregs of the beer barrel and mix that yeast with flour to make some cakes which, with the addition of water, would start to grow again. The dregs could also be kept wet and then used to start fermentation in the next brew. Excess top fermenting yeast which could be skimmed off the top of the beer in the fermenting troughs or which ran out of the casks, was valuable both for use in starting the next brew and also in baking. In Norwich in the sixteenth century brewers gave the yeast to charities though in later centuries brewers, especially in Holland, would be less willing to part with that valuable commodity for nothing.¹¹

With bottom fermentation, the overwhelming majority of fermentation takes place in 10 to 12 days. Then there is a period of secondary fermentation when the beer matures and that can be allowed to go on in the cask. Some space was left in the top after filling and barrels were stored where they were cooled by breezes around them. At least that was the practice advised in the second half of the sixteenth century. With top fermenting yeasts the period of fermentation was typically shorter, from one to three days and with such yeasts it was possible to have the whole process take place in the cask. The yeast, bubbling up, filled the empty space and then pushed out through a hole in the barrel where the brewer skimmed it off. Whether fermentation went on in troughs or in casks, one goal was to keep down the amount of air available to the beer. Sixteenth century brewers sealed casks, so it may be that they understood the advantages of keeping down the amount of air to which beer was exposed during fermentation. They put pieces of rough paper in the bung holes before tapping in the bungs. Another way to get the same effect was to use deep fermenting troughs. Only a small amount of the beer had a surface exposed to the air.¹² The increasing size of brews and the need to conserve space led to the use of larger and, therefore, often deeper troughs. Brewers got better results but it is not clear if they appreci-

Martens, "Bier en stadsfinancien te Hasselt, 16e en 17e eeuw," *Gemeente Krediet van België, Driemaandelijke Tijdschrift* 30/118 (1976), p. 249; Pasteur, *Studies on Fermentation*, pp. 7-10.

¹¹ Buijs, "De Bierbrouwer...", pp. 46-47; Pasteur, *Studies on Fermentation*, pp. 22, 25, 221; L. F. Salzman, *English Industries of the Middle Ages*, new edition, enlarged and illustrated (London, 1964), pp. 293-294.

¹² Buijs, "De Bierbrouwer...", p. 46; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, pp. 44-45; Hubert Ermisch and Robert Wuttke, eds., *Haushaltung in Vorwerken Ein Landwirtschaftliches Lehrbuch aus der Zeit des Kurfürsten August van Sachsen* (Leipzig, 1910), p. 32; van Loenen, *De Haarlemse Brouwin-dustrie voor 1600*, p. 30; Pasteur, *Studies on Fermentation*, p. 348.

ated why fermentation improved. Using smaller vessels speeds up fermentation because more yeast surfaces are put in contact with vegetable matter. One option used was to move the beer into smaller containers like barrels after the first two or three days. By the sixteenth century brewers certainly had greater control over fermentation than before. The practice of adding yeast and related developments in the handling of yeast and of beer during fermentation enabled brewers to decrease losses and maintain the quality of their product better than their predecessors.

Brewers also adjusted the aging or the period of curing their beer. Rules were laid down on how long beer had to stay in the brewery before delivery to consumers. The goal was to guarantee that full and proper fermentation had taken place. The yeast left in the barrel had to complete or begin to complete the secondary stage. By waiting as well brewers and buyers could guarantee that the beer had not gone sour. The first Delft bylaw on beer, dating from the fourteenth century, set a waiting period of eight days from the time the beer went into the barrel before it could be served. That applied to beer going to North Holland. For beer shipped overseas there was no such wait. A 1392 Gouda bylaw on brewing set down similar requirements. Amsterdam regulations called for beer to sit in the brewery for four days before it could go on the market, three days in the warm months of June, July and August. Beer for export out of the city could be shipped from the brewery the same day. On delivery, beer would have to sit for a short time to allow any solid matter to settle to the bottom. Beer could be kept for longer periods, increasing the need for some additives. Combinations of herbs and eggs and even linseed oil could help the beer to last and to improve the taste.¹³ Stronger, heavier beers could tolerate and even benefitted from aging for longer periods.

During the fifteenth century and even more in the sixteenth, Holland town governments established the composition and strength of beer by setting down specific recipes. The regulations fixed the *pegel* or standard for beer production. They laid down fixed quantities of each type of grain brewers used. The *pegel* was probably effective not only because of the quality of enforcement but also because brewers benefitted to some degree from having a standard. Though Amsterdam, for example, did in 1514 put in place three salaried wardens to oversee the industry, such men, and for that matter any officers to administer rules, were exceptional. The rules setting the *pegel* were not always consistent. There were many opportunities for substitution of different grains. Brewers var-

¹³ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 49; Ermisch and Wuttke, *Haushaltung in Vorwerken*, p. 33; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 8.

ied the composition of the beer and the quantities of the cereals depending on the availability and price of grains. There was also variation in the quality of grains used. In Leiden in 1606 a survey of 15 different breweries showed a wide variation in the average amount of grain in a brew, the largest amount being 57% higher than the smallest. There was no strict relationship between the quantity of beer produced by a brewery and the quantity of grain used in each brew.¹⁴ Some brewers were clearly better at getting more beer from their malt mixture than others. Even if there were questions of consistency, still the sizeable number of rules on inputs do reveal general tendencies as well as the intentions of both government and brewers.

Though beer could be made from literally any grain, the usual components were oats, wheat, rye and barley. The famous seventeenth century Dutch poet Jacob Cats glorified beer and said that it was made from all sorts of grain.¹⁵ Price data suggests that barley was typically the cheapest grain though the political and economic disruption in the Low Countries in the closing years of the sixteenth century caused the price difference between the most expensive grain, wheat, and barley to narrow. One writer in the mid seventeenth century, pointing to the health benefits of drinking beer, claimed that barley was the principal component of Holland beer. He did concede that wheat and spelt were also used.¹⁶ A sixteenth century Portuguese sea captain, Monzo Vazques, said Dutch brewers used wheat, barley or oats, and rye. Beer made with wheat he said was light and clear and served directly from the vats right away without having to go into barrels. Beer made with barley, he claimed, was good but cheaper and had less of a head. Beer made with oats and rye had a different color as well as body and so cost less and was weaker. Ludovico Guicciardini in the second half of the sixteenth century said that the brewing industry in Delft meant prosperity for merchants dealing in wheat, barley, malt, buckwheat and oats. He mentioned that traders in hops and wood benefited from the industry too.¹⁷

Barley has historically been tied to beer. At Gouda before 1400, though, it apparently was not used and only in the fifteenth century did it join wheat, rye

¹⁴ G. A. Leiden, *Secretaire Archief na 1574, #4337, fols. 3r-5r*; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 74-75; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #18; R. van Uytven, *Stadsfinanciën en Stadseconomie te Leuven van de XIIIe tot het einde der XVIe Eeuw* (Brussels, 1961), p. 316.

¹⁵ Jacob Cats, *Nuttelyck Huys-Boeck. Behelfende eene Bespiegeling des 's Mensche...En wat het nuttigste is, om lang Gesont te Leven &c.* (Leiden, 1769), p. 193.

¹⁶ Jan van Beverwijck, *Schat der Gezontheyt, Met veersenvergiert door de Heer Iacob Cats, Ridder., &c.* (Amsterdam, 1656), p. 133; van der Wee, *The Growth of the Antwerp Market...*, 2, pp. 32, 392-393.

¹⁷ van Bleyswijck, *Beschryvinge der Stadt Delft*, p. 730; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 151-152.



6. Jan Jansz van de Velde, still life with a beer glass, 1647, panel. Dutch painters produced thousands of still lifes in the seventeenth century, many of them showing tables with food and having different connotations. Surprising is the relatively small number of surviving works which include beer. The tall "*pasglass*" with the markers of different levels of beer would have been passed around among friends with each drinking down to the next ring around the glass. Using glasses made it easier for drinkers to see all the sediment in the beer so as the use of glasses increased brewers took a greater interest in making their beer clear.
Source: Rijksmuseum, Amsterdam

Table IV-1

*Proportions of Grains for the Production of Beer, in %**The Northern Low Countries, 1340-1580*

<i>Town</i>	<i>Date</i>	<i>Type</i>	<i>Wheat</i>	<i>Oats</i>	<i>Rye</i>	<i>Barley</i>
Delft	1340	hop	34	66		
Delft	1340	export	25	75		
Gouda	1366	standard	17	83		
nr. Utrecht	1377		27	73		
Utrecht	c.1390	hop	25	75		
Utrecht	c.1400	kuit		83		17
Utrecht	1404	hop	36	64		
Haarlem	1407		19	77		4
Haarlem	1407	kuyt	22*	45		33
Utrecht	1433	double hop	30	70		
Utrecht	1433	double koyt	19	47		34
Utrecht	1433	eenwisselen	32	68		
Utrecht	1447	thick	27	40		33
Utrecht	1451	thin		78		22
Utrecht	1475		13	67		20
Amersfoort	1484		18	57		25
Haarlem	c.1490		9	57		34
Utrecht	1491			60		40
Utrecht	1491			75		25
Amsterdam	15thC		26	36		38
Leiden	1497		23		40#	37
Amsterdam	1497		25	57		18
Haarlem	1501		13	56		31+
Haarlem	1501	kuyt	16	51		33
Gouda	1513			61	16	22
Gouda	1513	kuyt	16*	62		22
Amsterdam	1514		7	53	7	33
Zutphen	1515	koyt	22	40		38
Zutphen	1515	double koyt	23	40		37
Haarlem	1519	koyt	16	52		32
Gouda	1527	koyt	20	53		27
Haarlem	1544	double		45		55+
Haarlem	c1580		9	57		34

- # Rye or oats or a mixture of wheat and rye
- * Any combination of wheat or rye. Another formula calls for 22% *hart coerens*, possibly unmalted grain.
- + Extensive substitution possible

Sources: L. Alberts, *Van Gruit tot Kuit De brouwenning in het Nedersticht tussen 1300 en 1500* (Amersfoort, 1995), pp. 12-15; A. van der Poest Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," incomplete and unpublished doctoral dissertation (1959) — G. A. Gouda, p. 61; J. G. van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam [1512-1632]* (The Hague, 1929-1974), 1, #18-8; G. Doorman, *De Middeleeuwse Brouwerij en de Gruit* (The Hague, 1955), pp. 61-63, 67-69; G. Doorman, *Techniek en Octrooiwezen in Hun Aanvang* (The Hague, 1953), pp. 96-98; A. Houwen, "De Haarlemsche Brouwerij 1575-1600," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1932), p. 30; Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), pp. 31-36; S. Muller Fz., *Schetsen uit de Middeleeuwen* (Amsterdam, 1900), pp. 59-62; J. P. W. Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1937), p. 7; V. C. C. J. Pinkse, "Het Goudse Kuitbier, Gouda's Welvaren in de Late Middeleeuwen 1400-1568," *Gouda Zeven Eeuwen Stad* (19 July, 1972), pp. 100-105; E. M. A. Timmer, "Grepes uit de geschiedenis der Delftsche brouwenning," 1 and 2, *De Economist* (1920), p. 364; Richard J. Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," Unpublished Doctoral Dissertation, The University of Chicago, March 1992, p. 157 [in part].

and oats in the commercial brewer's mash tun.¹⁸ The rising production of barley in England in the late fourteenth century suggests that the shift to using barley was not unique to the Low Countries. Barley was, through to the seventeenth century, still only one of many components of the mix of malt used in Dutch beer making. There were standard proportions for certain kinds of beer and there were many different types of beer. Indeed, the mixture of grains was probably the most important determinant in fixing the type of beer.

The figures do suggest a general tendency toward an increase in the use of barley to replace oats, but only to a limited degree and by no means universally or for all beers. The *pegel* could be so complex as to make the figures in Table IV-1 somewhat misleading. For example, in 1544 Haarlem *dubbelbier* used 20 sacks of barley malt and 16 of oat malt with the possibility of substituting wheat for barley but at the rate of 2 of wheat for every 4 of barley and replacing oats at the rate of 3 of oats for 2 of barley. Even spelt could be used, replacing 1 sack of oats and barley together with 2 sacks of spelt. To add to potential confusion the *acht-endeel*, the measure for barley and oats, was 34.36 liters and that for wheat was 28 liters. The 1513 brewers' bylaw of Gouda as well as the earlier bylaw of between

¹⁸ Pinkse, "Het Goudse Kuitbier...", p. 103.

1488 and 1495 also had different measures for different grains even though the measures had the same name. The 1518 Gouda regulation set down a similar complex formula for brewers where a combination of grains with seven possible candidates, in varied proportions with differing measures in each of four general categories, had to be used. The regulations could change dramatically in a short time as well. At Gouda back in 1366 the ratio of oats to wheat was 5:1 but in the next year the rule went to 3:1, perhaps in an effort to imitate practice in Delft. The confusion from imprecise and variable regulation could only help brewers to evade or bend the regulations to their advantage. That would interest them since the relative prices of the different grains were always subject to both short and long term change. Though unmalted grain may well have continued to be a component of the raw materials for beer as late as the early sixteenth century in Holland that practice disappeared from commercial breweries by mid century. Haarlem tax regulations of the 1570s and 1580s mention wheat, rye, barley, oats, buckwheat and other grains as possible components of brewers' inputs. In the early seventeenth century Rotterdam brewers added buckwheat to their list of possible grains but they, like their counterparts in most Dutch towns by then, used barley as the principal component of their malt with wheat also an option.¹⁹ So even though there was a general trend toward using barley, for a very long time oats remained important to Holland brewers.

Short term changes in the regulations occurred if there was a marked shortage of a certain grain. Town governments also made changes now and again to accommodate long term trends in taste and relative costs of materials. While the rules set proportions they also, in many cases, set volume so the rules dictated both the type and the strength of the beer. The government and the consumer were probably more interested in the latter than the former. In 1549 at Delft, it was agreed that rather than have fixed legislated proportions of grain the town itself would, after consultation, decide on the best proportions for the next month.²⁰

Town governments limited the ability of brewers to respond to changing circumstances. Before the Revolt and to a lesser degree after the broad range of rules in Holland restricted potential technical advance and potential response to rising grain prices. The setting and enforcing of the *pegel* was only the most obvi-

¹⁹ Bijlsma, *Rotterdams Welvaren 1550-1650*, p. 105; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 55-56, 59-61; Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, pp. 135, 164-165, 278, 514; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 62; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 32-36; Jacques C. van Loenen, "Structuur der accijnsen van de stad Haarlem over de 17e en 18e eeuw, vanaf 1575-1795," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #143 [n. d.], p. 9.

²⁰ van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 711-713.

ous. Equally effective in circumscribing the possibilities for brewers were the restrictions on the times that they could brew. Brewing at night or even in the evening was prohibited, though the repetition of such regulation suggests that brewers did violate the rules. The permitted hours for brewing at Delft, for example, were 6:00 a. m. to 7:00 p. m. from 1 March to 1 October, in February and October from 8:00 a. m. to 7:00 p. m. and from 1 November to 31 January they were 6:00 a. m. to only 3:30 p. m. Beer could not go into casks before 11:00 a. m., no matter the month. At Haarlem work started at 5:30 a. m. in winter but 4:00 a. m. in the summer. The earlier hour was to keep the beer from being exposed to sunlight. Brewing on Sunday or on important holy days was, of course, commonly prohibited and at Gouda sales by brewers on such days were limited only to travellers with a maximum set on such sales too. At Delft from 1616 and probably before, Sunday brewing, though not maling, was permitted but subject to very strict limitations. Haarlem brewers were allowed two brewings each week so they could start the fire on Sunday and put water in the kettle but brewing itself could not get under way until after the evening service had sounded on the town's church clock. The repetition of prohibitions of brewing on Sunday suggest that brewers commonly violated those restrictions as well.²¹

Many towns fixed the price of beer. Many towns fixed the types of grains used, with some temporary variation possible. Even if wages were not set, the prevailing combination of restrictions meant that brewers' profits were determined by the amount of grain used to make a quantity of beer. In Holland after the Revolt restrictions on types and quantities of grain might go but price regulation continued. Since grain costs made up such a large portion of total costs and the large majority of variable costs, a small change in the market price of grain could mean a big difference to the brewer's return. Consumers might be interested in the strength of beer but to the brewer it was critical to the financial success of his operation. Grain prices rose in the sixteenth century. In Holland, the political troubles of the Revolt after 1568 sent prices up even more. Haarlem brewers, for example, faced a 300% increase in the cost of the cereals they used between 1520 and 1575. Everywhere beer quality deteriorated, consumers were dissatisfied, and brewers were forced to seek ways of improving productivity to protect their threatened profit margins. In some cases the brewers persuaded the government to allow small price increases, as at Leiden in 1604. Such increases were the exception at least until the 1570s. Diluting their beer was the way Dutch brewers had of passing on rising costs to customers. If they did that they could

²¹ G. A. Delft, *Eerst Afdeling*, #1922 - 4, 5; Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, p. 277; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 104-105; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 8.

well damage their chances for getting a price increase from the authorities. As part of their perceived public function, brewers, were expected to continue to brew even if profits were squeezed and even if they were negative. At Amsterdam in 1575 when there was what proved to be a short term decrease in grain prices, the town government seized the opportunity to set new lower prices for different types of beer. The penalties for violation of the Amsterdam price regulations were stiff. The first violation lead to forfeit of the beer, the second to a one year suspension of the right to sell beer as well as a heavy fine. A little more than a year later a new regulation lowered the price of the cheapest beer as well. It was not the first time that Amsterdam merchants noticed that brewers were slow to lower prices when grain prices went down. As early as 1483 the government had taken action to lower prices in light of a surplus of grain.²²

In many places, it appears brewers could skirt price regulation for example by exporting their beer. At least in the late fifteenth century some Holland towns with established export markets could pass on price increases to traditional buyers in other towns. Delft in 1481 told Middelburg that if a recent price increase was not accepted then exports would stop. There were subsequent complaints, though, about both the quality and price of the beer that was sent which did lead to a temporary embargo by Delft on beer exports to Middelburg. When not long after that in 1496 the Middelburgers complained to Gouda about rising prices of beer the reply was that for 18 months grain prices were down and so Gouda brewers were able to sell beer for less but now prices were back to normal and so Middelburgers would simply have to accept the fact. At times the elements intervened to destroy the plans of government. At Amsterdam in 1615 the winter was so harsh it was impossible to import beer by water as late as March and the transport by sled instead of by boat was the explanation given by the men who delivered beer in the town for the higher prices in the market.²³

The typical pattern for beer prices throughout the Low Countries was that which prevailed at Maastricht to the southeast of Holland. With the exception of two years, the price remained the same from 1529 to 1570, despite increasing costs and the falling value of the currency. Prices after 1570 rose rapidly and by 1600 they were five times their 1570 level. There was a good deal of fluctuation. Prices rarely stayed the same for more than three consecutive years. Prices remained at or near the 1600 level until the 1630s when they rose again to some

²² G. A. Leiden, *Archieven van de Gilden*, #184, #185; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, # 626, #638; DuPlessis, *Lille and the Dutch Revolt*, p. 124, note 12; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 118; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 18-19.

²³ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #194; Unger, *Bronnen tot de Geschiedenis van Middelburg*, 3, #304, #367, #373.

Table IV-2
Maximum Wholesale Beer Prices by Type
Sixteenth Century

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Price</i>
Veere	1540	Locally brewed	17 stuivers/vat
	1540	Winter beer	22 stuivers/ton
Amsterdam	1575	israel, pharao	80 stuivers/ton
		penselaer	42 stuivers/ton
		full beer	42 stuivers/ton
		nayer or keut	20 stuivers/ton
Amsterdam	1586	scharbier	6 stuivers/ton*
		scharbier (another)	12 stuivers/ton*
Ghent	1577-9	keyt	¹² / ₆ schillings and groten Flemish/tun
		klein bier	2 schillings/tun
		crabbelaer	4 schillings/tun
		enkele clauwaert	6 schillings/tun
	1585	dubble clauwaert	12 schillings/tun
		klein bier	² / ₈ schillings and groten Flemish/tun
		dubble clauwaert	12 schillings/tun
		dusselaer	20 schillings/tun
England	1582	export	5 schillings/vat+
London	1597	small beer	5 shillings/barrel
		full beer	8 shillings/barrel
England (retail)	1604	ale	1 penny/quart
		small ale	¹ / ₂ penny/quart

* not subject to excise tax

+ value fixed by customs collectors — beer not subject to duty

Sources: G. A. Veere, #311, fol. 96v-97v; Paul De Commer, "De Brouwindustrie te Ghent, 1505-1622," *Handelingen der Maatschappij voor Geschiedenis en Oudheidkunde te Gent* nieuwe reeks, 37 (1983), p. 89; J. G. van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam [1512-1632]* (The Hague, 1929-1974), 1, # 626, #730; Frank A. King, *Beer Has a History* (London, 1947), pp. 68-70; H. J. Smit, ed., *Bronnen tot de Geschiedenis van den Handel met Engeland, Schotland en Ierland, 1150-1585* (The Hague, 1950), 2, 2, #1441.

60-70% higher than the 1600 norm. This indicates a slow deterioration in the financial position of brewers through to 1570, some improvement at the end of the sixteenth century but increasing uncertainty. That remained the case until price fixing was dropped which did not come until well into the seventeenth century and in very different circumstances and only in some places.²⁴ Holland brewers enjoyed relative freedom of choice in how they brewed from the Revolt on but they did still for some time face strict price regulation.

The general tendency toward decreasing quality in the sixteenth century was often met by the production of a premium beer alongside the thinner beers still within reach of most consumers. By the late sixteenth century consumers were left with at least two kinds of beer. Imports supplemented the choice. Brewers and publicans preferred sales of the more expensive beers since the price differential between beers was typically more than the tax differential. Thus the greatest profit was to be had from the most expensive beer. Governments proved more willing to entertain price increases for the premium products. On the other hand only with great reluctance did they increase the price of *klein bier* or small beer since that had to be an unpopular move.²⁵

There was a variety of names for beers in the golden age of Dutch brewing. The names reflect a greater precision in the work of beer makers in that they could more accurately control what went into the process and what came out. As much or more, though, the names reflect extensive government regulation of all aspects of the brewer's trade. Consumers benefited from defined types of beer. They had a better idea of what they would get. Governments were much the greater beneficiaries, though. The more precise names and fixed distinguishing features for beer types made it easier for towns and the county to tax properly. Distinctions were made on the basis of the additives used to make the beer, the color — which depended on the type of malt used — the time of year or even the day the beer was made, the intended customers, the price of the beer, the strength of the beer²⁶ or where the beer came from. That by no means exhausted the sources for beer names.

Brewers and drinkers before 1500 were not at a loss for names. Often it was

²⁴ Aerts and Put, "Jezuïetenbier...", p. 124; C. G. L. Apeldoorn, "Een Onderzoek naar de prijzen van het bier en andere gegevens met het bier verband houdende, op het Stedelijk Archief te Maastricht," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #69 [n. d.], pp. 31-32.

²⁵ De Commer, "De Brouwindustrie te Ghent...", pp. 85, 88-90; Soly, "De Brouwerijenonderneming van Gilbert van Schoonbeke...", p. 343; Unger, *Bronnen tot de Geschiedenis van Middelburg*, 3, #781.

²⁶ Kristof Glamann, *Bryggeriets Historie I Danmark indtil slutningen af det 19. århundrede* (Copenhagen, 1962), pp. 135-136.

origin that mattered. The beers from towns like Delft, Haarlem and Amersfoort had a reputation for being stronger and so were more in demand. Stronger beers travelled better but the higher alcohol content also gave them a special prestige. Consuming them was something of a status symbol. Towns did what they could to maintain the fame of specific beers. Attaching a certain name could in some cases do the trick. Each grain gave beer a unique color and taste. Names reflected the differences. More important than grain used was whether the beer came from the first mashing, the second or, if there was one, the third or the fourth. That deeply affected the strength of the beer, its value and, presumably, the name brewers and drinkers gave it. There were beers with herbs and spices which a sixteenth century poet called "medicinal beers." The healing qualities of beer from Dordrecht were hailed by at least one writer.²⁷ Beyond all the better-known types which were produced in large quantities there were specialty beers from certain places and with unique recipes.

In general, and no matter the name, there were three types of beer: expensive and high quality, cheap and thin and another somewhere in between the other two. In Holland in the sixteenth century the three fold division meant, first, a very strong beer, usually for export if the town could find a market beyond its walls. That beer was sometimes mixed with spices to make a festive drink intended for a wealthy clientele. Often there was more than one variety with more than one name. Second, there was the usual middle table beer such as all the beers called double. Third, there was an inexpensive drink.²⁸ Legislation was emphatic about names and about fixing the prices of the different types. Towns did typically insist on proper marking of casks to indicate the different types of beer. Urban governments tried to promote some accuracy in the production and the naming of beers. In the process they created confusion since there was no guarantee of uniformity from town to town or over time. Some names were unique to certain towns or districts, others enjoyed widespread use but the meaning of a name could vary. The best example of confusion comes from a type called *kuyt*.

There has been a lengthy and unresolved discussion about what that word means and meant. The only conclusion which seems certain is that the name meant different things at different times and places. It has been suggested that kuit was a name for beer made with hops and that was the critical meaning of the word. On the other hand it has been argued most emphatically that what

²⁷ W. Abel, *Stufen der Ernährung Eine historische Skizze* (Göttingen, 1981), pp. 22-23; Hallema & Emmens, *Het bier en zijn brouwers*, p. 74.

²⁸ Michel van der Eycken, *Geschiedenis van Diest* (Diest, 1980), p. 60; Huntemann, *Das deutsche Braugewerbe...*, p. 12; Räsänen, *Von Halm zum Fass...*, p. 37; Harald Thunæus, *Ölets historia i Sverige*, (Stockholm, 1968-70), 1, p. 121; C. Verlinden and J. Craeybeckx, *Prijzen- en Lonenpolitiek in de Nederlanden in 1561 en 1588-1589. Onuitgegeven adviezen, ontwerpen en ordonnances* (Brussels, 1962), p. 85.

distinguished kuit was that it did not have hops. The weak and inconclusive evidence for that conclusion is that hopped beer and kuit are mentioned in the same sources. There was a distinction made, at Leiden, for example, in the tax on kuit and the tax on *hopbier*. It has been claimed that kuit was not subject to excise taxes and so enjoyed an enhanced competitive position in the fifteenth century. Yet documents from Utrecht dated to 1432 and one from Gouda of 1468 clearly state that kuit had to pay hops tax. Most telling, though, is the fact that *kuytebier* produced in Gouda in the fifteenth century was able to last for some time and travelled well, finding export markets in Flanders and Brabant. It seems likely that brewers used hops in making it. The difference between kuit and *hoppenbier* was, therefore, probably in the quantity and types of grain used in making it and so in the strength.²⁹ At Nieuwpoort in Flanders in the fifteenth century publicans faced penalties for trying to pass off kuit as Hamburg beer. The latter undoubtedly had hops and was of high value, so if the two could be mistaken for each other then kuit must have been a strong hopped beer. Amersfoort kuit had an alcohol content probably of about 6.5%, so was a strong beer and with a grain content similar to that of the better beers made in the town. No matter the original intention by the mid sixteenth century kuit was undoubtedly made with hops.³⁰

The word kuit comes from French and turns up as early as 1358. The first mention of the word in the northern Netherlands is in a Utrecht bylaw of 1397. It is clear there, as elsewhere, that kuit was inferior in quality to Hamburg beer. How inferior, though, is not certain. In 1433 Utrecht brewers were producing a double kuit which may have had as much as double the amount of grain but did have more barley and less oats than kuit. A Leiden document of 1450 equates *koeyt* with beer brewed in Holland and also notes that no more than 24 barrels should be produced in any single brew. Amersfoort exported *koyte* to Holland, perhaps as early as the close of the fourteenth century. That export product may have been thicker and heavier than the usual beers produced in towns in Holland. In Zeeland in the sixteenth century, kuit was cheap low quality beer. At Antwerp in 1542 the lowest priced small beer was called *koyte* or rather, small beer had deteriorated so much in quality that it had been replaced at the bottom of the spectrum by kuit. That was not always true. Back in 1440 the price of kuit put it at the same level as an expensive type. Tax records of other towns in the

²⁹ Blok, *Geschiedenis eener Hollandsche Stad*, 1, p. 205; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 73-74; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 68; Grolsche Bierbrouwerij, *Merckwaerdighe Bierolgie...*, p. 47; Pinkse, "Het Goudse Kuitbier...", p. 104.

³⁰ van Bommel, *Beschryving der Stad Amersfoort...*, 2, p. 774; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 66, 68-69; S. Muller Fz., *Schetsen uit de Middeleeuwen* (Amsterdam, 1900), p. 61; van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," pp. 342-347.

southern Low Countries show kuit as a more valuable beer, a status it had lost by the 1530s. In 1588 Delft kuit was described as the thin beer for the common folk. In the seventeenth and eighteenth centuries kuit was almost certainly the last and weakest and least valuable beer made in any brewing.³¹ Both the name kuit and the beer as with most other types were devalued over time.

In the fifteenth century, kuit was produced in Gouda for export and was popular in Flanders and Brabant. Haarlem produced kuit for export as well. In 1486 Leeuwaarden prohibited the import of any Haarlem beer. The following year a group of farmers came into the town and insisted on being served kuit from Haarlem. The result was armed conflict so kuit must have been a popular type and also one able to stand travel.³² Haarlem brewers started making kuit and exporting to Friesland because in the second quarter of the fifteenth century their hopped beer had been driven out of the Flemish market especially by cheaper kuit shipped from Delft and above all Gouda. Tax rates from Ypres (1451) and Bruges (1457) included rates for Holland and Delft kuit respectively. At Ghent the principal source for kuit was Gouda. There were even specific rules on the return to Gouda of casks which came filled with kuit. In 1474 at Lier near Antwerp 25% of the total of all beer consumed in the town was kuit from Holland. At Ghent between 1505 and 1542 almost 95% of imports were kuit from Gouda and Delft. Even a small town such as Biervliet in 1427 imported about 300,000 liters of hopped beer and kuit from Holland. As late as 1537/38 the figure was probably over 500,000 liters.³³

The success of kuit in fifteenth century export markets appears to have been based on quality and durability but even more on price. The greater proportion of oats in kuit may have given it a competitive advantage. Gouda brewers in the

³¹ Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," p. 58; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, pp. 67-68; Eykens, "De brouwindustrie te Antwerpen, 1585-1700," pp. 85-86; Halbertsma, *Zeven Eeuwen Amersfoort*, p. 44; Muller Fz., *Schetsen uit de Middeleeuwen*, p. 61; Hallema and Emmens, *Het bier en zijn brouwers*, p. 70; Pinkse, "Het Goudse Kuitbier...," p. 101; van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," pp. 343-344, 346.

³² Doorman, *De Middeleeuwse Brouwerij en de Gruut*, pp. 67-68; Faber, *Drie Eeuwen Friesland*, pp. 243-244; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 45, 81; Pinkse, "Het Goudse Kuitbier...," pp. 104-105; van Uytven, *Stadsfinanciën en Stadseconomie te Leuven*, p. 316; van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," pp. 341, 344-345; Richard J. Yntema, "Allerhande bieren Over biersoorten en hun distributie tussen de 14de en de 19de eeuw," in: *Bier! Geschiedenis van een volksdrank*, R. E. Kistemaker and V. T. van Vilsteren, eds. (Amsterdam, 1994), pp. 82-83.

³³ De Commer, "De Brouwindustrie te Ghent...," pp. 86-87, 132, 151; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 85; Herman van der Wee, "De handelsbetrekkingen tussen Antwerpen en de Noordelijke Nederlanden tijdens de 14e, 15e en 16e eeuw," *Bijdragen voor de Geschiedenis der Nederlanden* 20 (1965-66), p. 269; van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," pp. 339-340.

fifteenth century made kuit with oats, barley and wheat. The mix of grains changed over time and from place to place in Holland. The sheer presence of barley malt may have been what distinguished kuit in the early fifteenth century. It was then possibly a beer made from something more than just oats and wheat. Since barley is easier to mash brewers possibly could have gotten away with using less grain to make kuit than other beers. In the later sixteenth century there appears to have been a change to relatively less barley in kuit. Then and probably earlier kuit was made with some unmalted grains which may well have always been its distinguishing feature, the feature which gave it strength, a different taste and possibly even a lower price if malting costs could be avoided for some of the grain. Possibly kuit was also boiled longer than other hopped beers. That took away some of the strong hopped flavor, another advantage in the fifteenth century when consumers in western Europe were just getting used to beer made with hops.³⁴

In Holland, Gouda had such success exporting kuit, at least through the first half of the sixteenth century, that brewers there may not have produced a stronger beer. On the other hand Haarlem brewers certainly did turn out a *dubbelbier*. The quantity of grain used to make it was said originally to be twice that of single or *enkelbier*. There was a problem by the 1540s, though, since the two beers carried the same level of tax so brewers tended to produce *dubbelbier* on which their profits were higher than with *enkelbier*. In 1540 Haarlem town authorities recognized the production and sale of three sorts of beer, defined by their retail prices. The publicans who served the most expensive type were prohibited from serving either of the other two types. The goal was presumably to prevent avoidance of the heavier excise tax on the best beer. By 1545 and after a good deal of discussion Haarlem had fixed on the three types of beer. The lowest priced was the old hopped beer, now presumably watered down and in the market beside single and double beers.³⁵

While in the sixteenth century the trend was toward a wider variety of names and of beer types in the seventeenth names and prices seem to have settled down. Names such *moll*, a type brewed at Nijmegen, and *pharao* which turned up at Amsterdam and at Dordrecht, may well have just been the better, higher quality beer of the town, the local form of double beer. *Mol* also may have been made, at least in some places, without hops. In the 1570s the terms for higher quality, and thus higher priced, Amsterdam beers were *israel* and *pharao*, the

³⁴ van Uytven, "Haarlemmer hop, Goudse kuit en Leuvense Peterman," pp. 340-341, 348-349.

³⁵ G. A. Haarlem, *Archief van het Brouwersgilde*, #40, 4; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 59-60; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 34-36.

pre-classical references presumably giving the product even more of a cachet. A step down from those but still at more than twice the price of low cost *keut* were *penselaer*, also made in Delft, and full beer. Names such as *grootbier*, *dickenbier*, *swaer poortersbier* suggested heavier or stronger beers. Some beers were made exclusively or largely with one grain, though so called wheat or barley beer were not common. There was still in the sixteenth century a *gagelbier* which, presumably, was made with *gruit* and not hops. *Kermisbier* was a seasonal beer for celebrations before Ash Wednesday and presumably made with some spices to add flavor.³⁶

In Holland the polar opposite of the more expensive double beer was *scharbier*. Governments were conscious of both the market and technology for *scharbier*. It was thin and consumers bought it more for its purity than for the nutritive or inebriating qualities. At Groningen the town council insisted that such beer should have its full proportion of hops, though, so at least the beer would have the strong taste of its more nutritious predecessors through the brew kettle. The low quality beer carried a very low price because it was free of tax. Once a category of tax-free beer was established, the potential for avoiding legitimate excise tax expanded tremendously. The government had an interest in seeing that the composition of the tax-free beer be strictly understood and that no other beer be considered to be the tax-free type. In many places it was simply *klein bier* or small beer though that term could mean a taxable beer, still of low quality but better than the tax-free version. Other names such as *dun* and *scheynbier* and *volksbier* and *scharbier* and *scherbier* all turn up. No matter the name, it was always cheap.³⁷ In an attempt to stop tax avoidance Amsterdam required in 1573 that *scharrebier* not be made or stored in closed casks and that it be made only in small quantities. Publicans could no longer serve the beer and a maximum price was set on any of such beer that was imported. There was a similar restriction on publicans or druggists selling such beer in Leiden along with a regulated maximum price. By 1610 at Amsterdam imports of the very low priced beer could come into the town only at one place. The inspector of small beers had to be present when it was unloaded and keep a careful record of all such beer brought into the town. Amersfoort may well have been the source of much of that imported *scherpbier* since as the industry there declined brewers tried to specialize in making the

³⁶ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #626 — 1, 2, 3, 4; Eykens, "De brouwindustrie te Antwerpen, 1585-1700," pp. 85-87; J. G. Theodor Grässe, *Bierstudien* (Dresden, 1872), pp. 63-65; Hallema and Emmens, *Het bier en zijn brouwers*, p. 124; Yntema, "Allerhande bieren...", p. 87.

³⁷ G. A. Leiden, *Archieven van de Gilden*, #191, 38; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 76, 124; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 57.

cheapest beer. That in turn led the town government to try to keep standards from falling too far.³⁸

There was a beer that may have been even weaker than *scharbier*. That was *scheepsbier* or ship's beer, designed for use on board. This could be of a price and quality even less than that of the cheapest beer sold in towns. It was sold both to ships and to shipbuilders who enjoyed freedom from tax on beer for workers on the wharf. Herring beer appears to have been just like other ship's beers except that it was put in small casks which, once emptied by the crew at sea, could be filled with fish. A regulation from Emperor Charles V in 1549 limited the brewing of the low quality beer to the four months from 1 October but brewers at Delft petitioned him to extend the season to 1 June. They claimed the shortened period would hurt their industry. Presumably they wanted to supply vessels setting off in the Spring. No matter how weak ship's beer was at least there was a chance that it was drinkable. Crew members did complain on Dutch naval vessels about beer going sour. For longer voyages away from port, and such voyages were exceptional, captains would probably take on some better quality beer. Such beer would not spoil and would still be drinkable after the crew had consumed all of the weak ship's beer. Sailors used the weak beer as their water supply but also as food. When there was no butter for the hard biscuit of their breakfast, beer softened the bread.³⁹ Such tricks were known in the early eighteenth century, just before beer disappeared from the complement of ship's stores and presumably the practices dated even to before the seventeenth century when naval captains became responsible for the diet of their crews.

In addition to all those locally-produced beers Dutch consumers could buy, generally at great expense, imported beers. Their range in name and type was even greater than that for domestic beers but their range in quality was higher and narrower. Weak beers did not travel well so only the strongest entered long distance trade. In terms of volume, imports were of little importance. They were consistently subject to tax and usually to rather high taxes. Even with such levies the volume was so small that figures for the amount brought in are hard to gen-

³⁸ G. A. Leiden, *Archieven van de Gilden*, #191, 38; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #620, #1155; Halbertsma, *Zeven Eeuwen Amersfoort*, p. 47; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, p. 176; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 9, 16, 18; E. M. A. Timmer, *De Generale Brouwers van Holland Een bijdrage tot de geschiedenis der brouwning in Holland in de 17de, 18de en 19de Eeuw* (Haarlem, 1918), pp. 9-10.

³⁹ G. A. Amsterdam, *Gilden Archieven*, #1669, 29, pp. 1-2; G. A. Delft, *Eerste Afdeling*, 950; J. R. Bruijn, "Voeding op de Staatse Vloot," *Spiegel Historiae*, 2, 3 (March, 1967), pp. 175-180; Posthumus, *De Uitvoer van Amsterdam 1543-1545*, p. 33; E. M. A., Timmer, "De Impost op de Gijlbieren. Bijdrage tot de Geschiedenis der Bierbrouwerij in Holland in de 16de en 17de Eeuw," *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde*, vijfde reeks, 3 (1916), p. 312.

erate. Imports in Holland probably never formed more than 5% of consumption. Even after 1600, when the signs of decline began to appear in domestic brewing, imports were less than 2% of sales in most markets.

In Holland as the numbers of wealthy people rose in the course of the sixteenth century there was a greater interest in premium imported beers. Haarlem import figures tend to support such a conclusion. There were wide fluctuations in quantities brought in, though, dictated by changing political conditions in the Baltic, which could inhibit shipments, and changes in the taxes charged on imports⁴⁰. When a translator at Antwerp dealt with a list of premium wines in a Spanish story in 1550, the text as well as the language was changed to suit local readers. In the Dutch translation numerous beers are added to the wines given as gifts to flatter a lady. The Dutch translation, among all sixteenth century translations of the story, has the longest and most cosmopolitan list of wines. The beers, appended to that list of wines, included *Joopen*, Hamburg, *Mom*, English, March, Bremen, Leuven, Hoegaard and similar types.⁴¹ Presumably the Hamburg and Bremen beers were of higher quality than their fourteenth and fifteenth century predecessors. Leuven and Hoegaard beer came from brewing centers in Brabant just to the south of Holland.⁴² *Joopen* from Gdansk, *Mom* from Braunschweig, and English beers were the most important luxury imports, it would appear, in terms of volume and value in the sixteenth century.

At Amsterdam in 1554 the town set aside a different portion of the harbour, more removed, for the off-loading of beer from the Baltic and from England. The town also set a maximum wholesale price on English beer but retailers could sell it for as much as they could get. The beer from England was of higher quality, called *doble bere* by a Dutch customs official in 1549. The port facilities for handling beer imports developed quickly and a subsequent bylaw of 1558 dealt specifically with imports of English beer. It appears to have been so popular that buyers swarmed on board ships carrying it when they arrived at the landing place. In 1573 a ship from Holland made five trips carrying cargoes of beer each time from Ipswich to Enkhuizen. Such traffic seems to have been common with the expectation at the highest levels of government in the 1560s that the English would export beer to Holland and Dutch shippers would carry it. The quantities in each instance might not be large but the import of beer from England in the 1560s and 1570s is repeatedly mentioned in a variety of documents. London

⁴⁰ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 76-77.

⁴¹ Kathleen Kish, "Celestina Speaks Dutch — in the Sixteenth Century Spanish Netherlands," in: *Hispanic Studies in Honor of Alan D. Deyermond A North American Tribute*, John S. Miletich, ed. (Madison, 1986), pp 171-182.

⁴² Jozef van Balberghe, *De Mechelse Bierhandel-Geschiedenis-Folklore-Dialekt* (Antwerp, 1945), pp. 54-56.

appears to have been the typical port of departure, and various ports in Holland the destinations. In 1568 Amsterdam again reaffirmed maximum prices on English beer.⁴³ The upward pressure on prices confirms the ability of English brewers to match in quality their counterparts in many places in Germany and even in Holland.

Mom or *mumme*, originally from Braunschweig, found a market in most towns in Holland alongside English beer. The legend was that it was a type first brewed by a Christian Mumme in 1492 but there is evidence it was produced as early as 1425. It was a seasonal beer, at least in the seventeenth century, with brewing limited to the month of March. It was thick, strong, dark and flavored with a number of spices which gave it a bitter taste. Things such as bark of fir trees, pimpernel, birch shoots, marjoram, thyme and fresh eggs among others things have been suggested as the combination but the exact composition of additives was kept a secret. The beer travelled well. It was strong enough that it could even survive voyages to the tropics and so made it as far afield as India and South Africa in the seventeenth century.⁴⁴

The other high quality beer often mentioned and which enjoyed wide circulation in Holland was *joopenbier*, a dark, red-brown, sweet, heavy, slow flowing and very expensive beer originally from Gdansk but brewed in many places in Germany by the sixteenth century. There were as many as thirty variations of *joopenbier*. *Joopenbier* was said to be good for many maladies including bruises and constipation. At the premium price which it commanded *joopenbier* had to be thought of as medicine, though the high concentration of nutrients in the thick beer made it more valuable as a drink than even standard double beers. By 1524 a maximum price was set on *joopenbier* at Amsterdam. This suggests that it was already imported there and that its price was going up. In 1546 and again in 1547, the town of Amsterdam recognized the status of *joopenbier* and sent some off to the *Groote Raad*, the high court at Mechelen, to help the judges in their deliberations in a case affecting the town. Similar gifts to help bureaucrats in making decisions favorable to the town went to financial officers in Brussels in the same years. *Joopenbier* was so expensive, made even more so by the high excise tax placed on it, that it was usually imported in small units of less than 2 liters and rarely by the barrel. At Haarlem in 1581 imports of *joopenbier* were about 1% of

⁴³ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #384, #404, #555, #556; Hallema and Emmens, *Het bier en zijn brouwers*, p. 90; Smit, *Bronnen tot de Geschiedenis van den Handel mit Engeland, Schotland en Ierland*, 2, 1, #831, 2, 2, #1060, #1062, #1103, #1231 and, for example #967, #1033, #1080, #1105, #1137, #1210.

⁴⁴ Grässe, *Bierstudien*, pp. 40-42; Grolsche Bierbrouwerij, *Merckwaerdighe Bierolgie*, pp. 52-53; Hoffmann, *5000 Jahre Bier*, pp. 71-72; Pilgrim, "Der Durst auf den Weltmeeren...", p. 86; Techen, "Das Brauwerk in Wismar," pp. 148-150.

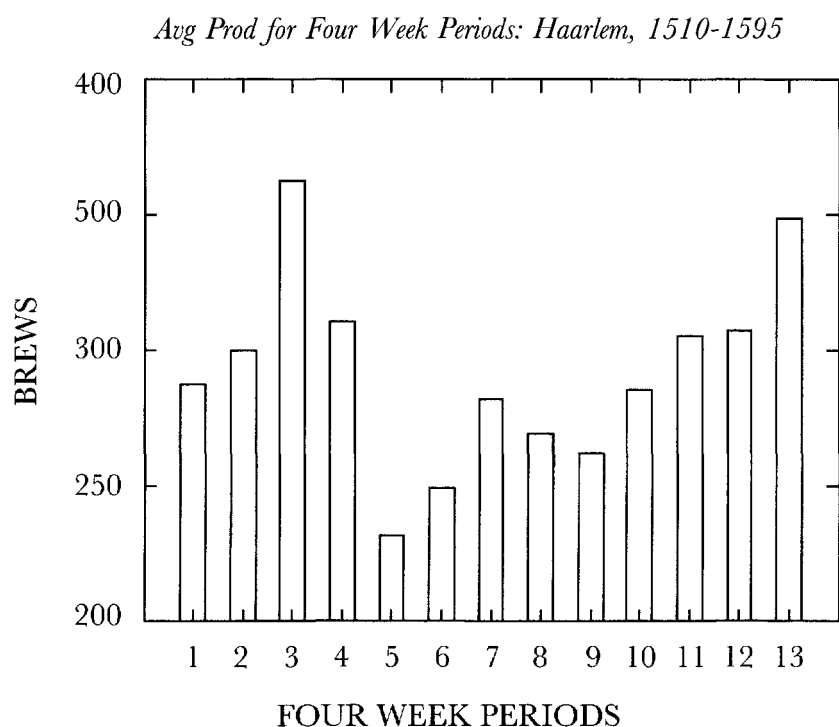
imports of English beer and the latter amounted to less than 30,000 liters if that. There were problems with the excise tax on *joopenbier*. Apparently the type was so strong and of such high quality that it was mixed with other beers to enhance them and to lower the rate of tax, or at least so the town authorities in Hoorn complained in 1605. At Hoorn in 1611 *joopenbier* was subject to a charge of 3 guilders per vat, 7.5 times the rate for other imports. Holland brewers by the late sixteenth century could produce premium beers but they did not keep foreign beers out of the market. Dordrecht still imported Hamburg, *Joopen*, Bremen and English beer among others in the 1580s.⁴⁵

All those imports, no matter their variety or the shifting patterns of taste and tax, were still only a small portion of the total consumption of beer. Governments spent an inordinate amount of time dealing with those beers because they carried higher prices, because they were subject to higher and more varied taxes and because local brewers always perceived imports as a threat. Government efforts to improve the classification of beers in order to assess taxation more effectively and equitably did not prove effective. Brewers appear to have favoured producing a variety of beers under a variety of names. There was the chance a new name might give them a competitive advantage and a chance that some tax burden might be reduced because of confusion among tax collectors about what any new name meant. After the Revolt and in an effort to bring order to the system of excise taxes which expanded rapidly during the war against Spain, Holland and Zeeland resorted to a simple system of classification. Beers would be identified by their wholesale price and those prices could occur only in intervals of 10 stuivers.⁴⁶ Beer of 20, 30, 40 and above 40 stuivers in price each carried a specific level of tax. As part of the legislation, efforts were made to standardize the measures used for beer as well. The system left it to the brewer to select the quality of beer he wanted to make for the fixed price. It was a system which abandoned any effort at sophistication for administrative efficiency and maximum government income. Not until ways of measuring alcohol content with some accuracy were developed in the nineteenth century was any advance made on classification by sale price.

⁴⁵ G. A. Hoorn, #305, first, 1611; Alleblas, "Nieuw Leven in een Oud Brouwerij?...", pp. 17, 20; Corran, *A History of Brewing*, pp. 48-49; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #92; Grässe, *Bierstudien*, p. 35; Hallema and Emmens, *Het bier en zijn brouwers*, p. 122; Hoffmann, *5000 Jahre Bier*, p. 72; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 80-81; Siebel, *One Hundred Years of Brewing*, p. 29; Ter Gouw, *Geschiedenis van Amsterdam*, 4, pp. 359-360.

⁴⁶ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek...*, 1, pp. 1703-1706 [1658]; Pieter Hendrik Engels, *De Geschiedenis der Belastingen in Nederland, van de Vroegste Tyden tot op Heden mit eenen Beknopten Inhoud der Tegenwoordig in Werking zijnde Belastingwetten* (Rotterdam, 1848), pp. 98-99.

Figure IV-2



Source: Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), Appendix VI, pp. 140-148

Towns in a number of cases restricted when during the year brewers could produce though seasonal production prohibitions seem to have been less common in Holland than in Germany. In many towns output of beer was highest in March, April and May, dropped through the summer months and then picked up again in November and December. At Haarlem sporadic figures beginning in 1510 and ending in 1595 for production for four week periods show that, on average, the end of February and the early part of March was the time of maximum output. From the warm months of May through into September output remained at lower levels, only recovering slowly in October and November. The closing weeks of the year saw average production at a level similar to that of March.

Haarlem brewers produced more beer in November than any other month, though in the sixteenth century only 10% of annual output was made in that month. The high point was in 1557 when 14% of the year's beer was made in November. That month and December saw more beer made because of the colder weather, because of the festive season and because up to Christmas there

Table IV-3

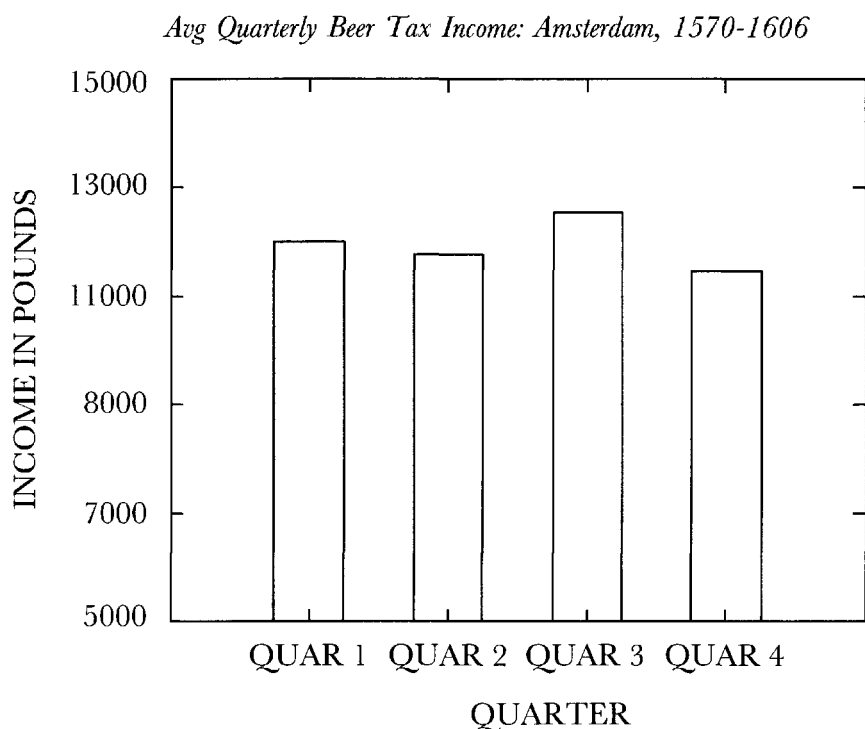
*Average Monthly Income from the Enkhuizen Beer Excise,
1 August, 1642 — 31 July, 1648 in Guilders*

<i>Month</i>	<i>Mean</i>
Jan	20.900
Feb	14.375
Mar	15.205
Apr	15.127
May	14.865
Jun	10.455
Jul	11.990
Aug	10.250
Sep	7.240
Oct	8.047
Nov	10.880
Dec	17.695

Source: G. A. Enkhuizen, #178 (1431).

were few if any holidays and church fasts to cut into production or consumption. Production data from Haarlem for the period 1590 to 1611, which give the number of brews in each week of the year, indicate that production was about average through April and then fell below the average until it rose in the first three weeks of June. The weekly average was very close to the annual average for the rest of the summer but early in August it moved above that level. In the last week of October production began to climb and reached the maximum in the last two weeks of November. Then instead of the average of about 46 brewings per week brewers fired up their kettles on average 66 times each week. Production stayed at higher than average levels until the week of Christmas when it fell sharply and stayed down until picking up again in the last two weeks in March. The Haarlem figures for the end of the sixteenth century confirm a pattern of a trough in the depths of winter, a busy Spring and a brisk summer with brewers most productive in the Fall. A survey done for Gouda for twelve months beginning in 1545 showed a consistent pattern of significantly higher output in two of the four quarters. Larger brewers were the most likely to maintain something closer to the average level of production throughout the year. Smaller brewers were likely to abandon brewing entirely in at least one and sometimes in both of

Figure IV-3



Source: G. A. Amsterdam, Archief van de Thesaurieren Ordinaris, 'Rapiamus'

the quarters when production went down.⁴⁷ Presumably they could only leave their capital idle if they found other employment and if their capital outlay was not great.

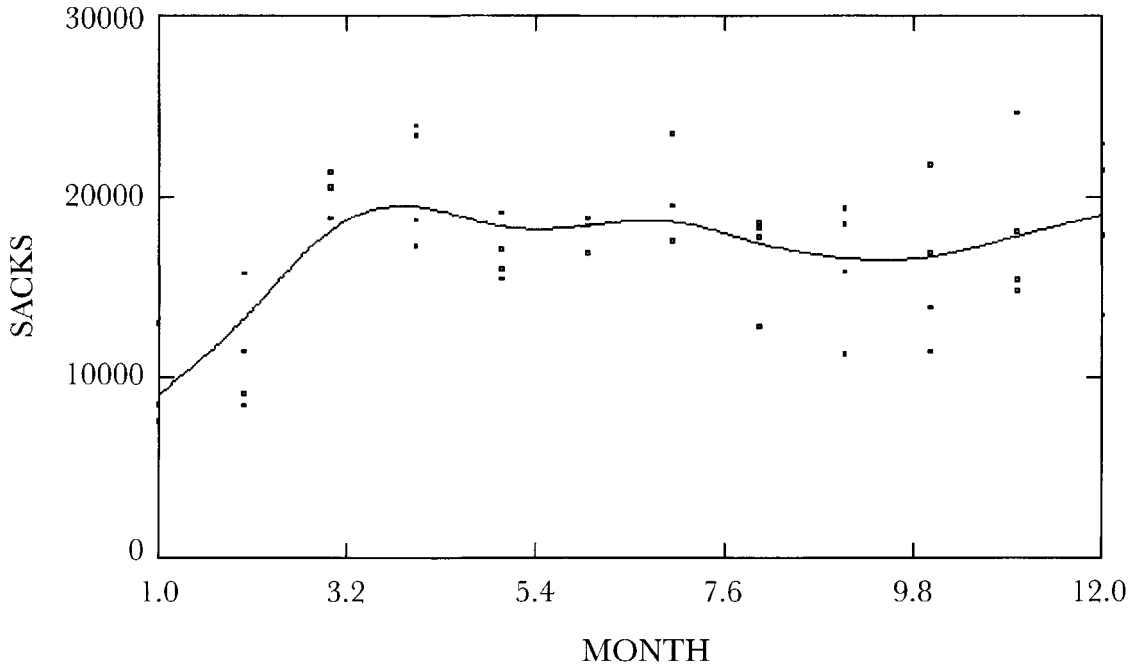
Monthly tax figures from Enkhuizen from as late as the 1640s show that peak production still fell in the winter, in December and January, with production continuing at a high level through May. It then fell off, by about 40%, through the summer and then fell sharply in September and October to revive again in November.⁴⁸

At Amsterdam, from 1570 to 1611 the quarterly income from excise taxes on production hardly varied from one period to the next.

⁴⁷ A. R., *Papiers de l'Etat et de l'Audience*, 1665/1; G. A. Haarlem, Archief van de Brouwersgilde, #27; Klonder, *Browarnictwo w Prusach Krolewskich*, p. 160; Andrzej Klonder, "Rachunki cecchu browarnikow Starego Miasta Elblaga jako zrodla do badan nad produkcja piwa w XVI-XVII w," *Kwartalnik Historii Kultury Materialnej* 28, 2 (1980), p. 206; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 49-50; Tehen, "Das Brauwerk in Wismar," pp. 291-292.

⁴⁸ G. A. Enkhuizen, #178(1431) [1642-1648].

Figure IV-4

Brewers' Monthly Grain Consumption: Haarlem 1662-1666

Source: G. A. Haarlem, Archief van het Brouwersgilde, #30

There was higher production on average in the third quarter which began in August, suggesting some revival after a slower summer and a greater availability of grain after the harvest. Production varied more in the third quarter from year to year but the standard deviation was only some 4% more than in the fourth quarter which showed the least deviation.

At a much later date, from 1662 to 1666, data on Haarlem brewers' grain use show the month starting in the fourth week of January typically had the lowest production level of the year. The following month saw some increase but by the month of March output was up to where it would remain largely consistently over the rest of the year. There was a drop in September and October, though not a great one, and then some increase back to the norm for most of the year in the weeks running up to and after Christmas.

For the very short period of 1667 to 1669 grain used by brewers is reported for the first seven months of each year and for the second five months. The figures are inconclusive. While in the first of those years the monthly average was almost exactly the same in both periods, in 1669 in the later portion of the year

grain use on average was 75% higher per month than in the first half. Obviously there were important factors at work which mattered as much or more than the seasons. However, the data do suggest that some progress was made in the course of the seventeenth century in decreasing the seasonal fluctuations in the industry and in being able to brew and sell beer through the summer months at levels consistent with the rest of the year. It would, however, be the nineteenth century before brewers finally mastered the difficulties created by changes in the weather.

In most cases consumption did not show such extensive seasonal variation. Many records in Holland suggest a consistent level of drinking throughout the year. Leiden quarterly excise tax records show only the slightest variation from one thirteen week period to the next between 1447 and 1476. Consumption seems to have been slightly higher in the Spring, from mid February to late May, but rarely more than 2% above the average for the year. Dordrecht excise data going back to 1429 and Gouda data from 1437 to 1553 suggest a similar consistency in consumption across the year with only small swings from month to month or from quarter to quarter. At Gouda the income for the quarter with the highest average yield was only 17% higher than the quarter with the lowest average yield. The fluctuation around the mean was greater in the fourth quarter and significantly so but was virtually the same for the other three quarters. There were some years when more beer than usual got drunk in the winter months around Christmas but otherwise the pattern was a stable one.⁴⁹ Excise data on quarterly consumption taxes from Leiden running from 1497 to 1574 show the same consistency in drinking throughout the year. The average share of excise tax income in the first quarter of November, December and January was 24% and for each of the others just slightly above 25%. There were swings from year to year. The widest deviations from the average came in August, September and October, perhaps a result of availability of beer at the end of the summer. In general, though, income in each quarter tended to rise and fall with the total income from the beer tax and so followed the general pattern of sales. The August, September and October quarter income was not highly correlated with income from the quarter starting in November or the one starting in March which suggests the same tendency toward slightly wider swings in consumption in late summer.⁵⁰ The consumption pattern reflected the lessening of grain sup-

⁴⁹ G. A. Dordrecht, *De Grafelijke Tijd 1200-1572*, #433-445; G. A. Gouda, *Aantekeningen A. v. d. Poest Clement*; G. A. Haarlem, *Archief van het Brouwersgilde*, #30; G. A. Leiden, *Secretarie Archief 1253-1575*, #521-552.

⁵⁰ G. A. Leiden, *Secretarie Archief 1273-1575*, *Rekeningen van de Tresoriers, 1493-1574*, #573-644.

plies as the harvest approached, the problems of keeping beer during the warm summer months and levels of production of breweries.

A Dordrecht report for thirteen weeks beginning on 1 July of 1597 shows a consistency even in consumption by days. Sales on Sunday were always zero. Average daily sales through the quarter were 63.3 barrels with Mondays having a much higher average level, that is 87.5 barrels. Saturdays on the other hand had a level lower than average, 53.5 barrels. Wednesdays were the low point of the week, averaging only 50 barrels. The remaining days of the week showed consumption very close to the overall daily average. Weekends were periods of lower beer sales, to be made up for by restocking on Monday. Laborers drank a good deal of beer and the daily sales pattern seems to confirm the connection between beer drinking and physical labor and possibly skilled physical labor. The amounts drunk from one week to the next varied but within the week the pattern remained surprisingly similar.⁵¹

⁵¹ G. A. Dordrecht, 1572-1795, #3813.

CHAPTER FIVE

TAXES, PROFITS, AND WOMEN'S WORK

The excise taxes on consumption items, which had become a mainstay of urban finances in the fourteenth century continued in that role and became if anything more important. The rates of excise on beer were always critical to brewers too since they made up such a large share of the selling price of the product.

Brewers paid a sum typically for each brew and then an excise tax on sale of the beer. The brewers excise rose as a share of price through the late sixteenth and early seventeenth century. There were occasional reductions. Brewers and even towns often petitioned for relief from the burden, but more typically the tax climbed. The cost of the war against Spain was, of course, the most important factor in forcing up taxes. Various governments from the 1580s on raised the rates. The increases also made more of an issue out of tax evasion or tax exemptions offered by governments.¹ Fifteenth century levels of taxation are hard to compare with sixteenth both because of different measures of beer and money and because of changes in the stage at which tax was levied. Some of the fifteenth century tax rates, like that of Dordrecht in 1468, are far out of line with what would prevail during the golden age of Dutch brewing. The tax was raised there because the town was getting less than 25% of its annual contribution to the comital government from the tax. In general, as at Leiden for example, taxes made up something on the order of 8-10% of the price of beer but there too the excise on beer rose in the course of the fifteenth century.²

In 1542, in order to meet commitments to the monarch, the province of Holland itself started to levy another excise on top of those already collected by the towns. Towns expected resistance, especially from the less-well-off who would be especially burdened by what was a regressive tax. Towns were also reluctant since an experiment with a province-wide excise tax in 1523 had yielded much less than anticipated. The 1542 and 1543 taxes, though, proved highly successful. In Holland, because of a compromise, the excises on beer were only to be collected in the towns. Since so much of the county was accessible by water it

¹ G. A. Archief Dordrecht, De Grafelijke Tijd, #407; R. A. in Zeeland, Archief van de Staten van Zeeland..., 1574-1795, #3228 [1587], [1587], [1588]; [1599], [1600].

² G. A. Dordrecht, De Grafelijke Tijd, #405; Marsilje, *Het financiële beleid van Leiden...*, pp. 269-270, 273-274.

Table V-1

Excise Taxes Levied on Beer in the Low Countries c. 1450-1611

In tuns unless otherwise indicated:

<i>Location and Year</i>	<i>Type</i>	<i>Rate of Tax</i>	
		<i>gross</i>	<i>%retail price</i>
Middelburg			
1528	2 gr./stoop and above	12 gr.	
	Less than 2 gr./stoop	6 gr.	
1548		20 gr.	
1563	28-38 sts.	12 sts.	avg. 36
38-48 sts.	20 sts.		avg. 47
Veere			
1467	Locally brewed	7 sts./vat	
	Imported eg English	20 sts./vat	
1474	All	6 gr./vat	
1540	Locally brewed	2 sts./tun+	17
Amersfoort			
1578	All foreign	90 sts./vat	
	Local <20 sts.	2.5 sts./vat	
	24 sts. <Local <40 sts.	5 sts./vat	
	40sts. <Local <60 sts.	10 sts./vat	
	Local >60 sts.	33% of the price	
c1600	All	27.5 sts./vat	
Maastricht			
1599	All	12 sts./vat	
Amsterdam			
<1491	Home brewed	11 sts./vat	
1491	Home brewed	8 sts./vat	
1514	All	16 sts./full vat	
1516	All	10 sts./vat (or per stick)	
	Imports	16 sts./vat	
1604	Locally brewed	11 sts. (home)	
	Foreign brewed	18 sts. (home)	
	Strong beer	32 sts. (pub)	
Delft			
1574	2 gls. or less selling price	15 sts. (pub) 10 sts. (home)	
Dordrecht			
1472	All	15 sts./vat	
1576	All	4 sts.	
1596	All	2 sts./vat	

<i>Location and Year</i>	<i>Type</i>	<i>Rate of Tax</i>	
		<i>gross</i>	<i>%retail price</i>
Enkhuizen			
1515	Holland brewed	4 sts. (home)	
		6 sts. (pub)	
	Foreign brewed	9 sts.	
1553	20 sts. & less; local	6 sts. (pub)	min. 30
	20 sts. & less; local	4 sts. (home)	min. 20
	21-29 sts.; local	9 sts. (pub)	avg. 36
	21-29 sts.; local	6 sts. (home)	avg. 24
	30-39 sts.; local	10 sts. (pub)	avg. 29
	30-39 sts.; local	7.5 sts. (home)	avg. 21
	40 sts. & above; local	12.5 sts. (pub)	max. 31
	40 sts. & above; local	10 sts. (home)	max. 25
	Joopenbier	30 sts./vat	
	English, Bremen, Hamburg or Rostock	15sts./vat	
Gouda			
1514	Locally brewed	10 sts.	
	Hamburg	18 sts.	
Haarlem			
1514	Locally brewed	10 sts.	
	Hamburg	18 sts.	
1555	Local	10 sts.	
	Imported from Holland	18 sts.	
	Hamburg or foreign	25 sts./vat	
1575	Locally brewed	10 sts.	
1577	Locally brewed	15 sts.	
1580	Locally brewed	25 sts. (pub)	
	Locally brewed	15 sts. (home)	
1587	Locally brewed	20 sts. (pub)	
	Locally brewed	12 sts. (home)	
1594	Locally brewed	8 sts. (home)	
1597	Locally brewed	20 sts. (pub)	
	Locally brewed	12 sts. (home)	
	Holland but not Haarlem	26 sts. (pub)	
	Holland but not Haarlem	18 sts. (home)	
	Outside Holland	30 sts.	
	<i>Joopen</i>	60 sts.	
1604	Locally brewed	10 sts. (pub)	
	Locally brewed	19 sts. (home)	
	Imported from Holland	30 sts. (pub)	
	Imported from Holland	22 sts. (home)	

<i>Location and Year</i>	<i>Type</i>	<i>Rate of Tax</i>	
		<i>gross</i>	<i>%retail price</i>
1610	Locally brewed	22 sts. (pub)	
	Locally brewed	19 sts. (home)	
	Imported from Holland	30 sts. (pub)	
	Imported from Holland	22 sts. (home)	
Hoorn			
1470	Foreign brewed	15 sts.	
1472	Locally brewed	5 sts.	
	Foreign brewed	15 sts.	
1563	32-44 sts.; imported	12 sts.	avg. 32
	22 sts. & above; imported	9 sts.	max. 40
	44 sts. & above; local	12 sts.	max. 27
	32-44 sts.; local	9 sts.	avg. 24
	32 sts. >; local	6 sts.	min. 27
1611	80 sts. & above	24 sts. (pub)	max. 30
	80 sts. & above	12 sts. (home)	max. 15
	40 sts. & less; import	8 sts.	min. 20
	40 sts. & less; local	4 sts. (home)	min. 10
Leiden			
<1450	Holland beer	14 gr./vat	
	Hamburg	28 gr./vat	
c. 1460	Leiden kuit	10 gr./vat	
	Leiden hop	10 gr./vat	
	Holland, not Leiden	14 gr./vat	
	Foreign	28 gr./vat	
1473	Leiden kuit	10 gr./vat	
	Leiden hop	10 gr./vat	
	Holland, not Leiden	14 gr./vat	
	Hamburg	16 gr./vat	
	Other foreign	28 gr./vat	
1514	Local @ .75 sts./stoop	8 sts./vat	
	.75 sts./stoop < local < 1 st./stoop	14 sts./vat	
	Local > 1 st./stoop	18 sts./vat	
1539	Locally brewed	8 sts/vat	
	Foreign brewed	14 sts/vat	
1540	Locally brewed	8 sts/vat	
	Delft & all Holland beer except for hopped beer	10 sts/vat	
	Leiden, hopped beer	14 sts/vat	
	Holland, hopped beer	16 sts/vat	
	Eastern beer	14 sts/vat	
	Foreign, non-Eastern	18 sts/vat	

<i>Location and Year</i>	<i>Type</i>	<i>Rate of Tax</i>	
		<i>gross</i>	<i>%retail price</i>
1573	Locally brewed	8 sts/vat	
	Delft beer	14 sts/vat	
	English beer	17 sts/vat	

Home = sold directly to citizens for consumption in the home

Pub = sold in a public house or inn by a licensed publican

gls.= guilders; sts.=stuivers; penn.=pennies; 1 guilder = 20 stuivers = 320 pennies

Flemish currency converted at Flemish £1 = 6 guilders; £1 = 20 schillings = 240 grooten

Tun = generally about 150 liters; a vat at least in Haarlem seems to have been a smaller measure

Stoop = about 1/62 of a ton or about 2.35 liters

+ An additional excise was charged per brew as well at the brewery

* Native brewed beers but put in English, Lübeck and Hamburg barrels were included

Sources: G. A. Amersfoort, #198; G. A. Dordrecht, *De Grafelijke Tijd*, #405; G. A. Dordrecht, *Archief van de Gilden*, #930, 43, #960; G. A. Enkhuizen, #171, #175; G. A. Haarlem, *Archief van het Brouwersgilde*, #90, 2; G. A. Haarlem, *Thesauriersrekeningen*, 19: #135[1555], #184[1604]; G. A. Hoorn, #305, 1611; G. A. Leiden, *Archieven van de Gilden*: #191, *Secretarie Archief 1273-1575*: #573-644, *Rekeningen van de Tresoriers*, #1493-1574; G. A. Veere: #311, fol. 5r-6r; fol. 96v-97v; R. Z., *Archief van de Staten van Zeeland...*, 1574-1795: #3227 [1580], 3231 [1610]; C. G. L. Apeldoorn, "Een Onderzoek naar de prijzen van het bier en andere gegevens met het bier verband houdende, op het Stedelijk Archief te Maastricht," University of Amsterdam, Unpublished Doctoraal Scriptie, *Economisch-Historisch Seminarium*, #69 [n. d.], pp. 21-22; J. G. van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam [1512-1632]* (The Hague, 1929-1974), 1, #16, #1046; Pieter Hendrik Engels, *De Geschiedenis der Belastingen in Nederland, van de Vroegste Tijden tot op Heden mit eenen Beknopten Inhoud der Tegenwoordig in Werking zijnde Belastingwetten* (Rotterdam, 1848), p. 99; Robert Fruin, ed., *Informacie up den staet, faculteyt ende gelegentheydt van de steden ende dorpen van Hollant end Vriesland om daenae te reguleren de Nieuwe Schiltalee, Gedae in de Jaere MDXIV* (Leiden, 1866), pp. 11, 242, 380; H. M. Kesteloo, "De stad-rekeningen van Middelburg, 1365-1810," *Archief van het Zeeuwsch Genootschap der Wetenschappen* 5-8 (1883-1902), 1, p. 49, 3, p. 263; Jacques C. van Loenen, "Structuur der accijnsen van de stad Haarlem over de 17e en 18e eeuw, vanaf 1575-1795," University of Amsterdam, Unpublished Doctoraal Scriptie, *Economisch-Historisch Seminarium*, #143 [n. d.], pp. 7-8; Jannis Willem Marsilje, *Het financiële beleid van Leiden in de Laat-Beierse en Bourgondische periode 1390-1477* (Hilversum, 1985), pp. 272-273; J. P. W. Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, *Economisch-Historisch Seminarium* (1937), p. 13; W. F. N. van Rootselaar, *Amersfoort 777-1580* (Amersfoort, 1878), 2, pp. 426-427; P. Scheltma, *Het Archief der Ijzeren Kapel in de Oude of Sint Nikolaas Kerk te Amsterdam* (Amsterdam, 1850), 1, p. 145; E. M. A. Timmer, "Grepn uit de geschiedenis der Delftsche brouwering," 1 and 2, *De Economist* (1920), p. 423; E. M. A. Timmer, "De Impost op de Gijlbieren. Bijdrage tot de Geschiedenis der Bierbrouwerij in Holland in de 16de en 17de Eeuw," *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde*, vijfde reeks, 3 (1916), p. 361; W. S. Unger, ed., *Bronnen tot de Geschiedenis van Middelburg* (The Hague, 1923-1931), 2, #108, #178; Theodorus Velius, *Chroniick van Hoorn, Daer in verhaelt werden des selven Stadts eerste begin, opcomen, en gedenckweerdige geschiedenissen, tot op den Jare 1630...*, fourth edition, with additions by Sebastiaan Centen (Hoorn, 1740), pp. 85, 90.

would have been, so the representatives of Holland said, impossible to enforce the tax in the countryside. The beer excise was combined with a land tax and a levy on income from real property, which were province-wide and collected in rural areas. These *nieuwe middelen* or "new expedients," as the taxes were called, proved an effective way of dealing with the high cost of the wars against France. The province continued the taxes after the end of the French wars, through the Revolt and beyond so beer had to tolerate another burden on top of already existing levies on consumption, production and on raw materials. The province-wide excise of the 1540s added 2 stuivers to the price of a barrel of beer but already in the 1520s Leiden was charging consumers in the town 8 stuivers and Haarlem 10 stuivers a barrel in town excises.³ Wars placed a tremendous burden on sixteenth century governments and when losses for a town were heavy, as was the case at Enkhuizen in 1553 during the French wars or at Amsterdam in 1575 during the Revolt, the solution was to raise taxes which typically meant excise taxes on beer. Very rarely the trend was in the opposite direction. At Dordrecht in the early seventeenth century as the costs of war fell taxes fell too and by a considerable amount. If all the mooted reforms had been made the decrease would have been more than 50%.⁴

During the Revolt there was talk of imposing uniform imposts throughout the seven provinces that would come to make up the Dutch Republic. It did not happen. Rather provincial taxation, along with the urban taxes, remained in place. At least in 1584 there was a uniform tax of 2 stuivers/tun levied on beer as it went into the barrel in the four provinces of Holland, Zeeland, Utrecht and Gelderland. Officially the tax was the *ton-biers-impost* but popularly the name was the *gijlimpost*.⁵ In the States of Holland in the 1620s the uniform impost of 2 stuivers/tun was declared to be good since it did not press too hard on the poor. This statement is doubtful in light of the widespread consumption of beer⁶ though

³ James D. Tracy, *A Financial Revolution in the Habsburg Netherlands Renten and Renteniers in the County of Holland, 1515-1565* (Berkeley, 1985), pp. 56, 73, 78-79, 86-87; James D. Tracy, *Holland under Habsburg Rule, 1506-1566 The Formation of a Body Politic* (Berkeley, 1990), p. 144; James D. Tracy, "The Taxation System of the County of Holland During the Reigns of Charles V and Philip II, 1519-1566," *Economisch- en Sociaal-Historisch Jaarboek* 48 (1984), pp. 75, 86-95.

⁴ G. A. Dordrecht, *Archief van de Gilden*, #930, 43; G. A. Enkhuizen, #175; P. Scheltema, *Het Archief der IJzeren Kapel in de Oude of Sint Nikolaas Kerk te Amsterdam* (Amsterdam, 1850), 1, p. 256.

⁵ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 2, pp. 2163-2168 [1584]; W. F. H. Oldewelt, "De Hollandse Imposten en Ons Beeld van de Conjunctuur Tijdens de Republiek," *Jaarboek Amstelodamum* 47 (1955), pp. 48-49; E. M. A. Timmer, "Delftsche bierconflicten," *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde*, vijfde reeks, 9 (1922), 122; Timmer, "De Impost op de Gijlbieren...," pp. 360-361; Timmer, "Grepren uit de geschiedenis der Delftsche brouwning," pp. 418-419.

⁶ van Deursen, *Plain Lives in a Golden Age...*, p. 172.

probably true in that the tax was only a small portion of the total of all taxes levied on beer.

The pattern of taxation is probably best illustrated by rules laid down at Hoorn in 1611. There the excise was 24 stuivers/tun of beer of a value over 2 guilders sold by publicans and half that or 12 stuivers if the buyer was a citizen of the town or if the beer was exported. For beer of a value of less than 2 guilders the tax was only 8 stuivers/tun if the beer was brewed outside the town and 4 stuivers/tun if it was brewed inside the town.⁷ This was an advance on the formula laid down in 1563 which had been imposed to finance work on the harbour. In the earlier regulations legislators showed concern over the industries in Delft and Gouda. They made concessions to beers imported from there but, as was common, discrimination against imports continued even if they came from within the same province.⁸ Always the highest rates of excise were reserved for luxury imports from England, Hamburg and especially for beers from further away in Germany and the Baltic. In almost every town, the weakest form of beer, so-called *scharbier*, made from the last mashing enjoyed freedom from tax. The definition of that beer was always a problem and always critical since, once identified, such beer lost the fetters of a heavy financial burden.

What the Hoorn pattern did not show was the additional charge on each brew. At Haarlem there was such a tax as early as 1422. It was raised through the course of the fifteenth century from 7.5 stuivers/brew to 11 stuivers and by 1522 to 24 stuivers/brew. That fee remained in place until 1575 when brewers were given a choice of paying the fixed fee for each brew or a fee for each sack of grain they used in making the beer. In 1582 the *brouwgeld* was converted completely to a tax on inputs in place of a tax on output. The logic of the change was undoubtedly that the quantities of various grains used were a better measure of the value of the beer produced. A tax on the output of each brew, like the original Haarlem tax, existed at Delft before 1492. It may well be that in 1514 the beer excise was only a fee per brew with no additional charges on each barrel. Delft brewers paid a total of more than 31 stuivers for each brew. At Haarlem by 1514 brewers paid a combination of a fee for each barrel in addition to a fee for each brew.⁹ Much later, at Dordrecht in 1596, brewers paid a fee of 18 stuivers for each brew. This was added to the *tonnegelt*, a charge of 2 stuivers/tun brewed

⁷ G. A. Hoorn, #305, 1611.

⁸ G. A. Hoorn, #306; Tracy, *Holland under Habsburg Rule*..., 25.

⁹ Robert Fruin, ed., *Informacie up den staet, faculteyt ende gelegentheyt van de steden ende dorpen van Hollant end Vriesland om daenae te reguleren de Nyeuwe Schiltale, Gedaen in de Jaere MDXIV* (Leiden, 1866), pp. 11, 333-334; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 10-11; van Loenen, "Structuur der accijnsen van de stad Haarlem over de 17e en 18e eeuw, vanaf 1575-1795," pp. 8-9; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 362.

in the town. The charge for a half brew was 15 stuivers so the tax structure promoted less frequent and larger efforts. On each brew brewers also paid 5 stuivers to cover the beer that they drank themselves. If they brewed twice a week then they paid 10 stuivers but if they brewed more than twice they still paid only the weekly maximum of 10 stuivers for their *drinckbier*.¹⁰ Beer consumption by brewers' households was always a source of concern for urban governments. They did not want that beer to escape tax entirely, a possibility if it never left the brewery. At Amsterdam in 1514 brewers were allowed 3% of their production for drinking in their own household, not a large portion but worthy of consideration. Leiden brewers in the second half of the sixteenth century paid 2.5 stuivers for each brew and 6 stuivers for each barrel of beer that they and their families consumed.¹¹

Towns did try to tax home brewing too, in the case of Amsterdam in 1484 and Haarlem in 1498, at a fixed rate for each brew. For Amsterdam below the threshold of 20 *vaten* at least home brewers were free of the charge for each barrel but were still subject, as they were reminded in a bylaw of 1492, of their responsibility of 2 stuivers for each brew. Such regulations remained in place until 1573 when home brewing was outlawed in the town. The prohibition was reaffirmed in 1581. In the 1580s the government of Holland outlawed home brewing throughout the province, the rule being repeated in regulations on beer taxes through the seventeenth century.¹² The prohibition did decrease the danger of fire but that was not the reason for the law. The province wanted to prevent beer escaping the tax collector.

The tax rates for Holland did settle down after 1605 and excepting increases in the 1620s remained stable for some time. Back in 1553 as part of the *nieuwe middelen* the province collected 1 stuiver for each barrel. The figure rose through the sixteenth century and then, after the Revolt which put much greater financial pressure on the government of Holland, the beer excise was joined by a broad range of excises on many different items as varied as horned beasts and nursery trees. The provincial taxes were based on retail prices but before the

¹⁰ G. A. Dordrecht, Archief van de Gilden, #960.

¹¹ G. A. Leiden, Secretarie Archief 1273-1575, #573-644, Rekeningen van de Tresoriers, 1493-1574; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #18-9.

¹² G. A. Leiden, Archieven van de Gilden, #191, 37 [1616]; J. C., Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid, II Bierbrouwerijen," *Nederlands Fabrikaat Maandblad der Vereniging Nederlands Fabrikaat* (1921), p. 75; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1715-1716, LV [1632], 3, pp. 938-939 [1677]; van Loenen, *De Haarlemse Brouwinindustrie voor 1600*, p. 11; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 8-9; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 20, 20n.43.

final consumption tax had been levied. From 1605 beer of the value of 20 stuivers, that is one guilder, per tun was subject to a tax of 6 stuivers, beer of 30 stuivers/tun 22 stuivers, beer of 40 stuivers/tun tax of 30 stuivers. There were special taxes for imports with English, Lübeck and other foreign beers paying 5 guilders and 10 stuivers/tun (See Table XI-1). When served in a public house there was an additional tax of 2 guilders and 14 stuivers/tun no matter the price. The men who served beer in public houses had to sell at least 13 barrels of all beers in each six month period or lose their licences. Barrels were to be, as long established, of standard size and brewers were allowed, at least at Haarlem, to use vats of twice the standard size to conserve their beer. Of course they had to pay tax at double the standard rate. Since beers from elsewhere were subject to higher rates careful documentation was required of the origin of any beer shipped and whether or not the Holland tax had been paid on it where it was made or whether that tax was still due and payable in the town where the beer was being sold. There were loopholes and exemptions and special rates such as the tax of 12 stuivers/tun on beer which was consumed by shippers while travelling. If they were tied up at a wharf then the shippers paid the full consumption rates. But on voyages the shippers were subject to the lower rate, that to convince them to buy beer from local producers before sailing off to some other province or country. The taxes added up. Consumers reached the limit of tolerance early in the seventeenth century. In 1621 the town of Rotterdam delayed the imposition of a new tax on beer of 24 stuivers per ton for six months. The money was badly needed because of the resumption of the war against Spain but the town feared a tax revolt, like the extremely violent one that had swept nearby Delft back in 1616.¹³ As brewers were more than willing to point out, by the 1620s beer was heavily burdened with taxes.

Some towns did collect beer excise, recording the sources and amounts of money collected in their annual accounts. The usual pattern was for towns to farm the tax. They put up for auction the right to collect the fixed duties, taking the lump sum payment from the highest bidder. Since the excise might be broken down by type of beer, there could be more than one tax farmer and more than one auction. Towns' accounts as a result often show the relative value of the taxes for different beers. Methods of collection used by the tax farmers, or excise masters as they were also called, were by no means uniform. There were some more frequent practices. Tax collectors could ask for help and protection from

¹³ G. A. Haarlem, Archief van het Brouwersgilde, #90, 6, 1-7 [1622]; van Deursen, *Plain Lives in a Golden Age...*, p. 196; Engels, *De Geschiedenis der Belastingen in Nederland...*, p. 99; Hallema and Emmens, *Het bier en zijn brouwers*, p. 103; Timmer, *De Generale Brouwers van Holland*, pp. 5-7; Tracy, *A Financial Revolution in the Habsburg Netherlands...*, pp. 93-95, 202.

town officials in their rounds. That did not eliminate the possibility of violence, however, and in some cases farmers or their representatives were not only hurt but even killed. Still, they were known for occasional acts of violence themselves. They smashed beer barrels and came armed with knives to enforce the law. In 1616 at a country inn outside Amsterdam a woman refused to allow the tax farmers to measure the quantity of beer she had made. She said it was still hot and the weather was hot, so the measurement would give an inflated result. Witnesses reported that the investigators then struck her and dragged her across the floor by the hair.¹⁴ In their zeal for collecting the tax, collectors did little to ingratiate themselves.

Tax farmers had to pay the town regularly, often each quarter but in at least one case each week. If they were late they had to pay a penalty. Usually there was a house or shed where the tax officer worked and there could be, as in Amsterdam, one in front of every brewery with employees of the farmer there to oversee the proper payment of any tax due. At Amsterdam the tax collector set up sheds along certain quays so that he could see the boats and make sure proper tax got paid on imports.¹⁵ Since taxing districts were very small publicans would go to the tax farmer in the neighboring jurisdiction and offer to buy beer there. It was illegal, but each tax farmer wanted to have beer bought where the tax income would accrue to him. The publican then could play off one tax farmer against the other and get a discount in the amount of tax he had to pay. At Alkmaar in 1620 tax farmers and beer sellers agreed to a one-third reduction in the beer excise with the full knowledge of the magistrate. The mass of legislation, the elaborate system for preventing fraud and extremely severe penalties for violation of the tax laws existed side-by-side with widespread and chronic abuses of the excise tax system.¹⁶

If the tax was levied on each brew, then brewers were expected to report their brewing and pay the amount due. At Gouda that simply meant within three days paying the tax on grain used as well as the fee for each brew. Originally it appears that some towns insisted that the excise master be present during the brew to make sure all the rules were followed, though that seems to have fallen

¹⁴ van Deursen, *Plain Lives in a Golden Age...*, p. 180; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #286; van Rootselaar, *Amersfoort, Sprokkelingen*, LXXX [1436], LXXXI [1464].

¹⁵ G. A. Hoorn, #305[1611]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #503 [1563], #689[1581]; Oldewelt, "De Hollandse Imposten en Ons Beeld van de Conjunctuur Tijdens de Republiek," pp. 53, 57; Philpsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 13; Unger, *Bronnen tot de Geschiedenis van Middelburg*, 2, #161 [1552], 3, #817[1564].

¹⁶ van Deursen, *Plain Lives in a Golden Age*, pp. 177-178.

out of use since brewers could not always wait around for the tax man and he could not be in a number of different places at the same time. At Amsterdam regulations of the brewers' trade dating from 1497 required that an official to be present to check on the filling of the barrels.¹⁷ At Delft from the mid sixteenth century until the practice was wound up in 1676 two officials had to be present when the beer went from the fermenting troughs into barrels. They issued a receipt stating the number of barrels filled. This was, therefore, a statement of the amount of beer on which excise tax was due. That meant the two men had to be available all day and at fixed times during the day so that brewers could call on them. In many towns, Delft included, the workers in the breweries were sworn to go once a week to the house of the excise master and report the number of brews and the kind of beer produced. In Amsterdam this weekly report was given at first on Friday but from 1533 on Saturday. In 1589 the province of Holland ordered that brewers in Leiden and Amsterdam report their activities of the previous week each Sunday or Monday to the tax farmer. This was, as with so many of the rules, to prevent tax evasion. Brewers could not hire any employee or underbrewer until the new worker had taken the relevant oath to report on time and accurately.¹⁸

For the excise on each barrel of beer, the usual practice by the sixteenth century was to have the excise master issue a receipt at his shed or one of his sheds for each quantity of beer. Whoever initiated the sale went to the shed and bought the receipt or ticket by paying the relevant excise. He would get that money back from the buyer when he sold the beer, that is unless he kept the beer for his own use. No barrel could leave a brewery without a proper receipt and no porter could deliver it without seeing that receipt and handing it over to the buyer. No one could sell beer from a house or in a tavern without having a receipt. The original practice in Delft was for the porter to have a small lump of lead for each barrel with different sizes of lumps corresponding to full, half and quarter barrels. He handed the lead lump on to the brewer before the beer could go out of the brewery. The excise collector visited the brewer every eight days to collect the lumps and with it the relevant tax. In some towns it was, in the same manner, the brewer who got the receipt. In 1574, tickets replaced the lead lumps in Delft. At some later date, Delft fell into line with the practice in the other towns in which consumers bought tickets for a certain quantity and quality of beer from

¹⁷ J. C. Breen, *Rechtsbronnen der Stad Amsterdam* (The Hague, 1902), 1497, 3; Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, p. 160; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 23.

¹⁸ G. A. Leiden, *Secretaire Archief na 1574*, #4332, 1 [1589]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #316[1546]; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 10, 16; Timmer, "Grepfen uit de geschiedenis der Delftsche brouwning," pp. 415-418.

the excise man. The brewer or more likely the bookkeeper of the firm kept the tickets and noted each transaction.¹⁹ Even beer not subject to tax was treated in the same way as taxed beer. The beer supplied at Amsterdam to shipbuilders had to have tax paid on it from 1539. With the proper documentation the shipbuilder could claim a rebate for his payment. The size of the rebate depended on how big the ship was, the figure being agreed with the tax collector before work began.²⁰

The ticket was to state both quantity and quality or type of beer but officials seem to have been lax in recording what the beer was, at least at Haarlem by 1612, and the result was potential tax fraud. Apparently at Delft and Dordrecht such lassitude was not allowed. Brewers at Delft were said to avoid tax by forgetting to return some of their lead lumps but that was strictly forbidden in an ordinance of 1537. With exports, on the other hand, although tickets in theory were needed it appears that in most towns neither brewers nor tax collectors bothered. That could cause trouble since all Holland beer was subject to a provincial tax and not having the relevant ticket could hold up delivery at the destination. Requiring exporters to get a ticket also gave the town government the option of stopping exports in periods of local beer shortage simply by stopping the issuing of receipts.²¹ The excise master had to know about export beer brewed, again to prevent fraud, and had to prevent beer for export staying in the town. At Amsterdam export beer had to go out of town during the day and could not even spend the night in town without the express consent of the tax collector. Amsterdam beer going to rural buyers could be shipped only in boats owned or rented by the tax collectors, brewers not being allowed to ship the beer independently. Tax was even due on beer used on board ship or sent far away, even to Scotland or Norway if exported from Dordrecht. It was illegal to sell imported beer at Amsterdam in advance. The filled casks had to be sitting in a vessel in the town harbor before any transaction could take place. Typically the excise men had to issue a receipt to show that full and proper excise had been paid before the beer could be unloaded from the boat which brought it. In 1622 Amsterdam importers got the excise collectors to agree that buyers of the imported beer, tav-

¹⁹ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #316[1546], #730[1586]; #784[1590]; De Commer, "De Brouwindustrie te Ghent, 1505-1622," p. 100; van Rootselaar, *Amersfoort 777-1580*, 2, pp. 426-427; van Rootselaar, *Amersfoort, Sprokkelingen*, XCVI [1610]; Ter Gouw, *Geschiedenis van Amsterdam*, 5, p. 325; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," pp. 421-422; Yntema, "Allerhande bieren...," p. 90.

²⁰ van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 177-179 [1586], 181 [1539].

²¹ G. A. Haarlem, *Archief van het Brouwersgilde*, #89, #90, 2; Apeldoorn, "Een Onderzoek naar de prijzen van het bier...," p. 21; Hockstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 35-36; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 422.

ern keepers, would go get the tickets and then present them to importers, saving the trader the trip to the taxman's shed. By 1626, though, it appears importers wanted to abandon that arrangement since it was so open to fraud.²² The excise master could, in rare cases, take on the role of dealer or importer of beer which presumably might decrease fraud.

There were specific times of the day when the excise master or his employees had to be available to sell receipts to brewers, publicans and consumers. At Hoorn those hours were from 8 a. m. to 11 a. m. and from 1 p. m. to 4 p. m. with no variation for time of the year.²³ The Reformation in Holland seems to have eliminated the sale of receipts on Sunday and the setting of different opening hours for the excise tax shed on saints' days and holidays. The general legislation laid down in 1616 on the beer tax included requirements on informing the excise man about any beer that was to be exported, requirements on the use of sworn beer porters, requirements that tickets, complete with the price of the beer, from the tax farmer accompany any transaction to do with beer and, among others, requirements about proper accounting procedures.²⁴

As time went on, regulations on all aspects of tax collection became more complex. Each new regulation was presumably designed to stamp out some novel form of tax evasion. By the early seventeenth century, brewers were to keep a daily record of the receipts which they had received and the tax farmer was to check it daily. Porters had to turn in their receipts each morning to the excise man. Brewers were prohibited from brewing the thinnest, and therefore tax free, beer before getting special permission from a tax farmer. Amsterdam was especially careful about the production and delivery of such thin beer, fearful that somehow a brewer would pass off good high quality beer as tax free beer.²⁵

In virtually every town in the Low Countries, beer had to be delivered by sworn agents, the beer porters, who worked for the brewers and customers but, above all, for the tax collectors. There was almost invariably a bylaw which stated that only sworn beer porters could carry beer away from the quayside where ships brought it in or away from breweries. In some towns only sworn porters

²² G. A. Delft, Eerste Afdeling, #976; G. A. Dordrecht, Archief der Gemeente Dordrecht, Keur- en Handvestboeken, #5, fol. 153v-154r, Archief van de Gilden, #930, 36-37, #931, 22; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #131 [1527], #245 [1539], #748 [1588], 2, #765 [1622], #1084 [1626]; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 179-180 [1588]; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 11.

²³ G. A. Hoorn, #305[1611].

²⁴ G. A. Leiden, Archieven van de Gilden, #191, 22-34, 39-43; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1708-1715 [1632].

²⁵ van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, pp. 177-179 [1586]; Timmer, *De Generale Brouwers van Holland*, pp. 9-10.



7. Jan Luyken, the beer porter, print from Peter Abraham, *St. Clara, Iets voor allen*, part 1, book on paper, before 1694. This was part of another set of drawings of different trades done by the artist. The two porters are lifting a barrel from the horse-drawn sledge to carry it into a house or tavern. The barrels carry the brand of the brewery and holes for the fitting of taps. Source: Amsterdams Historisch Museum 8472/11

could even move beer from one house to another.²⁶ The emergence of such men in the course of the fifteenth century was a sign of a change in the way beer was made, sold and distributed. The greater professionalization of the brewing trade and the limitations on brewing by ordinary citizens of towns created a new system of marketing beer and the porters were the designated agents in that new system. They were as much agents of the tax collector as they were employees of the brewers and beer dealers or at least that was the way legislators saw them.²⁷

There were severe penalties for failure to use the sworn porters. Porters were not only to be sure that the beer they moved had tax paid on it but also that the tax relevant to the type of beer was paid. In Haarlem, the porters had to report daily to the tax farmers any activity to do with moving beer. Porters were not allowed to have any beer in their houses on which excise had not been paid. The Amsterdam porters had to be available at their small house, which they had at least by the mid sixteenth century, at certain times, as early as 6 a. m. in the summer, so they could be called on to move beer. They would add a second house later. They could not work on holidays. They could also not refuse work. Their wages were strictly controlled, set by the town government at an amount for each barrel they moved and whether they carried beer, wine or vinegar. The town felt obliged now and again to clarify and repeat exactly what that wage was.²⁸ Beer porters were prohibited from showing up at work drunk, from drinking beer on the job or going into breweries or cellars where they might be tempted to have some beer to drink. There was always a fear of fraud and a fear that brewers would bribe porters. No porter could carry a knife, and each had to swear that no effort would be made to injure another. In case of fire, porters were required to join in fighting the blaze. By 1628, they were also required, in case of some public disturbance, to gather at their house and be prepared to arm themselves and, following orders from the mayors, join in restoring order. Porters were always prohibited from operating taverns or taking part in any such business or selling beer.²⁹ By the late sixteenth century

²⁶ G. A. Veere, #311, fol. 100v-102r[1540]; Breen, *Rechtsbronnen der Stad Amsterdam*, 1497, 17; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 11.

²⁷ G. A. Amsterdam, *Gilden Archieven*, #24, 1[1576], 2[1581].

²⁸ G. A. Dordrecht, *Archief van de Gilden*, #957; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #316[1546]), #1218 [1491], 2, #591 [1620]; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 74-75.

²⁹ G. A. Amsterdam, *Archieven van de Gilden*, #33, 1-2, 6-8; G. A. Haarlem, *Archief van het Brouwersgilde*, #90, 2; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #91[1524], #203[1533], #205[1533], #255[1540], #29[1548], #441[1558], #579[1570]; van Eeghen, *Inventarissen der Archieven van de Gilden en van het Brouwerscollege*, p. 21; Willem van Ravesteyn, Jr., *Onderzoekingen over de Economische en Sociale Ontwikkeling van Amsterdam Gedurende de 16de en het Eerste Kwart der 17de Eeuw* (Amsterdam, 1906), p. 69; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 8, p. 103.

porters were even required to taste the cheapest beer to make sure it was of low enough quality to be tax free. They also had to write in chalk on the barrel what was in it or have the brewer do so and be sure it was accurate.³⁰

The porters commonly used sledges to deliver the beer though barrows for small quantities were also a possibility. Where reasonable the porters preferred to use flat-bottomed boats which made the task of moving the heavy barrels much easier. They also had to return the barrels to the breweries. The return of their cooperage was a long-standing problem for brewers. As they became more conscious of the cost of lost barrels brewers pressed the porters to help them in getting the cooperage back. A 1559 law for Holland, Zeeland and Flanders, issued at the instigation of Delft to help its brewers, dealt with protecting and maintaining and above all getting back brewers' barrels.³¹ In the seventeenth and eighteenth centuries the return of cooperage would become an obsession with the brewers of Holland.

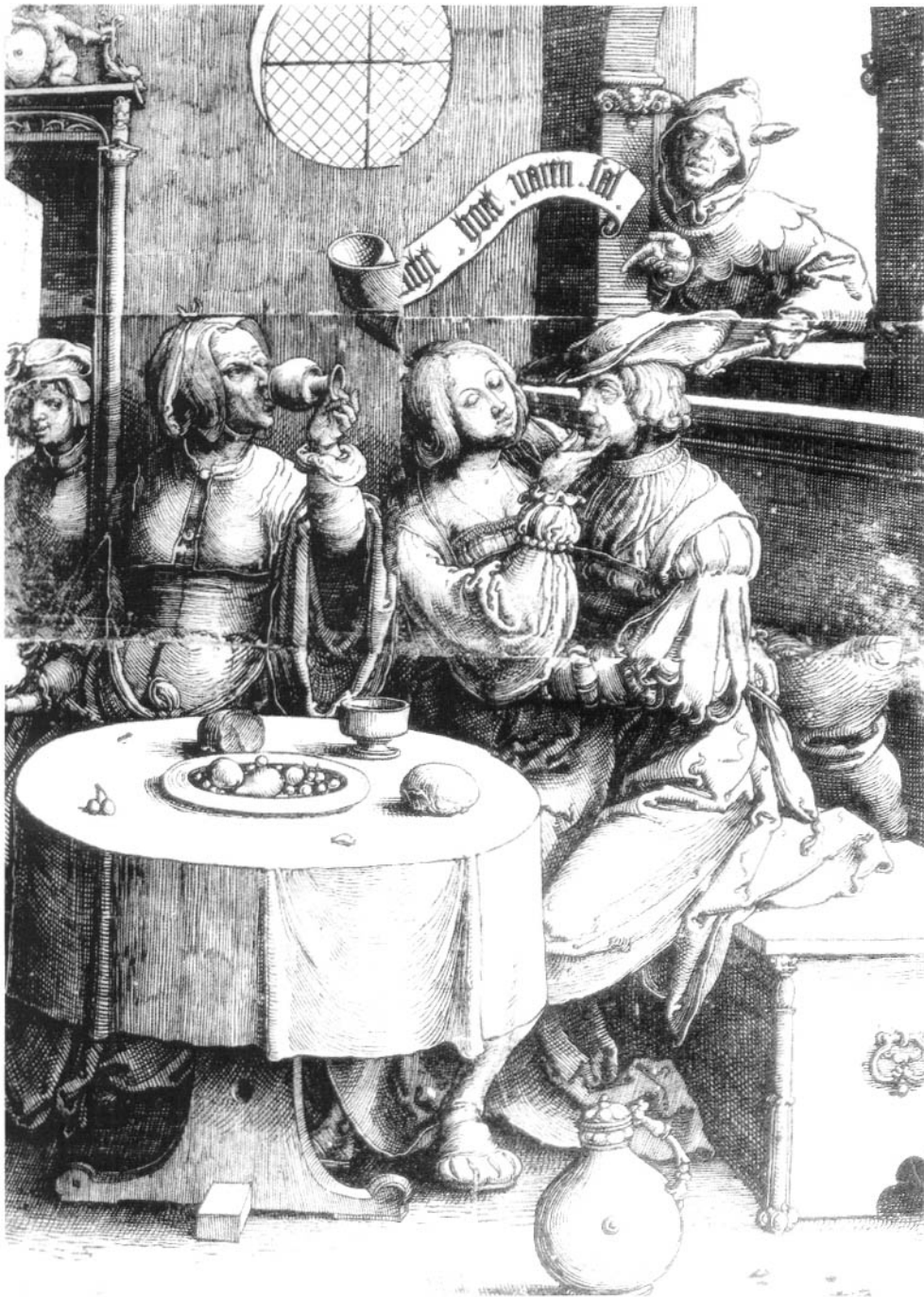
The numbers of porters were often small. At Dordrecht, for example, there were only three by 1583 and even in the largest towns a group of as many as 12 would be rare. The porters were to be sure that the system of receipts worked. If they arrived with beer and the purchaser did not have a copy of a proper receipt then they were to return the beer to the tax collector. They had to keep all the receipts straight, organize them by type of beer and type of excise, and make sure the right tax farmer got the right receipt. The confusion, the increasing number and levels of excise taxes and the very deep cellars led the beer porters of Amsterdam in 1578 to petition for a wage increase. The request from the porters' guild was for a higher fee for each barrel of Holland-brewed beer from outside the town which they handled. The brewers were probably trying to appeal to the protectionist tendencies of the town fathers. Such petitions did work and, on occasion, porters did get increases in their rate of pay and in their numbers to ease the burden of work.³²

Brewers and publicans came under a number of restrictions to guarantee that beer was channelled through the hands of the excise master and the sworn porters. The strict separation of beer making, beer transportation and beer selling, something else dictated by law in a number of places such as Amsterdam in 1497, probably was one of the most effective devices used in all town to decrease

³⁰ G. A. Amsterdam, *Archieven van de Gilden*, #33, 30-31; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, pp. 177-179 [1586].

³¹ van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 726-727; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #441 [1558], #514 [1564].

³² G. A. Dordrecht, *Archief van de Gilden*, #957; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #579 [1570], #645 [1578], #866 [1594], #1357 [1607], 2, #4 [1612].



8. Lucas van Leyden, a tavern scene, woodcut, 1518-1520. A young man is having his purse slyly removed. The fool is saying in the banderole, "Pay attention to which way the wind blows," that is beware of the vagaries of fortune. The impression was that taverns were dangerous places. Source: Cliché Bibliothèque Nationale de France, Paris, H. 33, N, 409-410, L. 214

fraud. By the early seventeenth century the prohibition of beer brewers, wholesalers and porters selling at retail was standard language in regulations in both Holland and Zeeland. Another similar restriction was to establish a separate class of taverns which could only serve beer of low prices. That arrangement, like so many other features of the system if it could be called a system, does not seem to have prevented tax evasion.³³

Excise taxes were never popular and the one on beer was especially hated. Fraud was commonplace, increasingly so as the tax fell on more and more people. Governments, urban and comital, repeatedly complained about avoidance of duties on drink and set heavy penalties for violation of the rules.³⁴ Town governments said that they knew of daily fraud in the excise and made sure that transactions took place at certain places and times and above all that there were no transactions at night, as with 1588 rules in Amsterdam on beer export. Amsterdam made illegal the selling of beer in a small neighborhood in 1629 because it looked like tax was not being paid on the beer drunk there. Even brewing at night was illegal by the early seventeenth century.³⁵ Rising penalties and repeated complaints about failure to pay suggest that consumers still found ways around the rules.

The great variations over time, the different levels of tax on various types of beer, the different types of taxes either by the barrel or by the brew, and abuses in the collection of the taxes make it impossible to use excise tax data to calculate brewers' profits. In March, 1520, Haarlem brewers presented a petition to the town government in which they described their costs, blaming their narrow profit margins on the taxes they had to pay. Selling beer at 13 stuivers/vat and making 34 vats in each brew brought their gross income to 442 stuivers, and with costs at 416 stuivers the net was 26 stuivers or 6% of gross income. Without the direct taxes they paid the brewers calculated their profits would have been twice that. In 1550 three Haarlem brewers said they were making a profit of 34 stuivers from each brew, up a little more than 30% over the profit level of 1520. The general tendency toward higher profits coincided with the rising number of barrels produced from each brew, a trend of the sixteenth century and a source of conflict among brewers. The Haarlem figures did not appear to include capital

³³ G. A. Leiden, Archieven van de Gilden, #191, 18, 22, 34 [1616]; Breen, *Rechtsbronnen der Stad Amsterdam*, 1497, 14; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek...*, 1, pp. 2048-2059; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 421.

³⁴ For example, A. R. A., Archieven van de Staten van Holland voor 1572, #126; Oldewelt, "De Hollandse Imposten en Ons Beeld van de Conjunctuur Tijdens de Republiek," p. 55.

³⁵ G. A. Leiden, Archieven van de Gilden, #198; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #1234 [1629]; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, pp. 179-180.

costs which were significant. An estimate for Rotterdam in the mid sixteenth century for building and equipment of about 40,000 guilders may be too high especially since Delft brewers, complaining of their burdens, and so having every reason to inflate the number, said their capital outlay on plant and equipment was between 5,000 and 6,000 guilders. A beer brewery did sell in Delft in 1601 for a rather higher level — 12,500 guilders. On the other hand, a figure offered by Haarlem brewers for about 1621 put the outlay at 24-25,000 guilders for the house, brewery and maltery, just slightly more than annual operating expenses.³⁶ Capital investment then must have been considerable and must have placed a high and rising barrier to entry to the trade. Brewers rightly expected to get a return on that investment as well as recompense for their own labor and management of the enterprise. In a petition of about 1550 it was the turn of the Leiden brewers to offer an estimate of their costs and returns. They said taxes for milling, on beer they consumed themselves, on the grain used, the *gruutgeld* on spices used which was still in place, on shipping wood, and the excise for each tun sold, came to a total of 8 stuivers on each barrel of beer.³⁷ Unfortunately they did not state the sale price of the beer or how much they expected to make from each barrel. Their purpose was to show the importance of their contribution to the local economy and, of course, to call for a reduction of their tax burden.

A 1519 idealized brewer's account from Haarlem broke down costs, adding in a portion for capital. For each of the 112 brews anticipated annually, the cost of maintenance and replacement of equipment added only .8% to the total outlay. Almost half of those costs were for the upkeep on the copper kettle or kettles and various tuns. For each brew 67% of expenditure was for grain. Hops took 5% of the outlay and peat for heating 8%. Labor was just 6% and cooperage 3%. The town got 5% in a direct tax for each brew. There were some incidental expenditures for transportation, candles and other items. A 1514 account of expenses for a Gouda brewer has very similar figures, though admittedly the data in this case as in all others are difficult to interpret without some detail about how they were generated. A little more than two-thirds of all outlays went on grains, 4% on yeast and hops, 15% on heating materials, 6% on labor and 4% on capital, the last including rent for the premises and costs of equipment. A 1550 accounting from Haarlem did not give an estimated annual production so it is impossible to spread the capital costs across the total of output. The accounts do include a new

³⁶ Bijlsma, *Rotterdams Welvaren 1550-1650*, p. 104; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 8-9; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 91-92; John Michael Montias, *Artists and Artisans in Delft: A Socio-Economic Study of the Seventeenth Century* (Princeton, 1982), p. 55n; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 370.

³⁷ G. A. Leiden, *Archief der Secretaire 1253-1574*, #976, 23.

item, though, which would be a source of concern for brewers for many years. The greatest single capital outlay, more than three times any other cost and 56% of all expenditures on capital went to cover the loss of barrels. Repairs to kettles, troughs and other equipment only took up 15% of all capital expenses. Repair and replacement of various other small pieces of equipment took up the rest of the charges. No mention was made of costs for the building. The figures for expenses for each brew are of little help since the cost of grain is not included. The remaining expenditures for peat, hops, candles and so on seem consistent with the proportions reported at Haarlem earlier in the century. Capital costs then seem to have been typically of the order of 5% of the total, with of course great variations possible. An undated sixteenth century cost breakdown from Haarlem, which seems to have some inaccurate calculations imbedded in it, set the share of operating expenses going to grain at 79%, 46% for barley, 27% for oats and 6% for wheat. Only 8% of total outlays went for peat, 3% for hops, 3% for fees to coopers and millers. There was an after tax profit of something on the order of 3%. That was for higher quality beer. For cheaper beer using only barley and oats grain costs were 74% of the total. Peat took up 9% of expenditure and the cost of hops was so small it was included in fees to coopers, millers and others. The proportion for that category was only 6% of the total.³⁸

The making of hopped beer followed by the growth in the size of firms, the bigger operations with bigger kettles, more frequent brewing and more capital made breweries more valuable properties. The owners of breweries often became rich. Because of capital requirements they often started out rich. The sharp separation between the owner and the workers that was a feature of the textile industry, for example, never existed in the brewery. Labor costs were a small portion of total costs, perhaps at the most in the range of 10-12% of the total. The small scale of operations made relations between the master and workers more intimate. Often some if not all the workers were family members. Changes in workers' wages had small effects on profits so brewers saw little gain in forcing down the compensation of those in the brewery.³⁹ A brewery could be run by as few as three individuals. The numbers were often higher but even the largest of breweries probably did not have more than a dozen workers. Among them were almost invariably a number of women.

In the fourteenth and fifteenth centuries the role of women in brewing was critical, though not always equal to that of men. When brewing was a household operation and the brewer and his family made beer for sale to the neighborhood,

³⁸ Huntemann, *Das deutsche Braugewerbe...*, pp. 34-35; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 131-135; Pinkse, "Het Goudse Kuitbier...", pp. 101-102, 127.

³⁹ Soly, "Nijverheid en kapitalisme te Antwerpen in de 16e eeuw," pp. 346-351.

then wives, husbands and children worked side by side with a limited division of tasks. The husband and wife could operate independently and women did operate their own breweries. The growth in the size of breweries in the sixteenth century generated a greater degree of specialization in the workplace. Women in brewing did not escape completely the pattern of low pay, low skill jobs which prevailed for female workers, but they did find some potential for status and earning power not available in other trades or professions. Breweries often had a *comptoirmejd*, a women responsible for keeping track of outgoing beer and keeping records for the authorities. Women, called *brouwsters*, typically got the job of overseeing the boiling of the wort with hops. Women, called *wringsters*, were typically responsible for mixing the malt with hot water, using large and long rakes and oar-like paddles to move the malt around in the mash tun. It had the consistency of a thick dough so the work was much harder than stirring the wort. The term *brouwster* had two meanings: the highest paid assistant to the brewer who saw to the boiling of the beer at a critical stage in the brewing process and a woman who ran her own brewery.⁴⁰ Widows had the option, under most civic regulations, to carry on with the brewery of their late husbands. Strangely enough the structure of brewing, where capital took on greater importance, gave some women, that is those with capital, an opportunity to act as independent businesswomen.

Women in Holland in the fifteenth and sixteenth centuries remained active in most aspects of the beer trade, at least into the early years of the seventeenth century. Women could always inherit breweries and continued to receive them and operate them through the eighteenth century. There are some hints that women as employees, as *brouwsters* and *wringsters* became less important and even disappeared in the early seventeenth century. The Dordrecht guild or confraternity had in all documents talked about the members as *brouwers en brousters*, but from the 1630s only brewers get mentioned. On the other hand Haarlem in 1622 referred, as was traditional, to brewer and brewsters and clearly referred to brewsters as independent operators of breweries.⁴¹ More dramatic than an erosion in the mention of brewsters in government regulations was the change in the rules of the guild of beer wholesalers in Amsterdam in 1632. There women were excluded from the trade entirely and their hus-

⁴⁰ Judith M. Bennett, "Work in Progress: Misogyny, Popular Culture, and Women's Work," *History Workshop a journal of socialist and feminist historians* 31 (1991), pp. 166-168; Bijlsma, *Rotterdams Welvaren 1550-1650*, p. 104; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 59-60; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 29; Edmond Urien and Frédéric Eyer, *La Bière Art et tradition* (Paris, 1968), p. 33.

⁴¹ G. A. Dordrecht, Archief van de Gilden, #931; G. A. Haarlem, Archief van het Brouwersgilde, #90, 6, 19, 24-25 [1622].

bands were prohibited from acting for them. A decade before nine of the 58 importers had been women.⁴² Such dealers in imported beer were not the makers of beer or the sellers of beer so there were still many vocations in the brewing industry open to women. However, skilled tasks appear to have been less and less the reserve of women by the end of the sixteenth century. The loss of relatively high paying jobs was part of a general loss of employment in the industry. The decline in brewing may well have been especially bad for the incomes of women.

For brewers throughout the Low Countries and probably all of northern Europe the scissors of rising grain prices and increasing taxes meant a fall in profits through the sixteenth and into the seventeenth century. As grain prices rose brewers went to all kinds of expedients to reduce their costs. The expedients included technical changes in heating, investing in more equipment, becoming involved in the coal trade, controlling the wages of their workers, increasing production, becoming more active in export markets and, of course, approaching governments for some tax relief.⁴³ Brewers also lowered the quality of their beer. Decreases in quality had to be carried out with the connivance if not the active support of governments. Brewers in Holland seem to have been somewhat better than others in dealing with the declining circumstances of their trade, in part because of the size and prosperity of the industry, in part because the Dutch economy expanded so rapidly, and in part because Dutch brewers adopted new techniques.

The mass of regulation on the movement of beer, the marking of barrels which also had to be of the right size and shape, the transfer of documentation, and the careful and precise recording of all transactions created a burden for brewers. They and virtually all those operating in the production and distribution of beer were presumed potential criminals. Governments may have entered a partnership with beer makers to share the profits to be gained from a good with robust sales but they tilted the partnership in their favor, insisting on a greater share of profits because of their own rising needs created by the more and more frequent wars of the sixteenth century. Brewers saw their profits disappearing already in the higher grain prices that farmers and landowners extracted. For brewers fraud was an ever more tempting option. Brewers became more concerned with legislation to protect them and with legislation that might be detrimental to

⁴² van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, p. 444, note 4, #1471 [1632], #1234 [1629]; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, p. 1191.

⁴³ Langer, "Das Braugewerbe in den deutschen Hansestädten der frühen Neuzeit," p. 79; Soly, "De economische betekenis van de zuidnederlandse brouwindustrie in de 16e eeuw...", pp. 107-111; van Uytven, *Stadsfinanciën en Stadseconomie te Leuven...*, p. 336.

them. Relations between brewers and governments became less and less a matter of cooperation and in the course of the seventeenth century more and more a matter of conflict.

CHAPTER SIX

INVESTMENT, CONCENTRATION, AND PROTECTION

Brewers in the sixteenth century reacted to government regulation and the rising costs of their principal raw material in a number of ways. The most consistent, the one which promised the greatest savings and the one which best exploited the potential of existing technology was to increase the size of the individual firm. Consolidation immediately created political problems. Many smaller brewers saw they could be driven out of business by bigger and expanding competitors. The narrowing gap between costs and income was more of a threat to smaller brewers. They turned to governments to protect them, to maintain and enforce existing legislation which limited the scale of brewing operations. Brewing was not the only sixteenth century industry in the Low Countries to suffer from legal battles over the scale of units within the industry, but it was one where the battle was long and bitter and it was one which the big operators won.

The economics as well as the technology of brewing favored consolidation. There were economies of larger scale production to be reaped. Greater capital investment yielded markedly lower unit costs and spread both fixed costs and labor costs across larger output. Larger firms could have more efficient connections with markets for their output either through direct sales to the houses of consumers or through sales to commercial outlets such as inns and taverns. Beer, even heavily hopped, was a perishable good so decreasing uncertainty about outlets for production could translate into better financial performance. Larger units could economize on administrative costs, so much so that smaller units often preferred to sub-contract work for larger ones. Bigger brewers with greater access to capital could combine malting and the production of yeast with the making of beer and in that way too expand the potential for profit. Governments did not mind concentration in the industry since it made tax collection easier.¹ The upper limit of production was effectively set by the size of the copper brewing

¹ Huntemann, *Das deutsche Braugewerbe...*, pp. 74-75; Leo Noordegraaf, "Betriebsformen und Arbeitsorganisation im Gewerbe der nördlichen Niederlande 1400-1800," in: *Hansische Studien IV Gewerbliche Produktion und Stadt-Land-Beziehungen*, Konrad Fritze, Eckhard Müller-Mertens, Johannes Schildhauer, eds. (Weimar, 1979), pp. 60-61; Soly, "De economische betekenis van de zuidnederlandse brouwindustrie in de 16e eeuw...", pp. 113-144.

kettle and the frequency of brewing. As metallurgy improved and as it became possible to construct larger and larger kettles, the more aggressive brewers ran squarely into government regulations on the scale of their operations. Originally set to maintain quality, to protect domestic supplies as at Haarlem in the 1520s where a maximum of 112 was set on the number of brews a brewer could export each year,² and to give as many brewers as possible a chance to carry on the trade commercially, the rules increasingly became a way to protect smaller brewers against their expansionary competitors. The conflict led to investigations, government regulation, court suits and often bitter correspondence, all of which not only illustrate the changing character of brewing through the sixteenth century but also the rifts opened in towns in the Low Countries as populations and economies grew.

In places like Gouda and Haarlem large brewers carried on their business continually, invested heavily in equipment for malting and large kettles and sold beer to consumers at a distance as well as locally. Small brewers kept their equipment simple, bought their malt from specialist malters, brewed under the legislated maximum and decreased their risk by entering supply contracts with publicans, though the last was rare. Haarlem in 1407 legislated against independent malters and insisted that those who brewed had to make their own malt. This damaged smaller operators but by 1501 it was legal to produce malt and sell it to others, including brewers. In fact, a number of smaller brewers gave up making beer and specialized in producing malt.³

In a number of towns market expansion, the growth in exports to other towns, contributed to concentration and so generated protests from brewers about the increasing scale of firms. Gouda in 1480 had 197 brewers and 20 of them averaged between 1 and 10 brews per quarter. Another 27 averaged between 10 and 15. By 1546, when production was lower only 1 brewer fitted in the lowest category and just 6 in the second. In 1482 the 32 largest producers brewed just 26% of the total number of brews, but in 1546 the top 32 producers did 47%. What is more in the intervening years the size of the brew had risen from 31 barrels to 41 barrels. Haarlem went through the same process of concentration, though it was stretched out over a longer period. In the fifteenth century average production was about 50 brewings each year or just under one each week. By the 1520s that was up to 60-70 brewings each year on average, by 1537-40 up to 78 and in 1563 up to 80. Not surprisingly that trend led, between 1514 and 1574, to a rise in the average production per brewery. From 1496 to 1537 the number of Haarlem brewers fell by half. Even so, in 1512-1513 about half the breweries were small firms and about

² Brünner, *De order op de buitenmering van 1531*, p. 91.

³ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 93-94.

half large. That would change. In 1500 there were some 100 brewers at Haarlem and in 1550 some 41. Production remained about the same, so average output more than doubled. The number of breweries continued to go down. In 1574 there were four big breweries, six of middling size and five small ones and in that year four of the small breweries went out of business. A revival in the market led to the addition of three more breweries in 1577 and another in 1579, but that did not stop the trend to concentration. By 1578 the four biggest brewers made more than 50% of the beer. The largest brewer in 1574 brewed 6,750 barrels of beer but the maximum number in 1580 was 9,200 barrels. By 1599 the single small brewery was brewing 20 times each year and there was one that brewed 25 times. The remaining eight all produced 40 or more brews that year.⁴

Leiden brewers in 1590, like so many other brewers in Holland, had to pay a fixed fee for each brew plus a penalty on each barrel of beer over the legislated maximum of 33 *vaten* in each brew. In the third quarter of that year overbrewing, that is amounts in excess of the maximum, were 88% of the amount produced within the limit. Brewers had turned the limitation into nothing more than a higher tax on their production. Protection for small brewers by that date had been virtually annihilated. Of the nine brewers still operating in Leiden in 1590, three clearly operated on a large scale, producing about 1.5 times as much as the average, two produced at about 1.25 times the average, three at about 80% of the average and one at little better than a third of the average.⁵ The three largest brewers produced 53% of all the beer made in Leiden in that third quarter of 1590. The tendency toward a smaller number of larger brewers then took its toll in all major production centers in the sixteenth century.

Where the *peil*, the limit on the number of barrels for each brew, was hard and fast brewers could acquire other breweries to expand their operations. They might not be able to reap savings from larger kettles but they could lower administrative and distribution costs as well as distribute risk. Expanding existing facilities and buildings always created the hazard that income would not cover the increased capital costs but with buying breweries capital investment was predictable. In Rotterdam a prominent family acquired three breweries by 1586, added a fourth in 1607 by renting it, and consolidated the largest of the collection with one next door in the same year, and bought yet another in 1608.⁶

⁴ G. A. Gouda, *Aantekeningen van A. v. d. P. Clement*, 1, chap. 3, pp. 213-219; Houwen, "De Haarlemsche Brouwerij 1575-1600," pp. 18-22, 25-26; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 49-50, 71, 87-90.

⁵ G. A. Leiden, *Archieven van der Gilden*, #279.

⁶ Bijlsma, "De opkomst van Rotterdams Koopvaardij," pp. 75-77; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 87; Soly, "De economische betekenis van de zuidnederlandse brouwindustrie in de 16e eeuw...", pp. 111-113.

Some of the breweries that were brought together in the hands of one brewer or family of brewers might be shut down and the equipment redistributed to the other unit or units of the family enterprise. The results were fewer producers and higher average production from each brewery.

Finding good, clean water was a constant problem for brewers. As the industry grew, especially in towns with sizeable export markets and high levels of production, the problem became more acute. Small brewers could not survive without pure water to make beer and to clean their equipment and their storage facilities. Pollution forced the creation of joint capital-intensive schemes to give access to needed water. Such schemes could only serve to increase the pressure for concentration.

The long struggle in Haarlem over use of canal water was typical of the problems facing brewers. In 1478 the brewers and the town agreed to share equally the costs of deepening a canal to bring sweet water to the brewery sites. They also agreed to share the costs of repairs so that foul water could not enter it.⁷ Other industries, and at Haarlem that meant bleaching, created demands on supplies and made water unusable for brewing. The rivers and canals that passed through towns in Holland did not move swiftly, so the location of various industrial activities and where brewers took their water became critical to the quality of the beer and to the success of that beer in export markets. The Haarlem brewers resorted to a law suit in 1577 to try to get rid of bleachers who dumped their waste into the canals. The brewers petitioned the town government to take action against the bleachers in 1581 and 1583 and in the latter year they got the judgement they wanted from the courts. Next, they went after the preparers of flax and in 1591 it was the turn of the paint makers. In 1599 the brewers complained again about the bleachers. The constant problems with foul water forced brewers to try to improve existing water sources and to find new ones.

In some parts of the Low Countries, low-lying and near the coast, the ground water was too brackish to allow brewing at all and in the early sixteenth century the problem posed a serious threat to the Haarlem industry. Despite deterioration in the quality of beer, the town of Hoorn in 1508 urged continuing to import and drink Haarlem beer over the potential rival, Gouda beer. The reasons for the support of the Haarlem industry seem to have been political rather than economic. At Haarlem difficulties with the brackish water in the Spaarne River led, as early as 1549, to the organization of a system of bringing in water by ship. A 1557 regulation forbade the water carriers from supplying brackish water and laid down penalties, including suspension from doing business for one year, for failure to comply with the regulation. Brewers could take their water

⁷ G. A. Haarlem, *Achief van het Brouwersgilde*, #40, first.

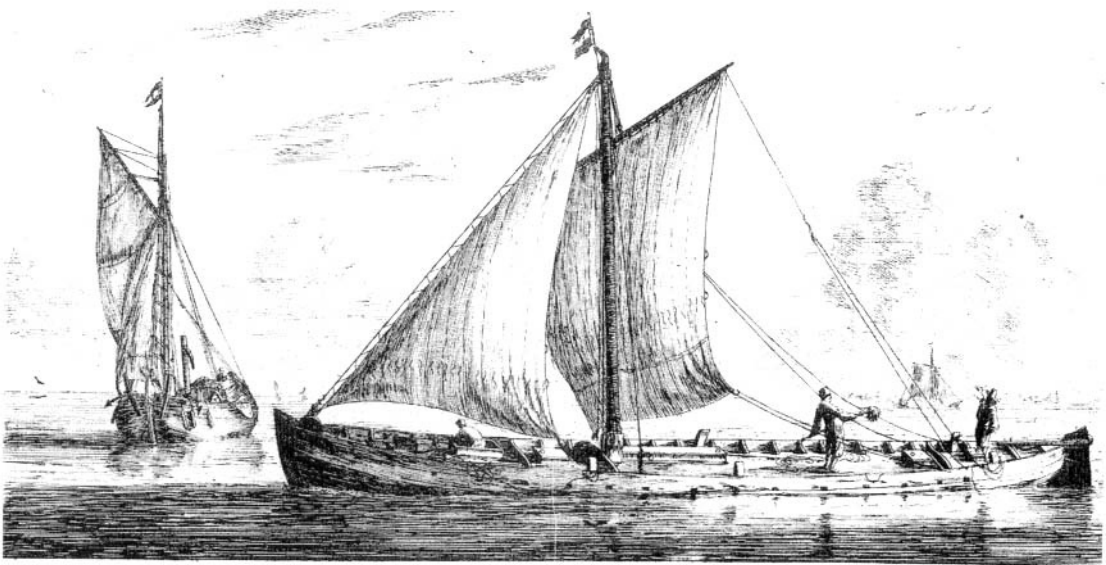
only from certain places and they came over time to pay for the upkeep of certain sluices. They even rented an icebreaker as early as the 1620s to open the canals so that boats could ferry water into the town in the cold months.⁸

Gouda brewers, like their Haarlem counterparts, could only operate in certain specific streets and along certain canals. They took water from those canals and also used the canals to bring in water by boat. At Delft as early as 1450 there were rules about the use of canal water for brewing and in 1473 the town prohibited brewers from using canal water at all in the summer. In the same year Duke Charles the Bold assured the town that the construction of a bridge across a stream nearby would not cause adverse effects for the brewing industry. In that year he also noted that the canals of the town had become dirty and that the pollution was hurting the brewing trade. He authorized the construction of a sluice to carry water into the town. When the water level was high enough the sluice would also serve for boats, but the principal function was to give Delft brewers the water they needed. Incidentally, it was not just water pollution that troubled Delft brewers. In 1547 Charles V prohibited the construction and operation of limestone ovens within a half mile of the town and even insisted that one shut down because the smoke and stench were bad for the brewing industry.⁹

At Amsterdam as with other Holland towns when local supplies in streams and canals proved inadequate the brewers first turned to professional water hauliers but in a few cases they banded together, invested in vessels and so gained control over their critical supplies of sweet water. As early as 1497 Amsterdam brewers had to bring water from outside the town and in 1514 they were restricted to one waterway as a source. The water was to be landed at a specific site and only sound vessels could be used. Those hauling water for brewers had to swear that they got the water from the designated place and from no other with fines levied for violation of that and other relevant bylaws. By 1530 all canal water in Amsterdam proved too foul for use, that despite regulations, repeated in 1547, that levied fines on polluters. In 1541 to prevent the shipping of brackish water from villages inland, a town official was appointed to oversee the taking of water at one village. At the same village of Abcoude in 1593 two bridges needed to be widened for the haulage of water so the site was still being used. As the century went on the distances covered to bring in good water increased. A society of

⁸ G. A. Hoorn, #169 [2499]; G. A. Haarlem, *Achief van het Brouwersgilde*, #40, second; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 19-21, 36-37; Houwen, "De Haarlemsche Brouwerij 1575-1600," pp. 44-46, 49-58; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 102-103; see chapter X.

⁹ G. A. Delft, *Eerste Afdeling*, #142; van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 700-709; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," p. 199; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 57; Hallema and Emmens, *Het bier en zijn brouwers*, p. 66.



Een Waterschip voor d'Soutketen,

Een Brouwers Water-Schuyt,

9. Reiner Nooms, alias Zeeman, etching, c. 1630. A brewer's *waterschuyt*, a small inland vessel to bring water from the countryside. This one belonged to the Amsterdam brewers,
 Source: Reiner Nooms, *Verscheijde Schepen en Gesichten van Amstelredam*, facsimile ed. (Alphen aan den Rijn, 1970) b6.

water hauliers existed at Amsterdam down into the nineteenth century and was not obsolete until 1853 when the first pipes brought water from wells in the dunes along the North Sea to the town. Around 1560, brewers began to bring water from the Haarlemmermeer. In that year, a piece of land was bought in Amsterdam where the water could be landed and brewers could come and get what they needed. Some water was sold to other users but the principal goal was to guarantee suppliers to the beer makers. In 1561, the brewers asked the town to keep two ships to bring in water for them. The Haarlemmermeer water proved over time to be too brackish, though brewers did not give up on it entirely until 1685. They found they needed to haul water from other nearby sites but further to the east.¹⁰

Brewers greatest investment was in larger brewing kettles. If the scale of operations was to increase, all the vessels had to be bigger. Since many were typically made of wood and were in some cases divisible it was not difficult to increase their capacity for mashing or fermentation. Above all, the investment in those vessels and in rakes, shovels and stirring paddles could be made incrementally. With the copper brew kettle, divisibility was difficult and less efficient. Since the big kettle had to sit on some stand which often meant on a furnace, the investment was lumpy. What is more, since wort contracts about 4% on cooling and since it is necessary to have about 30% so-called 'head space' to allow for vigorous boiling, the copper had to be about 35% larger than the maximum amount of beer being made at one time. The bottom of the kettle, moreover, had to be thicker than the sides but not too thick since that would slow the transmission of heat, slow boiling and increase fuel requirements. Too thin a bottom, on the other hand, would not stand up for long.¹¹ The quality of workmanship required in the making of the kettle made it expensive as well. For such a sizeable investment to pay off brewers needed to be able to reap the economies of the larger scale of production. When they tried to do that they ran directly up against legislation.

Towns typically set the *peil* in the number of barrels that could be extracted from a single brew. By setting the *peil*, authorities also set the size of the beer ket-

¹⁰ G. A. Amsterdam, Archief Burgermeester, Portefeuille Handel, 9, A, 1-5; J. F. M. Den Boer, "De Waterschuit en het Drinkwater," *Amstelodamum, Maandblad voor de Kennis van Amsterdam* 49 (1962), pp. 129-130; Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid, II Bierbrouwerijen," p. 75; Breen, *Rechtsbronnen der Stad Amsterdam*, 1497, 6-9; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #18, 1, 2; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 58; I. H. van Eeghen, "De Ijsbreker," *Jaarboek Amstelodamum* 46 (1954), pp. 61-62; Hallema and Emmens, *Het bier en zijn brouwers*, p. 44; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 5-6; Ter Gouw, *Geschiedenis van Amsterdam*, 5, pp. 50-51; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 8, pp. 232-233.

¹¹ Buijs, "De Bierbrouwer...", pp. 19-20; De Clerck, *A Textbook of Brewing*, 1, pp. 312-313.

tle, since technology dictated a close relationship of one to the other. Brewers might take two or three mashings in a single brew to get more beer from each brew, even if of lower quality, but that only mitigated and did not overcome the upper limit on production set by the *peil*. Brewers could and did have two kettles so that they could start on brewing the second mashing while still brewing the first. Having two kettles going would speed up the process but that too only mitigated the limits on production. Often governments also restricted the number of times per week, or per month or per year that a brewer could turn out the maximum amount allowed under the rules. The result was to dictate the scale of the brewing operation and the upper limit of what any brewer could produce. In 1484 at Amsterdam anyone making less than 20 barrels each time she or he brewed was considered an amateur. Scale was used to identify professional brewers but, once identified, towns increasingly tried to keep under control the scale of their operations. The first regulations on maximum production date from early in the fifteenth century. They were usually expressed in the total number of barrels that could be made but sometimes were set in *stock sticx*, a barrel but perhaps a larger one used for secondary fermentation after the beer had been taken out of a yeasting trough and before going into a barrel for delivery to the customer.¹² Since the exact size of the barrel is not certain the total volume of the brew is not certain but within each town the barrel measure was consistent and it was a barrel full and without foam.¹³ The number of barrels allowed per brew did go up through the fifteenth and sixteenth centuries.

Brewers sometimes found ways to get around the regulations. Authorities were aware of the potential for abuse and made provisions for inspection and enforcement. Government's concern over the problem of brewers' *drinckbier*, the extra beer produced for consumption in the brewer's household, grew in part from a fear that provision for that private consumption might prove a loophole and allow larger scale brewing. The *drinckbier* was typically included in the maximum that could be brewed at one time. Brewers also could avoid the limits by having another brewer produce for them at a fee, the subcontractor becoming little more than a wage labourer for the first brewer. The limitation on production became, in effect, a quota which had a value and could be in a sense sold in an admittedly restricted market. Brewing in larger quantities was a way to use less grain for each liter of beer produced. In periods of high grain prices, like the

¹² Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 65; J. A. Ten Cate, "Verslag van een onderzoek naar de geschiedenis van het Amsterdamse brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #118, (1940), p. 2.

¹³ G. A. Veere, #311, fol. 96v.

Table VI-1

The Maximum Size of a Brew in Towns in the Fifteenth to Eighteenth Centuries

C=century				
Date	Town	Number of Barrels	Frequency Per Week	Restrictions
14thC	Hamburg	25	1	
1332	Wismar	.5		
before 1340	Delft	24	2	
1356	Wismar	2		
14thC	Delft	36		
1366	Gouda	14		
c.1380	Hamburg	25		
1399	Wismar	1		
1407	Haarlem	14	3	Hoppenbier
1407	Haarlem	26	3	Export kuit
1407	Haarlem	25	3	Export kuit- Holland
1440	Haarlem	14.5	3-4	Export hobbier
1440	Haarlem	24	3-4	Kuit
1440	Haarlem	28	3-4	Kuit for Friesland
15thC	Amersfoort	18.5	1	.5 barrels for Household use
1442	Amersfoort	24	2	Exporters only
1450	Leiden	24	2	Kuit
1460	Hamburg	35		
15thC	Gouda	31	2	
1462	Utrecht	1		
1484	Amersfoort	25		
1484	Amersfoort	30		Exporters only
1488	Gouda	30		
c.1480	Delft	37.5	4.1 (avg.)	
1495	Gouda	31		
1495	Gouda	28		Beer for Bruges
1497	Amsterdam	20	2	
1498	Haarlem	30		Kuit
c.1500	Wismar	30		
1501	Haarlem	31	3	
1501	Haarlem	31	4-5	Export to the south
1514	Amsterdam	1		
1514	Haarlem	30		
1518	Gouda	30		
1520	Haarlem	32	2.15 (avg.)	
1521	Liege	32	1	
1536	Antwerp	58		Koyte-lowest quality
1540	Veere	40		
1540	Gouda	41	2	

Date	Town	Number of Barrels	Frequency Per Week	Restrictions
1544	Haarlem	32		
1547	Gouda	41	1.4	
1548	Haarlem	40		
1549	Holland	41	2	
1549	Holland	82	1	
1549	Delft	41	2	
1549	Rotterdam	41	2	
1562	Leiden	33		
1570	Amsterdam	30		
1574	Amersfoort	2		
1577	Liege	40		
1584	Liege	55		
1586	Liege	40		
1592	Haarlem	3		
1595	Haarlem	50	0-4	
1598	Flushing	20 (minimum)		
16thC	Haaselt	12		
1624	Haarlem	80		
1667	Delft	50		
1687	Haarlem	80		
1692	Haarlem	85		

Sources: A. R., *Papiers de l'Etat et de l'Audience*, 1665/1; G. A. Amsterdam, *Archief van de The-saurieren Ordinaris*, 'Rapiamus'; G. A. Haarlem, *Archief van het Brouwersgilde*, #29; G. A. Delft, *Eerste Afdeling*, #954; G. A. Leiden, *Secrtaire Archief na 1574*, #4337, fol. 25v; G. A. Veere, #311: fol. 96v-97v; Abraham van Bommel, *Beschryving der Stad Amersfoort...* (Utrecht, 1760), 2, pp. 776-777; R. Bijlsma, "Rotterdams Welvaren in den Spaanschen Tijd," *Rotterdamsch Jaarboek-je* 8 (1910), p. 79; Wolf Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert* Dissertation zur Erlangung der Doctorwürde der Philosophischen Fakultät der Universität Leipzig, Eingereicht im Jahre 1907, *Zeitschrift des Vereins für Hamburgische Geschichte* 14 (1909), pp. 244-245, 248; Dirck van Bleyswijck, *Beschryvinge der Stadt Delft* (Delft, 1667), pp. 728-729; A. van der Poest Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," incomplete and unpublished doctoral dissertation (1959) — G. A. Gouda, pp. 58-60, 70-71; L. M. Rollin Couquerque and A. Meerkamp van Embden, *Rechtsbronnen der Stad Gouda* (The Hague, 1917), pp. 135, 160, 164-165, 278, 514; J. G. van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam [1512-1632]* (The Hague, 1929-1974), 1, #18, 15; G. Doorman, *De Middeleeuwse Brouwerij en de Gruit* (The Hague, 1955), pp. 48, 96-98; H. Halbertsma, *Zeven Eeuwen Amersfoort* (Amersfoort, 1959), p. 43; P. Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1935), pp. 3, 8; A. Houwen, "De Haarlemsche Brouwerij 1575-1600," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1932), pp. 4, 16, 24; Johan Huizinga, ed., *Rechtsbronnen der stad Haarlem* (The Hague, 1911), pp. 114, 119, 134-135, 196-197; Jacques C. van Loenen, *De Haarlemse Brouwindustrie voor 1600* (Amsterdam, 1950), pp. 36-45, 64-67, 103; Jos Martens, "Bier en stadsfinancien te Hasselt, 16e en 17e eeuw," *Gemeente Krediet van België, Driemaandelijke Tijdschrift* 30/118 (1976), p. 249; S. Muller Fz., *Schetsen uit de Middeleeuwen* (Amsterdam, 1900), p. 63; J. P. W. Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende

Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1937), p. 7; V. C. C. J. Pinkse, "Het Goudse Kuitbier, Gouda's Welveren in de Late Middeleeuwen 1400-1568," *Gouda Zeven Eeuwen Stad* (19 July, 1972), pp. 102-103; W. F. N. van Rootselaar, *Amersfoort 777-1580* (Amersfoort, 1878), 2, pp. 144-145; René van Santbergen, *Les Bons Métiers des Meuniers, des Boulangers et des Brasseurs de la Cité de Liège* (Liège, 1949), pp. 236-237; Hugo Soly, "De Brouwerijenonderneming van Gilbert van Schoonbeke (1552-1562)," *Revue Belge de Philologie et d'Histoire* 46 (1968), p. 342; J. Soutendam, *Keuren en Ordonnantien der Stad Delft van den aanvang der XVIe Eeuw tot het jaar 1536...* (Delft, 1870), pp. 160-172; Friedrich, Techen, "Das Brauwerk in Wismar," *Hansisches Geschichtsblätter* 21 (1915), pp. 294-295, 339-340; E. M. A. Timmer, "Grepnen uit de geschiedenis der Delftsche brouwnering," 1 and 2, *De Economist* (1920), p. 360

1530s, brewers at both Gouda and Delft approached town governments for an increase in the *peil*.¹⁴ They were conscious of the dangers of losing export markets in the long term if the quality of their beer fell but argued that raising the scale of production would both maintain quality and protect brewers' incomes. Such claims often proved convincing.

At Haarlem there was a long and drawn out struggle over the maximum that could be brewed at one time. The fight was between brewers interested in export and smaller scale brewers interested in supplying the home market. The division dated from the fifteenth century, as did the animosity and the conflict over the size of the brew. At Haarlem as early as 1407, a maximum of 14 barrels from each brew of hopped beer was set and it remained in place through the fifteenth and sixteenth centuries. That was beer of very high quality and price. More subject to change and to agitation was the limit on the less expensive kuit. The maximum for that type, set around 1440, was 24 barrels for each brew. Kuit was not taxed until after 1489 and in 1498 a limit of 30 barrels was set. This was compensation to brewers for a more than three-fold increase in the amount they paid the town for each brew. By the end of the fifteenth century many of the smaller brewers had been driven out of business by a sustained economic depression. Export brewers came to dominate both the industry and the concern of regulators. The town measured the fermenting vessel in each brewery and sealed and marked each one, in essence controlling the maximum that could be produced at any one time. It was so common for brewers simply to overbrew that the town government in 1501 appointed seven beer tasters. Brewers had to send to those men a quarter of a barrel from each brew so the officials could determine the strength of the beer, catching anyone from getting too much beer out of the fixed amount of grain. The system of limitation and brewers' transgressions forced the establishment of such overseers.

¹⁴ Brünner, *De order op de buitennering van 1531*, p. 159; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 48-49.

At Haarlem from 1501 on, brewers turned their efforts to getting rid of the limits and getting rid of the officials who enforced the limits. That led to a suit in 1519 which the town won before the *Hof van Holland*, the county high court, and on appeal at the *Groote Raad* at Mechelen, the highest court in the Low Countries. In 1520 the system of surveillance was reaffirmed but the maximum brew was raised to 32 barrels. Gouda had five officials responsible for overseeing the maximum brew by 1518 and probably before that date. Delft had inspectors to check, under oath, that brewers conformed to the rules by 1549 at the latest.¹⁵ In 1546 the attack on the Haarlem officials was renewed. A petition from 30 brewers and brewsters to the high court of Holland claimed that existing legislation was causing a decline in the industry. A supporting letter from the town of Monnikendam helped the case. It said that forcing Haarlem brewers to prove the quality of their beer caused an unnecessary increase in costs. In 1548 the brewers won. The high court ruled that the system of oversight was not needed and it was duly abolished.¹⁶

Under Emperor Charles V the government of the Low Countries took a greater interest in the industrial policies of the towns. Already in 1519 towns were prohibited from raising excise taxes without approval from the next level of government. When differences arose between towns they were often referred to the *Hof van Holland* and, before the Revolt, on to the *Groote Raad* at Mechelen which dealt with various cases involving beer. Conflicts about beer excise and what was due in different jurisdictions made up a sizeable portion of such disputes. Often, after a protracted legal struggle, one party would turn to politicians in power to resolve the conflict. Since all governments had such a deep interest in brewing and relied heavily on income from excises, each was ready to have politics take precedence over the law or over the dictates of the economy.¹⁷

Under Emperor Charles V the government of Holland took an interest in the whole issue of taxing brewing in towns. While Charles' income was a fixed annual subsidy a healthy industry and the tax receipts that flowed to the States of Holland from it made easier the payment of the subsidy. Charles in 1548 set up a

¹⁵ van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 711-713; Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, p. 278; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 36-41, 64-67, 103.

¹⁶ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 41-43; Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," pp. 266-267.

¹⁷ Brünner, *De order op de buitennering van 1531*, pp. 13, 84; Florike Egmond, "De Strijd om het dagelijks bier Brouwerijen, groothandel in bier en economische politiek in de Noordelijke Nederlanden tijdens de zestiende eeuw," in: Clé Lesger and Leo Noordegraaf, eds., *Ondernemers en Bestuurders Economie en Politiek in de Noordelijke Nederlanden in de Late Middeleeuwen en Vroegmoderne Tijd* (Amsterdam, 1999), pp. 155-157, 190-193.

commission to investigate the status of the industry and to explain why exports had fallen off. A petition from a prominent citizen of Delft, Dirk Duyst, inspired the action. Duyst claimed that big brewers in the town had control of finances making it impossible for small brewers to compete. Bigger kettles allowed, so the petitioner said, brewers who used to brew 36 barrels at a time to make 72. The integration of cooperage and the grinding of grain into brewing enterprises all hurt smaller firms, he said. The success of the petition was a sign of the loss of influence of the bigger brewers in the government of the town, something they had enjoyed for decades. The conflict and court cases at Haarlem as well as petitions from Gouda contributed to the decision to carry out a full-scale investigation. Charles V's commissioners went to the towns of Delft, Leiden, Haarlem, Gouda, Rotterdam and Schiedam and asked how many times each week each brewer brewed, how many barrels they produced each time and how much of what types of grain they used. Those members of town governments who were brewers themselves were excluded from any discussions. The governments of Delft and Leiden produced a report for the commission in 1550 showing conclusively economies to be reaped from a larger scale of production and showing that the savings were greater the more expensive the beer. The biggest gains came from lower average capital costs as the investment in buildings and equipment was spread across a larger number of liters produced.¹⁸

The commission report on production methods and grain used led to a spate of legislation affecting the province of Holland and specifically the major brewing towns. They were not all pleased with the results. The general decision applying to all those towns was that a brewer could brew up to twice a week, that is a maximum of 104 times each year, and produce 41 barrels each time. With permission, though, a brewer could produce 82 barrels at a time, but then could brew only once a week, that is 52 times a year. The town bailiff had to give permission for such double brewing. Even if a brewer had invested in a bigger, more expensive kettle, it was not possible for him or her to increase production. In addition, the price of beer was to be fixed in relation to the price of grains used in making it. The decision on any price change would be made by knowledgeable town officials who were not brewers. Brewers were prohibited from making their own barrels or grinding their own grain. Officials were put in place to oversee the enforcement of the rules and the maintenance of the quality of the beer. A county government investigation of the effects of the legislation was undertaken

¹⁸ Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 709-710; Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," pp. 265-266, 274-275; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," pp. 163-167.

immediately. The results of that enquiry led to a change in 1551 which dropped the limits on the frequency of brewing altogether — a victory for the bigger brewers in the major brewing towns. The price fixing system was dropped as largely impractical. On the other hand the restrictions on brewers making barrels and grinding grain seem to have remained in force and been effective, at least at Delft.¹⁹

The problem of brew size which had plagued Haarlem since early in the fifteenth century did not disappear but was a continuing source of conflict down to the Revolt. In 1549 the Haarlem government allowed a maximum of 40 barrels per brew but also made provision for brewing another 8 barrels on top of that for an additional fee of 6 stuivers per brew. In essence, the government raised the limit to 48 barrels and the tax to 30 stuivers. By that same year of 1549, as part of the general reform for the province, the maximum for Haarlem was changed to 42 barrels per brew with a fee set at 24 stuivers for each brew. Presumably the extra barrel above the provincial limit of 41 was beer for the brewer's household. If a brewer overbrewed then there was a fee to be paid of half a stuiver for each barrel. Brewers had to report monthly under oath how much they had brewed. Despite various reform efforts regulations on maximum brewing continued to be unpopular with a number of people and a regular source of public debate.²⁰ Brewers renewed their assault on the system and in 1558 they got a decision from the *Groote Raad* at Mechelen that got rid of the tasters but replaced them with sworn officials who oversaw any beer above the limit being put in barrels. From about 1560 the limit was set at 40 barrels per brew. Brewers were responsible only for paying an excise tax on any more grain used to make any beer over the 40 barrel limit. The maximum of 112 brews per year set at Haarlem early in the sixteenth century was widely ignored later.²¹ That was a further reflection of the victory of large-scale brewers who produced for a wider market. By 1624, brewers made a maximum of 80 barrels in each brew. In April of that year of the total of 474 brews 30, or 6%, were of 70 barrels or more and the share of production was 38%. Brews of 60 barrels and over, though making up only 10% of the brews, contributed 87% of the total number of barrels. 11% of the brews were of 15 barrels or less²² so even

¹⁹ Bijlsma, "Rotterdams Welvaren in den Spaanschen Tijd," p. 78; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 2, pp. 2059-2066 [1549]; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 70-71; Timmer, "Grepn uit de geschiedenis der Delftsche brouwering," pp. 366-368; Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," p. 267.

²⁰ G. A. Haarlem, *Archief van het Brouwersgilde*, #40, 3, 5.

²¹ Hallema and Emmens, *Het bier en zijn brouwers*, p. 136; Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 16; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 40-43.

²² G. A. Haarlem, *Archief van het Brouwersgilde*, #29.

though there were still small producers around production was dominated by large scale brewing and large scale brewers.

The big brewers at Gouda fumed under the restriction to brewing just twice a week and brewing no more than 31 barrels at a time. The argument for a change, up to 40 or 41 barrels, was the need to compete in export markets such as Dunkirk. The grain shortage and accompanying high prices in 1539 perhaps tipped the balance in favor of larger and, by definition, weaker brews. In 1540 the brewers did get an increase to 41 barrels but were limited to brewing no more than 75 times per year or 1.4 per week in 1540. The average frequency was, in fact, just 1.1. The arguments opposing the change by the 48 of the some 120 brewers in the town who were the only ones to give evidence, were that small brewers would be driven out of business as bigger operators lowered their costs, the quality of beer would decrease as access to good water and adequate grain supplies would be harder, the total volume of production and by implication the amount of tax money collected would go down, and incomes of suppliers like coopers would fall. The small operators said that 50% of brewers would be driven out of business. The reason the change was made, despite the strong opposition, was the decline in the industry. Allowing the scale to increase was an effort to make Gouda more competitive.

In 1546 Gouda petitioned Charles V for the right to increase the number of brews and the size of the brew. The town said restrictions were ruining the trade. It pointed to the greater freedom of brewers at Delft, Leiden and Rotterdam. It also noted that in those towns there were other industries such as textiles or the herring fishery to compensate for problems in brewing, but Gouda had really only one industry. In effect the town asked that brewers be able to brew as much as they wanted and as frequently as they wanted so long as the beer was good. The response from some brewers was that already the limit of 75 brewings allowed per year was rarely reached and the usual number was more like 40 or 41. Freedom to produce at any level would drive, they said, smaller, poorer brewers out of business. The petitions led the crown to investigate the frequency of brewing. It turned out that many brewers did not reach the upper limit on how often they brewed. Back in 1480, though brewers could make beer as often as 112 times each year, the average was 69. By 1544-1545 the average number of brews each year had dropped to 57. This was a sign that the upper limit was being tested by a small number of brewers, and there were many brewing only a few times each year. At Haarlem the average was a much higher, 89, indicating the typically larger scale of brewing there, the greater concentration by that date on exports and the greater prosperity of the Haarlem industry. In 1546 the government at Brussels responded to the request from Gouda. The unique position of the town was recognized. Other towns such as Delft, Leiden and Rotterdam

had prosperous brewing industries and so, until some general policy on brewing could be developed, the government would make some special arrangement for Gouda. Despite the positive language, the limits remained at 41 barrels and a maximum of 75 brews a year, the rule set down in 1540. By 1548 the number of brewers had fallen by more than 50% since 1540 from 97 to 45 and the average was up to 1.7 brewings per week.²³ Just a small increase in the amount brewers could produce at any one time had the predicted result. A number of larger brewers must have already reached the new and increased limits on production within a decade after the change, driving smaller ones out of the trade.

At Dordrecht, even with a relatively small industry, the trend toward concentration was if anything more clear. By 1572 some brewers made as many as 67 barrels each time they brewed. There were commercial brewers producing only 25 barrels at a time, even though presumably they were capable of making more. No less than 53% of all barrels produced came from brews of 60 barrels or more. Less than 10% of the barrels produced came from brews of less than 30 barrels.²⁴

At Delft as part of the reforms of 1549 the limit on brewing had been set at 41 barrels for each brew and the maximum of brewing at twice in one week. The option of brewing 82 barrels at a time but at most only once a week was included. By 1551 that had already been changed to a maximum which could be produced in any one house so brewers could make more beer if it was done at multiple sites. Price fixing was also abandoned. The result was that small brewers were driven out of business. In 1552 those lesser producers asked for and got a tax on beer made by a brewer not in his own house as well as a prohibition of a brewer holding an interest in more than one brewery. Earlier legislation in the sixteenth century had prohibited brewing in a house unless the brewer owned it or had leased it for a minimum of one year and the new rule reaffirmed that earlier practice. The 1552 legislation was renewed in 1562. The problem was that there were brewers with the capacity to go well beyond the traditional limit of 41 barrels per brew.²⁵ The maximum annual production was raised 6% in 1564 and inexpensive small or ship's beer was no longer included in the basic limit but given a new quota which could add another 30% to a brewer's total output. Going over the limit brought a heavy fine. The smaller brewers tried to get the 1564 increases overturned but in 1566 the courts reaffirmed the raised limits. It seems doubtful that the town enforced the rules with any vigor so even the maxima set

²³ A. R., *Papiers de l'Etat et de l'Audience*, 1665/1; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 63-70, 202; Pinkse, "Het Goudse Kuitbier...," pp. 102-103.

²⁴ A. R. A., *Het Archief der Rekenkamer te Auditie*, #329.

²⁵ G. A. Delft, *Eerste Afdeling*, #954; Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 711-713; Timmer, "Grepren uit de geschiedenis der Delftsche brouwning," pp. 360-361; Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," pp. 267-268.

in the legislation may understate what actually came out of the breweries. By 1572 the anticipated average size of brew was 45 barrels. In 1592 Delft even allowed two, three or more breweries to join together in producing beer. There is every indication that it was the bigger brewers that prospered at Delft in the second half of the sixteenth century.²⁶

The tendency in production and in legislation clearly favored larger brewers. The restrictions on large scale operations made by the government in Brussels in 1550 were part of both an effort by that government to gain greater control over the finances of Delft and an effort on the part of some citizens to unseat big brewers from positions of power in the local government. It appeared in 1550 that intervention by Brussels had broken the power of the big brewers. Their replacements were immediately accused of incompetence and misdeeds. Gradually those new men were driven from office. The stringency of rules on brewing weakened and by 1560 big brewers were back among the senior magistrates of the town. The effort by the central government to intervene proved an abject failure as did the efforts to limit the growth in the size of brewing firms. With the success of the Revolt came the end of any efforts to limit the size of the brew. The new government dropped careful regulation of brewing. During the Republic, that is down to 1795, Holland made no effort to limit the size of brews, the frequency of brewing or the composition of grains used to make beer. Many towns slackened their efforts as well so that the industry was freer than it had been in the fifteenth and much of the sixteenth century. The more lax regimen worked to the advantage of larger brewers, though they did not have it all their own way. Delft at the end of the sixteenth century proposed to the Estates of Holland that the tax of 2 stuivers/barrel be replaced by a charge of 3 guilders for each brew. Taxes of the latter sort were well known in towns but the shift to a standard figure for each brew would have favored larger breweries with higher output for each brewing. The Delft suggestion was not followed and the charge for each barrel continued.²⁷

The rules on limiting brewing were broken or, more commonly if they were too restrictive, simply fell out of use. By the eighteenth century virtually every-

²⁶ A. R. A., *Het Archief der Rekenkamer te Auditie*, #332; G. A. Delft, *Eerste Afdeling*, #956; Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 714-720; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," pp. 368-372; Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," p. 268.

²⁷ Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 728-729; Timmer, "De Impost op de Gijlbieren...," pp. 367-369; Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," pp. 269-277; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 173; Yntema, "Een kapitale nering De brouwindustrie in Holland tussen 1500 en 1800," pp. 74-75.

where the limitations and restrictions were dropped entirely. Bigger brewers expanded the scope of their operation and integrated their operations horizontally as well as vertically. They acquired smaller breweries, usually to increase capacity but also in a number of cases to acquire a larger production quota. They sold beer at retail in their breweries, built and operated their own malteries and became grain merchants, getting some influence on the supply and price of their principal raw material. Through the sixteenth century governments, both comital and urban, found themselves more interested in improving their tax income than in protecting small brewers. The decline in the number of brewers can be attributed largely to the increasing size of brew kettles and the increasing scale of brewing operations. Smaller brewers were always at a disadvantage because successful businessmen were the source of personnel for town governments and the big brewers were therefore likely candidates. By the mid fifteenth century, a brewer of Leiden could become a mayor. The collection of excise taxes was typically auctioned in towns, and brewers often found it highly profitable to buy the right to collect the beer excise. There was no perceived problem in combining politics with his trade and there were real advantages to the brewer. The cooperation between government and brewers to increase public income had already in the fifteenth century led to a merging of the profession and public power. By early in the sixteenth century the most successful brewers joined well-to-do townsmen in being able to afford commissioning portraits of themselves and their wives.²⁸

This trend affected not only brewers in the sixteenth century. Many towns faced the issue of whether or not to protect smaller producers, more closely tied to handicraft traditions, against the onslaught of larger, better organized and better capitalized producers. Most towns, as with brewing, tended to side with the growing, expanding producers who brought potential for greater income for the town and the benefits that went with economic development. At least in one case in the textile industry the town of Lille refused to join the stampede and the government defended the smaller producers. When the Revolt against Spanish rule came, the town remained loyal to Philip II. The industrial policy appears to have led large numbers of workers and small entrepreneurs to support the existing urban government. In places where governments had offered little protection, the call for a change and for support of the rebellion proved more popular.²⁹ In Holland in brewing towns the comital government fought a rearguard action against the larger brewers, often with little enthusiasm. In fact, the cen-

²⁸ Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 54; Pinkse, "Het Goudse Kuitbier...", p. 121; Prevenier and Blockmans, *The Burgundian Netherlands*, p. 178.

²⁹ DuPlessis, *Lille and the Dutch Revolt...*, pp. 313-320.



10. Cornelis Engebrechtsz., portrait of Dirc Ottenz. at age 42, oil on wood, 1520. His brewery on the Gangetje is in the background. Grain is being raised to the third story or loft where presumably it was malted. He was involved in the textile trade as well and at the time his portrait was painted he was one of the mayors of Leiden.

Source: Koninklijke Musea voor Schone Kunsten van België, Brussels.

tralizing government could be seen by smaller producers as being in league with the bigger brewers. Whatever the political costs might be and whatever the efforts of smaller producers through petitions and court suits to slow the trend, governments permitted the growth of big brewers. Even after the Revolt and after the seven provinces in the North declared their independence from the king of Spain, governments continued to allow and more than ever promoted growth in the scale of the industry. The pressing need for funds to fight the war against Spain, the discovery made in the 1540s that excise taxes, especially on beer, could be a sizeable and novel source of funds for the county, the willingness of brewers to seize opportunities to exploit their fixed investment more fully, all contributed to the continuing expansion of brewing firms.

Government regulation was always an integral part of brewing. In Holland up to the Revolt the role of government in brewing expanded. Towns generated increasingly elaborate structures to oversee the beer trade. Regulation of brewing was difficult because the product was not susceptible to standardization. Using the same quantities of ingredients and the same procedures during manufacture did not guarantee a uniform product. In 1564, Philip II made a grant to the city fathers of Delft to set any rules for the industry they liked, so long as they did not violate his own. When making the grant he acknowledged that bylaws on brewing in the past had both helped and hindered the brewing industry. There was a continuing tension among brewers over regulation and a continuing tension between local particularism and interregional and intraregional regulation.³⁰ Brewers were caught in the conflict and played their parts on different sides.

Towns wanted to support and promote their own industry so urban legislation was frequently directed at hindering competition from other towns. That led to conflict among authorities. In one obvious case of protection towns ran into no opposition, that is except from consumers. Towns made longstanding and repeated efforts to prevent competition from brewers in the countryside. Drinking outside the walls predated 1450 but the problem, as towns and urban brewers perceived it, became acute as the fifteenth century wore on. In the early sixteenth century agitation against rural brewers increased until, in 1531, the government of the Low Countries took definite action. The idea behind the new legislation was clear, its effect less than perfect.

Rural brewers could not produce the same quantities or quality of beer as their urban counterparts in the fourteenth century. But in the fifteenth as their skills increased and as urban taxes on beer went up, small establishments outside the

³⁰ G. A. Delft, *Eerste Afdeling*, #955; Egmond, "De Strijd om het dagelijks bier Brouwerijen....," p. 153.

city walls beyond the reach of the tax collector, offered drinkers a less expensive alternative. Rural producers did not have to pay taxes and rural property was less expensive as well. Duke Philip the Good said that costs were 40% less in the country for beer of the same strength. In 1464 violence broke out when 's Hertogenbosch brewers tried to keep out beer from a nearby village. The Duke reacted, fixing prices and imposing the same level of tax on all brewers to put an end to the fighting and murder. In 1413 Amsterdam prohibited brewing in the area around the town for a distance of a quarter mile (1.625 kilometers). In 1452, since many younger men were going outside the town to drink, Duke Philip required that any beer or wine drunk within that quarter mile of the town had to pay civic excise taxes. Exception was made for two religious houses. A member of the town government even got fined in 1495 under provisions of the rules.³¹ Other towns had similar restrictions to prevent *buytendrincken*, drinking outside the town, but the effectiveness of the restrictions was limited. The right of towns to prohibit industrial activity in an area close to them dated back to a tenth century edict.³² Citizens going outside the town to drink deprived towns of the income from excise taxes on consumption. The presence of breweries in the countryside made such drinking more likely, but also denied urban brewers a potentially lucrative market. The town's right to limit brewing in nearby villages was not in doubt but their ability to do so always was.

Towns usually tried to prevent the setting up of taverns within 500 roden (5 kilometers) of the town walls or at least claimed that they could collect excise taxes at any tavern in the zone around the town, that from 1494. A 1451 rule which had put the tax collectors' reach at 200 roden (2 kilometers) proved ineffective. Taverns simply moved just beyond the limit and the limit followed them 43 years later. Hoorn got a specific prohibition from Duke Philip the Fair in 1498 against the sale of beer or wine within 500 roden (5 kilometers) of the town. The grant was designed to stem impoverishment of her finances after a fire had destroyed one-third of the town.³³ Even with laws against infringing those limits rural brewers still operated close to towns. New bylaws at Haarlem in 1501 were directed at stopping the decline of the industry, but customers went in greater numbers than ever to drink outside. The village of Heemstede, next to Haarlem, had 15 bars in 1524

³¹ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, pp. 24-25; N. H. L. van den Heuvel, *De ambachtsgilden van 's-Hertogenbosch voor 1629* (Utrecht, 1946), pp. 416-417; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, pp. 18, 171-172; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 12; P. Scheltema, *Inventaris van het Amsterdamsche Archief* (Amsterdam, 1866-1874), 1, pp. 76-77; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenis...*, 8, p. 227.

³² Brünner, *De order op de buitennering van 1531*, p. 131; Hoffmann, *5000 Jahre Bier*, p. 63.

³³ G. A. Hoorn, #98[2713]; Marle, *Hoorn au Moyen-Age*, pp. viii-x.

and 11 of those were within the restricted zone. Leiderdorp, a village just outside Leiden, at about the same time had 27 ale sellers. Some produced their own beer but a number sold beer brewed in Delft, another thing to vex Leiden brewers.³⁴

Towns complained repeatedly about brewers setting up alehouses just beyond the limits of town jurisdiction to avoid tax, as in 1515 when they petitioned Charles V. Towns also did not like monasteries which apparently sold off surplus production, in competition with urban brewers. The argument often made was that the public purse was a great loser. The failure of the 1515 petition led towns to try different measures of their own to get taxes on beer consumption to apply in the countryside. In 1515, renewed in 1522, Dordrecht made an arrangement with Charles V so that there would be an excise on beer drunk in local villages. Half went to the town and half to the comital government.³⁵ In 1525 the towns offered a payment of 100,000 pounds to the States of Holland for a blanket prohibition on brewing in the countryside and in cloisters. The proposal was studied. In 1529 the towns did get a prohibition against the setting up of any new breweries in the countryside without permission of the nearest town and also the breaking up of any existing breweries. Requests for more restrictions followed in 1529 and 1530.

In 1531 the county government finally issued a lengthy regulation of all rural industry. The towns promised to make a single lump sum payment of 100,000 guilders if the new regulation came into effect. Among many other provisions there were to be no new breweries in the countryside and no alehouses within 600 roden (6 kilometers) of a town. Town for the purposes of the legislation meant any place with both town rights and town walls. The Hague did not qualify but was added to the list which included all the major and some of the minor towns of the county. Delft would argue later that The Hague was in the countryside and so should not be allowed to have industries.³⁶ The Hague was not walled and so lacked an essential defining element for a town. The order obviously did not work because in 1540 and 1541 Leiden asked the government to shut down alehouses in the countryside. In 1545 Dordrecht went to court to try to impose excise collection on beer sales in certain villages close to the walls, falling back on old privileges to argue their case.³⁷ It appears that town efforts to stop rural brewing or at least to get country brewers to pay excise taxes were

³⁴ Brünner, *De order op de buitennering van 1531*, pp. 98-101, 131, 151; Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 32.

³⁵ G. A. Dordrecht, *Archief der Gemeente Dordrecht, De Grafelijke Tijd, 1200-1572: Mandament van de Roomsche keizer...*, #395.

³⁶ G. A. Delft, *Eerste Afdeling*, #971; Brünner, *De order op de buitennering van 1531*, pp. 67, 77-78, 97-98, 104-107, 112-113, 118-121, 126-128; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 25; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 27.

³⁷ G. A. Dordrecht, *De Grafelijke Tijd 1200-1572*, #400.

doomed to failure. The government did not enforce the law vigorously and the towns found it hard to win judgements in the courts based on the 1531 law.

Lords in the countryside resisted the expansion of town power and with that the reach of the urban tax collector. In 1515 in order to avoid a court suit landowners in the area around Dordrecht agreed to get their beer from the town, paying excise on it. The town took to court a few who got beer from villages for village drinkers and also took to court shippers who took beer from places other than Dordrecht to villages in what the town considered a protected market.³⁸ Haarlem went so far in 1545 as to agree to an annual payment of 200 guilders to the Lord of Heemstede, in exchange for which he would prohibit the establishment of any new breweries on his lands. Lords had made such accommodations with Haarlem and with Leiden since the 1520s. The lords insisted they needed compensation for lost revenues if the breweries shut down or if the town collected excise taxes in the alehouses on their lands. In 1540, Leiden again negotiated the matter with the lords of Leiderdorp and Zoeterwoude, the discussions being complicated by the presence of brick making, lime burning and other industries in the lordships which the town wanted to promote and wanted to supply the workers there with beer. The compromise was that the industries would get a fixed quantity of beer, and the lord would get a fixed cash payment. Only four alehouses would remain, and they would have to pay excise on sales of beer. The 1540 agreement was superseded in 1547 and the number of permitted taverns rose to 13.³⁹

When the towns managed to extend regulations then brewers just moved a few more meters further away from the town limits. After 1543 towns increasingly turned to using their own charters as a basis for challenging rural industry and it fell to the largest towns to carry the effort through the courts. The number of cases appears to have decreased which suggests that towns possibly won a partial victory and could limit, although not eradicate, the competition of rural brewers. Towns also had mixed success with trying to impose excise taxes on the consumption of beer within a fixed distance of their walls. Country taverns were centers of drunkenness and disorder, sites where there were fights and murders, according to petitions of 1539 to Charles V. What is more, all kinds of dangerous people, including Lutherans and Mennonites, made rural inns their meeting places, all the more reason to try to keep up prices on beer in the countryside and make sure that taxes were imposed.⁴⁰ Such stories about rural drinking

³⁸ G. A. Dordrecht, *De Grafelijke Tijd 1200-1572*, #411, #412, #591.

³⁹ Brünner, *De order op de buitennering van 1531*, pp. 79, 99-101, 147-148, 153-154, 164-170; Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 33.

⁴⁰ Brünner, *De order op de buitennering van 1531*, pp. 164-166, 181-186; Timmer, "Delftsche bierconflicten," p. 120.

places were standard because even in the 1640s when Amersfoort was having trouble with a country inn and strongly forbidding citizens to visit it the town claimed that inns in that village had always been gathering places for thieves, whores, branded criminals and all kinds of disreputable people.⁴¹ Rotterdam had a grant from 1412 which prohibited brewing in the area nearby, but the town had made grants over the years to taverns to operate within the set limit. So long as they were within the control of the town, such rural inns seem to have been acceptable. Rotterdam renewed permission for those pubs to exist as late as 1643.⁴²

In about 1542, Dordrecht again requested a reaffirmation from the count of a 1520 ruling which let the town charge excise in villages close to the town. The petition proved a strange conglomeration of the moral, legal and practical, all with the aim of getting recognition of the power to tax. Earlier that year villagers had claimed in court that they enjoyed tax freedom, but they lost the case. The villagers' subsequent resistance was the occasion for the petition.⁴³ Dordrecht in 1580 went back to the government of Holland in the person of Philip II to get a grant of taxing power within the limited distance of one half mile of the town. That included four nearby villages where drinking appears to have been popular. Visitors, it was claimed, took the ferry across the river to a small village where they bought wine and beer. This hurt the business of the innkeepers where the travellers stayed but also hurt the war effort against the rebels. After Dordrecht joined the rebels, the different government renewed taxing powers within a half mile of the town.⁴⁴ The town continued to charge an excise on beer in all villages within two miles of the town and in a number of specified villages beyond that limit through the seventeenth and in the eighteenth century as well. The tax was farmed and the tax farmer must have enjoyed even less popularity than his urban counterparts. The towns' interest was, as in Dordrecht, to protect their own brewing and brewers and to protect their income. That income could be substantial. In twelve months in 1614 and 1615 the excise tax which Leiden levied on beer in nearby villages, including Leiderdorp, added 45% to the receipts from excise charged on beer in town.⁴⁵

⁴¹ van Rootselaar, *Amersfoort, Sprokkelingen*, LXXXIV, XCV, CLXXII-CLXXXVII.

⁴² W. G. D. Murray, "Oud-Rotterdamsch Kroegleven," *Rotterdamsche Jaarboekje*, fifth series, 2 (1944), p. 44.

⁴³ G. A. Dordrecht, *De Grafelijke Tijd 1200-1572*, #413, #414.

⁴⁴ G. A. Dordrecht, *De Grafelijke Tijd 1200-1572*, *Keur- en Handvestboeken*, #24; Alleblas, "Nieuw Leven in een Oud Brouwerij...", p. 1; Pieter Hendrik van de Wall, *Handvesten en Privilegien der Stad Dordrecht* (Dordrecht, 1790), p. 1487.

⁴⁵ G. A. Dordrecht, *Archief der Gemeente Dordrecht 1572-1795*, #3782-#3809; G. A. Leiden, *Archieven van der Gilden*, #292.



11. Adriaen Brouwer, innkeeper, Bode 67, oil on canvas, c. 1630. This is one of the many tavern scenes done by this artist who, though born in Flanders had some of his most productive years while living in Haarlem. Drinking and fighting and the general ugliness of the scene are complemented by signs of dissipation. The innkeeper sits on an old beer barrel holding a large flagon and does nothing about the disorder. He is tranquil but the moralizing owl above him points to his failure to control the chaos created by drink.
Source: Bayerische Staatsgemäldesammlungen, Munich.



12. Adriaen van Ostade, a country inn with farmers dancing, smoking and drinking, watercolour on paper, before 1685. A man, left centre, drinks beer from a long narrow “pipe glass.” Van Ostade and other members of the Haarlem school painted many scenes of rustics in festive moods. Though influenced by Adriaen Brouwer, van Ostade’s view of peasants, peasant life and so also of the drinking of beer was much more positive than the older painter.
Source: Amsterdams Historisch Museum, A10235

Concern was for tax income but also for the social life and political position of towns in general. In 1612 a report to the States of Holland urged the closing of rural beer-sellers and breweries in the extreme north of Holland since people were staying away from Alkmaar as a result and the town was suffering. Drinking in village taverns always meant money diverted from town coffers. The States of Holland declared in 1620 that no one could sell beer in towns or the countryside until and unless the individual was granted permission by the local magistrate and had taken an oath which had to be repeated annually.⁴⁶ In 1663 Amsterdam civic authorities were faced again with the question of selling beer in the countryside around the town. The matter had not come up since 1539 and nothing had been done to stop it. The government set up a commission to look into the matter and nothing more was ever heard on the topic.⁴⁷ Legislation may have gone away but the problem did not.

Towns had to be vigilant of competition from the countryside. If the towns like Leiden and Amsterdam did gain the upper hand in the end it was only because they pressed to the limits their authority, appealed to higher authorities for assistance, and were willing to turn a blind eye now and again. The results in Holland from late in the sixteenth century indicate that rural brewers may have lost each battle with the towns but they never truly lost the war. The struggle carried on, ending only after 1795 with the transformation of the entire structure of government and with it taxation in Holland and the Dutch Republic.

Free of tax and unregulated, the rural brewers left no record of their operations. Towns imported beer from some villages, but that too often escaped record keepers. Any decline in urban beer consumption indicated by excise tax data may not be real but rather the indication of a shift to the lower-priced beers of nearby villages in the late fifteenth and sixteenth centuries.⁴⁸ The complaints and court suits indicate rural brewing did make inroads into the urban market. How large a share country brewers enjoyed is impossible to estimate. The ability of urban brewers to gain government support as well as some sparse tax data and some anecdotal evidence all indicate that brewers in towns everywhere remained much the larger producers.

The universal desire to protect the local brewing industry in the sixteenth century usually led simply to charging higher excise taxes on the consumption of imported beer. The argument was that local brewers had already paid excise tax

⁴⁶ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1760-1763 [1620]; van Deursen, *Plain Lives in a Golden Age*, p. 18.

⁴⁷ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1519, 713, n. 2.

⁴⁸ Soly, "De Brouwerijenonderneming van Gilbert van Schoonbeke (1552-1562)," p. 348; van der Wee, *The Growth of the Antwerp Market...*, 2, p. 99.

on production, so the higher consumption excises on imports made competition among beers more equal. One abiding division that reappeared in dispute after dispute in Holland was that between exporting towns, like Delft, Haarlem and Gouda, on the one hand which favoured free trade, cheap transportation including freedom from tolls and an absence of import restrictions, and importing towns on the other hand which favoured price controls, oversight of the quality of beer and protection of their own brewers. All parties agreed though that they wanted to get as close to a monopoly as they possibly could in any market whether it be their own or in another town. The government of the county and the courts could grant both free trade and specific restrictive privileges, despite the seeming contradiction. The conflicting desires of protection and promotion of exports led to protracted political struggles within Holland. Holland towns had a good deal of political independence and typically enjoyed the power to levy taxes. That meant they could protect their own industries and in the fifteenth and sixteenth centuries sympathetic superior authorities were at times willing to support urban protectionist urges.

If the circumstances of the brewing industry turned truly bad then towns could resort to temporary embargoes on all imported beer.⁴⁹ Such restrictions were never expected to last and so did not draw the ire of other towns. There could be, without much fear of political reprisal, long term heavy taxes on English and German beers. Those imports were common targets of very high rates of excise. Amersfoort beer threatened brewers in Holland towns since it entered the county free of duty, that is on the payment of an annual lump sum to the count. Amersfoort feared its beer might be treated as were beers from German Hanse towns and so heavily taxed at rates which the quality of Amersfoort beer could not sustain. In 1531 Amersfoort got from Charles V a ruling that their beer was not to be treated like that from the Baltic but rather like that from any town in Holland. The ordinance, to which the States of Holland agreed, was a repetition of a ruling of 1523⁵⁰ and suggested that Amersfoort had to be vigilant to maintain its privilege. The same was true among towns in Holland.

In 1508, Gouda received a grant, repeated in 1518, that its beer would not be taxed at a rate higher than local double or better quality beers in any other Holland town. Objections, especially from Haarlem which had to face stiffer competition in its traditional export markets in north Holland, did not sway the government or the courts. Despite the efforts of Gouda, efforts which included going to court to protect the privilege, its double beer was driven out of markets in Flanders and elsewhere. Towns imposed excise taxes, despite the law, or invented

⁴⁹ G. A. Veere, #311, fol. 157r.

⁵⁰ G. A. Amersfoort, #733.

new taxes on beer imports from Gouda. Enforcing grants of tax advantage in the face of the protectionist tendencies of town governments proved difficult. Charles V gave the extension in 1518 because of the deterioration in the quality of Gouda beer which had hurt exports and therefore the industry on which the town so much depended. Charles V blamed the officers of the Gouda brewers' guild for the decline in quality and so had them removed and replaced by retired brewers. New, more stringent rules on brewing were imposed to bring back the good old days. The quantity of beer that could be produced from a single brew was strictly limited and even suspicion of violation was enough to bring officials down on the most respected and well-established of brewers. Cases could drag on in the courts for some time. Prosecution may not have always been inspired solely by a desire to maintain the quality of beer. Enforcing the rules might open the possibility of venting some personal animosity of long standing⁵¹.

Delft was always a great exporter of beer within Holland and beyond the county. In Haarlem there was even a canal called the Delft, the site where boats would wait to carry Delft beer to north Holland and Friesland. Delft beer was so successful that Haarlem brewers tried to imitate it and brought a Delft beer worker to the town in 1549 to teach them how to make beer in the Delft style.⁵² Though the experiment did not work, it showed the respect enjoyed by Delft beer. It also helps to explain why Delft wanted to stop any protectionist measures against its beer. Delft received a grant from William of Bavaria, the Count of Holland, in 1411 that her beer would never be subject to greater tax than locally produced beer in any other towns in Holland and Zeeland. Maximilian of Hapsburg and Charles V renewed the law a number of times. Delft was a most vigorous defender of that legislation, and often complained to the Count or went to court to have excise taxes changed. Two cases in 1515 between Delft and Dordrecht suggest that Delft brewers tried to use the legislation to their advantage. They invaded the traditional markets of other towns and used low quality beer to that end. Dordrecht was not above going to court itself, as in 1522, to protect its right to be the exclusive supplier of beer in the area just around the town. Delft complained vigorously about such violation of the 1411 rules on equal access to markets. Dordrecht repeatedly reminded consumers in the area that they had to buy their beer in Dordrecht. A decision in 1549 to free those living nearby from that requirement led Dordrecht to press the case more enthusiastically, both politically and in the courts.⁵³ In 1519

⁵¹ Brünner, *De order op de buitennering van 1531*, pp. 92-94; Egmond, "De Strijd om het dagelijks bier Brouwerijen...", pp. 166-184.

⁵² Bleyswijck, *Beschryvinge der Stadt Delft*, p. 791; Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 33.

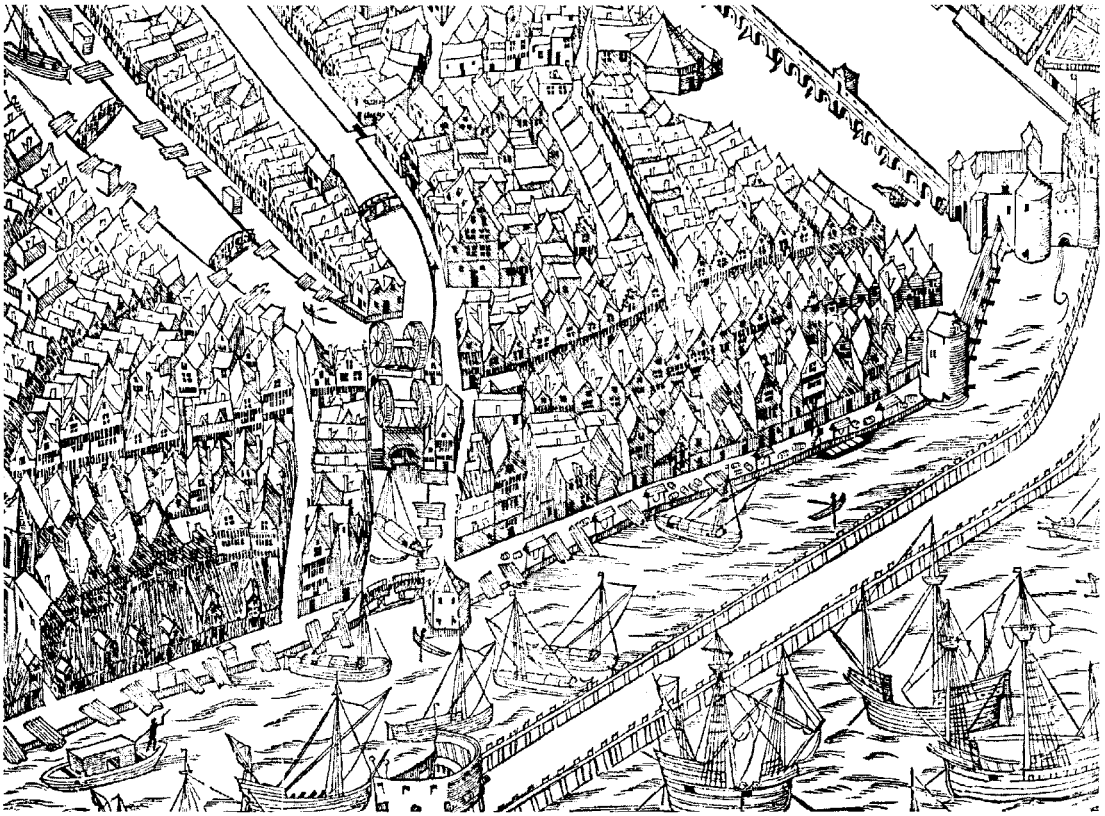
⁵³ G. A. Delft, *Eerste Afdeling*, #1921; G. A. Dordrecht, *De Grafelijke Tijd 1200-1572*, #396 [1515], #403 [1562], #408, #409, #592.

Delft, along with Gouda, approached Charles V for a ruling that their beer be taxed at no higher a level than locally brewed beer in any town in Holland. They wanted a restatement of the 1411 principle and their petition succeeded. A 1537 charter from the Emperor, gotten presumably at some expense, gave Delft a renewal of the privilege and said that Delft beer should not be taxed more heavily than any other beer in Brabant, as was already the practice in Holland, or in any of Charles V's patrimonial lands. The reason given was that a fire in 1536 had devastated half of Delft so its principal industry needed help. Delft did get a reduction in the tax it owed the count, the reduction being used to reduce the burden on beer.⁵⁴ Still Delft was as worried by the possibility of other towns raising the tax on its beer or lowering the excise on beer and forgetting to include Delft beer in the reduction. Leiden was one of Delft's special targets since Leiden charged a higher excise on beer brewed elsewhere in Holland than on beer brewed in the town. As early as 1470 and again in 1472 Delft, in the latter case along with Gouda and Haarlem, complained and insisted Leiden change the tax rates. The three towns went to court but whatever the *Hof van Holland* decided, Leiden did not make a change. In 1524 Delft wrote to Leiden and complained that not only they but also other Holland towns such as Dordrecht, Haarlem, Amsterdam, and Rotterdam were displeased with the tax regime. The Delft government was blunt and said it feared that if Leiden could discriminate against non-native beer, other towns would do the same. An agreement in that year with Delft levelled the prices and taxes of other Holland and local beer, but in 1544 Leiden was having a dispute with Delft again. Leiden came to negotiations armed with an open letter from Dordrecht that pointed out that in their town, Delft beer was subject to a higher rate of excise than local beer.⁵⁵

The result was another agreement similar to the earlier one. Despite that, in 1575 Delft again asked that the discriminatory tax be lifted. This request came amid accusations that Leiden brewers bought Delft beer, put it in their own casks and claimed it to be Leiden beer in order to have a lower rate of tax charged. Delft even asked the Prince of Orange to force Leiden to eliminate the sizeable 10 stuiver surcharge on beer brewed outside the town. In the midst of the struggle with Spain, the leader of the Revolt decided that it was best to stay out of the fight. The towns, he said, should deal with the matter in the States General of the new Union. A report made to the town government of Leiden in 1606 said

⁵⁴ Br  nner, *De order op de buitennering van 1531*, p. 84; Scheltema, *Inventaris van het Amsterdamsche Archief*, 1, pp. 146-147; Woltjer, "Een Hollands stadsbestuur in het midden van de 16e eeuw: brouwers en bestuurders te Delft," pp. 276-277.

⁵⁵ G. A. Delft, *Eerste Afdeling*, #949; G. A. Leiden, *Archief der Secretaire 1253-1575*, #976, #977; Marsilje, *Het financi  le beleid van Leiden in de Laat-Beierse en Bourgondische periode 1390-1477*, p. 270; Timmer, "Delftsche bierconflicten," pp. 113-115.



13. The highly detailed bird's-eye view of Amsterdam by Cornelis Anthonisz. done in 1546 included many breweries that can be identified. In the lower right, in a neighbourhood that would later be the centre of the industry, the fourth house to the left of the tower has a crane in front next to the protective roof at the anchorage, a sure sign of a brewery.
Source: see S. A. C. Dudok van Heel, "Vroege Brouwerijen aan de Amstel in de Vijftiende en Zestiende Eeuw," *Amstelodamum, Jaarboek* 28 (1990), 23-74.

that even in 1589 Delft complained about its beer being heavily taxed, but Leiden did not consider the complaint important. In 1596 there was yet another agreement between Leiden and Delft in response to complaints from Delft and once again Leiden promised the excise on Delft beer would be the same as on locally brewed beer.⁵⁶

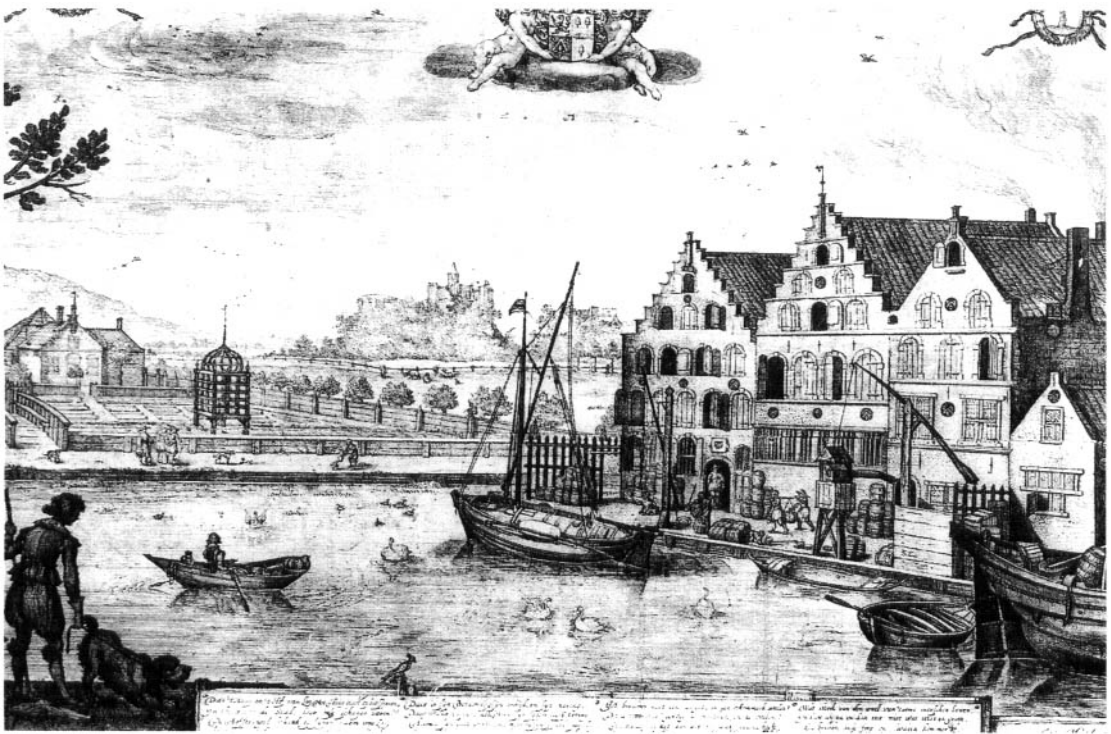
The discussions, negotiations and court fights were lengthy, time consuming and presumably expensive. Delft did win some of the battles so the struggles could pay off. In 1558 Delft took the town of Alkmaar to court because of a prohibition of the import of beer from elsewhere in Holland. The 1536 charter on equal treatment of Delft beer was cited. Alkmaar argued that their own town charter dating to 1254 gave them the power to make laws. The *Groote Raad* at Mechelen in 1560 ruled that Alkmaar did have the right to make law but could not in this case contravene the rule made for Holland so Delft won and its beer could be sold in Alkmaar. A 1578 request by Delft brewers to be relieved of paying a surtax when they sold their beer in Amsterdam fell on deaf ears, however. Amsterdam brewers were free of that tax, the judges said, because their barrel was larger than the Delft one and so they had to pay more for water and for milling charges than their Delft colleagues. The court ruled the surtax on Delft beer was justified and it stayed.⁵⁷

When in 1600 Delft said it would not pay the two stuiver per barrel Holland-wide tax on beer before it was fermented, Rotterdam immediately imposed the tax on beer imported from Delft, claiming that otherwise Delft beer would enjoy an unfair advantage. Delft claimed the act was in violation of the 1411 grant and the renewal of 1537. An earlier effort by the small town of Gorinchem along the same lines in 1580 ended in a victory for Delft, so there was every expectation that the town would win again.⁵⁸ In 1604 Rotterdam and Hoorn were still charging that additional two stuivers on each barrel of Delft beer, even though by then Delft brewers were paying the sum at home. Delft approached the other towns and when their requests for equity were not met, Delft went to court. The Rotterdam market was of special interest to Delft. It was so close by, and Rotterdam brewers were at that point able to supply less than 20% of demand in the town. The *Hof van Holland* decided in favor of Delft. Once the court had ruled against Rotterdam, Delft negotiated an end to the double charges at Hoorn, Dordrecht,

⁵⁶ G. A. Delft, Eerste Afdeling, #962; G. A. Leiden, Secretaire Archief na 1575, #4333, #4337, fol. 26r; Timmer, "Delftsche bierconflicten," pp. 126-127.

⁵⁷ G. A. Delft, Eerste Afdeling, #953; G. A. Leiden, Archief der Secretaire 1253-1575, #976; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #656; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 16-17; Timmer, "Delftsche bierconflicten," pp. 116-117, 121.

⁵⁸ Timmer, "Delftsche bierconflicten," pp. 123-125, 127.



14. Jacob Matham, *The Brewery The Three Lilies of Johan Claesz. van Loo, Haarlem*, pen drawing on wood, c. 1627. Like all breweries it was on the water. Smoke from the chimneys shows brewing is underway. A boat for bringing water to the brewery sits at the quay which has a number of barrels waiting to be moved. On the left the artist has drawn the country house of the brewery owner along with the formal garden, all some distance from his place of business. The text at the bottom is a song of praise, in rhyme, to Johan Claesz. van Loo.
Source: Frans Halsmuseum, Haarlem

Purmerend, Edam and Medemblik.⁵⁹ That success led Delft to press Amsterdam and an agreement was soon reached there on potentially discriminatory fees on small beer. The next target was Haarlem, but there the matter had already been decided. Haarlem insisted, in 1606 and again in 1609, that they had scrupulously followed the old rules, now reaffirmed by the States General, of equal treatment of all beers in Holland.⁶⁰ When a semblance of peace was restored by the Twelve Year Truce in 1609, Delft did not relax its vigilance. In 1610 Delft brewers complained that cheap imports of beer from the southern Netherlands hurt their industry. In the following year they urged the imposition of a charge on beer coming from Brabant and Flanders since exports of Holland beer to those counties, still under Spanish rule, had to pay a high license fee.⁶¹

Haarlem, like Delft, relied on the 1411 legislation when small towns in north Holland placed higher taxes on Haarlem beer than on their own. Despite complaints in the 1630s and 1640s rates of tax in a number of towns such as Medemblik and Hoorn discriminated in favor of local brewers. Gouda in concert with Delft or sometimes alone also pressed for equal taxation. Gouda went to the *Groote Raad* at Mechelen in 1520 when the Flemish town of Blankenberge put a discriminatory duty on Gouda beer and the court found in favour of Gouda. In the same year Gouda also won a case against Amsterdam which had laid down some price regulations which Gouda thought, and the Court agreed, discriminated against its beer. Gouda succeeded again in 1535 in a case against the village of 's-Heer Arendskerke on the island of Zuid Beveland in Zeeland. The fact that it would press the matter against such a small and even remote village indicates the importance of the principle involved. The village argued that they had been granted the power to fix taxes and, in response to Gouda, said that the Gouda privilege would prevent the emperor from making grants to other jurisdictions. No one should be in a position to limit the power of the central authority so the village argued. Gouda might not like the argument but the *Groote Raad* did and found in favour of 's-Heer Arendskerke.⁶²

More drawn out was a battle between Gouda and the town of Hoorn which began in 1505. Back in 1470 when a brewery was set up at Hoorn, a blanket prohibition against all imports or at least a heavy duty on all imported beers

⁵⁹ G. A. Delft, *Eerste Afdeling*, #968, #969; G. A. Hoorn, #139 [2735].

⁶⁰ G. A. Haarlem, *Archief van het Brouwersgilde*, #87; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #1143.

⁶¹ R. Z., *Het Archief van de Staten van Zeeland en hunne Gecommitteerde Raden 1574-1795*, #3231, 1611; Jonathan I. Israel, *The Dutch Republic and the Hispanic World 1606-1661* (Oxford, 1982), p. 57.

⁶² Egmond, "De Strijd om het dagelijks bier Brouwerijen...", pp. 172-173; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 26.

helped the brewery get established. The funds from the new tax were to go, in part, to maintain the dikes. The reaction to higher prices was sharp and violent. A number of guildsmen from, among others, the weavers, fullers and fishermen went to the town hall and threatened to attack and even kill members of the town council who had petitioned the count for permission and then had imposed the new levies. The demonstrators then went to the market and broke up barrels filled with beer. Only with help from outside could town authorities later apprehend the ringleaders. They were jailed and fined but many workers in the textile industry left rather than face charges against them. In the long run, this led to a dramatic decline in the town's textile industry. In the following year the count acknowledged that the tax rates had been too high. He set taxes on locally produced beer at a low level and postponed the increase on imports until the following year. Even with the concession Hoorn still had, compared to other towns in Holland, high rates of tax.⁶³

Haarlem complained about protection at Hoorn in 1508, but apparently to no avail. Hoorn had by then changed its strategy for supporting the local industry setting a maximum price on Gouda beer sent to the town. In 1507 Gouda asked the courts to set aside such price fixing. Though not strictly about equal access to markets the principle was one of free trade. The arguments made by both sides in the dispute suggest little interest in free trade but great interest in retaining privileges. Gouda did come closer to asking for a free market, claiming the seller should be allowed to charge whatever the market would bear. The court agreed but Hoorn resisted, only after lengthy delays dropping the price maxima and then reinstituting them a year later. A court investigation of the consequences of the price fixing indicated that four or five Gouda breweries supplied the Hoorn market and their closure would lead to the loss of some 10 or 11 jobs. The argument that a Gouda mayor expected would have more effect, though, was that if Hoorn could set a maximum price then other towns would do it. That could threaten not only the prosperity of the some 146 breweries in Gouda but also the four stuivers in direct taxes that came from each brew made by those firms on average twice each week. The response from Hoorn was a weak one, pointing to the need to regulate their own economy and the loss in welfare for the poor. Although there was no clear resolution, in the end Gouda won in that price fixing seems not to have spread.⁶⁴

⁶³ Theodorus Velius, *Chroniëck van Hoorn, Daer in verhaelt werden des selven Stadts eerste begin, opcomen, en gedenckweerdige geschiedenissen, tot op den Jare 1630...*, fourth edition, with additions by Sebastiaan Centen (Hoorn, 1740), pp. 85-93.

⁶⁴ Egmond, "De Strijd om het dagelijks bier Brouwerijen....," pp. 173-178; Marle, *Hoorn au Moyen-Age*, pp. 140-141; Velius, *Chroniëck van Hoorn...*, p. 86, n. 115.

Some forms of protection seem to have been condoned by the Count of Holland, despite the watchful Delft government which challenged so many efforts to protect local industries. The decline in the number of breweries in the sixteenth century led towns to think about raising taxes on imported beers. By the early seventeenth century, the need for protection began to dominate thinking, if not action. The principal form of protection chosen by town was setting favorable rates of excise taxes. They could use those duties because of the elaborate system set up in virtually every town to administer taxes. Protection did not address the more fundamental problems which emerged for the industry in the seventeenth century. For much of the golden age of Dutch brewing producers had to face threats of restriction and to struggle against authorities in order to explore the technical limits of the industry.

CHAPTER SEVEN

GUILDS BEFORE 1620

Brewers' guilds were one among the institutions for regulating brewing. The deep, abiding and unflagging interest towns had in the income which came to them from the sale of beer meant almost universal extensive regulation of brewing, so extensive in some towns that guilds were never formed and brewing remained a free trade. In the others, guilds were slow to form or, when formed, had a limited scale and scope. As a result the criteria for being a brewer had more to do with capital than with technical skill. The lack of some required master status, variable production and the large amounts of capital needed to enter and to continue to operate in the trade created strong possibilities for concentration in a small numbers of firms. There was no pressing need to create guilds¹ yet despite all those factors, through the sixteenth century an increasing number of brewers got guilds or confraternities not only to circumscribe their methods of making and selling beer but also to represent them to public authorities, in towns and in the county and in the States General of the Dutch Republic as well.

The first mention of the brewers' guild at Delft comes from 1340 though the organization disappeared by the end of sixteenth century only to reappear later in the seventeenth. At Dordrecht the brewers' guild had disappeared in the fifteenth century but a new brewers' organization was set up in 1583. The two officers were, at least, brewers and no one could be a brewer in town without being a member of the club. Material from the St. Martin or Brewers' Guild of Haarlem survives from 1459 on and Gouda had a guild in the early sixteenth century though it too would disappear. In 1554 the town of Alkmaar said there would be no new guilds but, following a trend toward increased control of brewing, the brewers got a special dispensation to establish one in 1609. At Enkhuizen in 1646 the new rules for a guild covered only a limited number of topics, but they did extend existing regulations. Leiden had a guild of brewers from 1461. Rotterdam had its Saint Stephen's Guild set up in 1468.² Amsterdam, not a major

¹ Noordegraaf, "Betriebsformen und Arbeitsorganisation im Gewerbe der nördlichen Niederlande 1400-1800," p. 64; Soly, "Nijverheid en kapitalisme te Antwerpen in de 16e eeuw," pp. 345-346.

² G. A. Dordrecht, *Archief van de Gilden*, #957 [1583]; Geeraerd Brandt, *Historie de Vermaerde Zee- en koopstadt Enkhuizen*,... (Enkhuizen, 1666), p. 110; C. W. Bruinvis, *De Alkemaarsche Bedrijfs — en ambachtsgilden* (Haarlem, 1906), p. 5; Jacob Dirks, *De Noord-Nederlandsche Gildepenningen*, two volumes

center of beer making absolutely or relatively until the mid seventeenth century, never got a guild. Brewing was one of the trades like textiles and ropemaking where traditional arrangements continued. In 1613 and again in 1651 officers of the brewers are mentioned but the organization was not active. It was only in 1658 that a permanent brewers' group was set up. In 1673 the Brewers' Society got recognition. It was a producers' organization which bore a great similarity in selection of officers and regulations to a guild. The officers had the same names if not the same functions of those typical in guilds. In 1690, 1693 and 1700, the members petitioned the town to give their society guild status but the petition fell on deaf ears in city hall. The organization proved highly durable, lasting until 1871.³ The society offered little more than social functions and an opportunity to pool capital for the supply of water. The brewers might not have had a guild but the Amsterdam wine sellers, beer retailers, coopers and even the beer porters got guilds in the first half of the sixteenth century.⁴ Clearly, brewers were thought unique.

The establishment of a guild of brewers meant that only members could brew beer. Exercising the trade without being a member of the guild typically brought a heavy fine.⁵ Setting up brewers' guilds was, in a number of instances, part of the general tendency in the fifteenth century to take away the traditional right of brewing enjoyed by all citizens of towns. Only certain individuals or those who owned certain properties or, in the end, those who had been admitted to the guild would be allowed to make beer. Since guilds were ultimately civic institutions, created and legitimized by town governments, their imposition also meant further assertion of urban control over brewing.⁶

and plates (Haarlem, 1878). 1, pp. 171, 214; E. Wiersum, *De Archieven der Rotterdamsche Gilden* (Rotterdam, 1926), p. 4, IV; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 224.

³ Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid, II Bierbrouwerijen," p. 75; van Eeghen, *Inventarissen der Archieven van de Gilden en van het Brouwerscollege*, p. 127; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," pp. 1-2; Ravesteyn, *Onderzoekingen over de Economische en Sociale Ontwikkeling van Amsterdam...*, p. 162; F. A. Schwartz, "De Sociteyt der Brouwers in de XVIIIe Eeuw," *Jaarboek Amstelodamum*, 38 (1941), pp. 67, 70; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 8, p. 230; Richard J. Yntema, "Tot welken der brouwers Gilden en brouwersorganisaties in de 17de en de 18de eeuw," in: *Bier! Geschiedenis van een volksdrank*, R. E. Kistemaker and V. T. van Vilsteren, eds. (Amsterdam, 1994), pp. 118-119.

⁴ Posthumus, *De Uitvoer van Amsterdam 1543-1545*, p. 24.

⁵ G. A. Dordrecht, *Archief van de Gilden*, #931, second; Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 38 [1592].

⁶ Janacek, "Pivoarniectvi v Ceskych Kralovskych Mestech V 16. Stoleti," p. 75; August Löhdefink, *Die Entwicklung der Brauergilde der Stadt Hannover zur heutigen Erwerbsgesellschaft (Ein Beitrag zur Lehre von den Unternehmungen)* (Hannover, 1925), pp. 29, 36.



15. Bartholomeus van der Helst, the militia unit of captain Roelof Bicker in front of the Amsterdam brewery *De Haan*, oil on canvas, 1629. Such group portraits were common in sixteenth and seventeenth century Holland. The owner of the brewery, an officer of the company, stands in the middle of the picture. His future brother-in-law and successor as brewer is third from the right. The brewery was a large and well-known one. The inclusion of this brewing family in the organization demonstrates their prominence and that of brewing in Amsterdam.

Source: Rijksmuseum, Amsterdam

The monopoly of the practice of brewing brought with it the added restriction that those making beer were not to engage in a number of other trades, as at Haarlem. Still a number of options were open. Integration was typically vertical, brewers moving into other phases of the process of assembling the necessary components for a successful brewing operation. Larger brewers, those devoted to producing for export, had long malted their own grain selling part of production to small brewers and other malt users. Brewers in some instances operated taverns. Large exporters could own shares in ships. The most lucrative extension of business activities for brewers, however, was to enter the grain trade. An Amsterdam regulation of 1438 which limited brewing because of a shortage of grain and consequent high prices, required brewers bringing in grain to put it on the market at prevailing prices. The rule suggests that some of them already dealt in grain. If brewers were grain dealers, though, and handled their own supplies, they could plausibly argue that their buying of grain did not affect the supplies for local consumers. Gouda did take the precaution in 1518 of limiting brewers' grain purchases to the afternoon so that other buyers could get whatever they needed first. The general tendency in the sixteenth century was to increase limitations on brewers, and so in effect legislate specialization. The increasing scale and frequency of brewing in the sixteenth century did occupy more of the brewers' time so there was less opportunity to pursue other, related, and usually commercial activities. The 1550 reform of Charles V which set a standard size of brew for all of the Low Countries also prohibited brewers from taking up a second trade.⁷

While documentation for brewers' guilds is almost non-existent for the fifteenth century, it becomes more common in the sixteenth and, as the industry declined in the seventeenth, brewers produced more material which has survived. The records of the guilds indicate a great deal about the internal organization of the societies and the functioning of the trade locally but they report little if anything about the development of individual firms, about business practices within those firms or about the technology of brewing. Since brewers were often prominent in the governments that granted guild rights, they may have thought regulation on techniques was redundant. The groups that formed in the late sixteenth century and the seventeenth were more typically social institutions, less concerned with the practice of the trade than with protecting their declining business through political channels.⁸

⁷ Bijlsma, "Rotterdams Welvaren in den Spaanschen Tijd," p. 78; Clement, "De Bierbrouwerijen van Gouda in middeleeuwen en 16e eeuw," pp. 65, 76-77; Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, pp. 278-279; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 94; Unger, *De Levenmiddelenvoorziening der Hollandsche Steden in de Middeleeuwen*, pp. 67-68.

⁸ E. Aerts, "De Zuidnederlandse brouwindustrie tijdens het Ancien Régime...," p. 29; Langer, "Das Braugewerbe in den deutschen Hansestädten der frühen Neuzeit," p. 75.

The most complete extensive single piece of documentation which survives from any guild is its charter or guild letter. That contained a full set of regulations, a body of bylaws that covers a broad range of topics. The guild letter demonstrated that the guild enjoyed full recognition. It usually indicates how the guild operated and what the authorities deemed important enough to deserve regulation. It was agreed or often imposed by town governments. Brewers' guilds were different from other guilds in the character of their guild letters too. For brewers in towns in Holland such documents before the seventeenth century are rare, often short, and limited in scope. Above all, for many towns they simply do not exist. Since brewing was subject very early to close scrutiny by government, brewers functioned within prescribed limits set by civic bylaws long before they got guild status, recognition, or legislation. When guild letters were finally granted often they were anti-climactic and often merely summarized what was already in place. The model for guild legislation was civic regulation of brewing rather than practices with other trades.

In addition to guild letters, the brewers' organizations often kept copies of grants from higher authorities. In rare instances they have also left some correspondence with other brewers' organizations or with governments. Most common among surviving records, however, are documents on the assessment and collection of excise taxes. Surveys of members, surveys of production, records of payments made to the town, and even records of how much beer was drunk at meetings were all directed at making sure the right tax was paid. As more guilds were founded and as brewers, under pressure, sought tax relief from governments in the sixteenth century, the volume of surviving material increased. It was, however, nothing compared to the mass of material generated in the seventeenth century by a much smaller number of brewers. The decline in the industry did take its toll in the eighteenth century. Documentation decreased and then disappeared with the guilds themselves in the early nineteenth century. Most of the information about guilds and how they functioned in regulating the industry comes from the late sixteenth and seventeenth centuries. The documentation shows that guilds or associations of brewers acted as much or more as representatives of the tradesmen in disputes with governments than they did as agents administering the trade. If there was pressure toward tighter organization of the brewing trade in the seventeenth century, it came from concentration, from the decreasing number of breweries and the increasing size of each one.⁹

Admission procedures were usually relatively simple. The lack of an apprenticeship and a legislated master status usually account for that. In Dutch guilds it

⁹ Noordegraaf, "Betriebsformen und Arbeitsorganisation im Gewerbe der nördlichen Niederlande 1400-1800," p. 60.

was common to favor the children of members and to favor citizens of the town. Foreigners came at the bottom of the list and faced the greatest restrictions on admission. At Dordrecht in 1582 the entry fee for the sons of town citizens was 17% less than that for outsiders. Delft discrimination in the late sixteenth century in favor of the native born was more extreme. Citizens born outside paid twice what those born in Delft paid, though there was an additional charge for such members when they started to brew. All members had to pay an annual fee of 10 stuivers. The highest level of worker, assistant to the brewer, was reserved for those already citizens as well and no brewer's assistant was allowed to operate a brewery outside of the town. The penalties for that were heavy.¹⁰ At Haarlem there were no restrictions at all and anyone could become a brewer, so long as he or she had the capital. As with most other places in Holland there was at Haarlem no requirement to demonstrate a skill in brewing to become a brewer. That also made part time brewing possible. In 1501 the Haarlem guild began a process of restricting entry. Under bylaws of that year in order to be in the guild the member had to live in a house with a brewery. Another bylaw in the same document insisted that the brewer either own or rent the brewhouse where he worked. Also in 1501, the guild opened membership by dropping the 1407 requirement that anyone be a citizen for five years before being allowed to brew. Those who were not citizens, though, had to pay a higher entry-fine, according to the much later bylaws of 1592. There was a similar 1583 regulation at Dordrecht. If a Haarlem guild member died, his widow and children could choose one from among their number to take over the membership. If any others in the family wanted to join, they had to pay an entry fine.¹¹

The admission system meant that there were two ways to become a brewer: by inheritance or by purchase. As the sixteenth century wore on the fines did more typically become standardized and unchanging. At Delft, in addition to the entry fee a new brewer had to make a deposit of 200 guilders, the money being forfeit if the new member lost citizenship within the next ten years or went to set up a brewery outside the town.¹² The total number of master brewers was never limited. It was not guild entrance requirements that kept men and women out of brewing, but the economic and technical changes in the industry which translated into greater capital requirements.

¹⁰ G. A. Delft, *Eerste Afdeling*, #1922, first, 1, 2, second [c. 1600]; G. A. Dordrecht, *Archief van de Gilden*, #930, 20; J. Soutendam, *Keuren en Ordonnantien der Stad Delft van den aanvang der XVIe Eeuw tot het jaar 1536...* (Delft, 1870), pp. 160-173, I, XII-XIII [between 1460 and 1514].

¹¹ G. A. Dordrecht, *Archief van de Gilden*, #931, fifth; Eykens, "De brouwindustrie te Antwerpen, 1585-1700," p. 84; Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 38; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 83, 84-85, 108-109.

¹² Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," pp. 427-428.

Each guild had a small number of officers, generally selected by some complex process. Town officials responsible for the surveillance of brewing often predated the establishment of the guild and so the guild superiors in a number of cases took on not only the functions but also the titles of old positions. At Delft in the fourteenth century, members of the town government chose five men who, along with four mayors, chose four officials. The last quartet were to be present at, participate in, and certify the closing of casks. Every six weeks they reported to the group of five who had chosen them any violations of the rules on beer packing. The five acted as a court and penalized wrongdoers. The four officials at Delft, like their counterparts in Haarlem after 1411, were to be sure that beer did not leave the brewery before it was fermented enough. By the early sixteenth century, Delft guild officers had to have been citizens for at least three years and have a certain minimum level of wealth. The election process was still complex. The town mayors had a say in the selection of two of the five chief men. The system was simplified in the seventeenth century down to just four officers, of whom two were replaced each year. The earliest Gouda bylaws on brewing from 1366 designated two responsible men to see that brewers used the legislated weight of various grains in making their beer. The officials were appointed by and answerable to the town.¹³ At Dordrecht in the late sixteenth century the two superiors of the guild, increased to three in 1583, were chosen by a majority vote of the membership. Those deans in turn were to keep an eye on the quality of work of the membership. Elections were typically held on a fixed date every year and at Dordrecht that was 1 April. At Haarlem in the early fifteenth century the outgoing nine finders, as the officers were called, selected six new officers and the town another three to make up the new body. The nine then chose ten assistants representing the different town districts where brewing went on to help them in their task. That system remained in place into the sixteenth century but by the 1590s it had changed dramatically. Then two new finders were chosen from a list of four submitted to the town government. They joined the two men carried over from the previous year to make a total of just four, the lower number presumably indicating concentration in the industry. Rotation of officers, preventing the same men from dominating the governance of the guild, lay behind a number of the rules on selection of officers. The rule at Dordrecht was that anyone who was a chief man of the guild for a year could not be for the next two but if he were chosen for a second one year term then he could not be an officer for the following

¹³ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 51; Hallema and Emmens, *Het bier en zijn brouwers*, p. 135; Pinkse, "Het Goudse Kuitbier...", p. 105; Timmer, "Grepen uit de geschiedenis der Delftsche brouwning," pp. 428-429.

four years.¹⁴ Simple processes of selection were virtually unheard of in any town in Holland.

The officers acted as the judiciary of the guild and of the brewing trade. They acted as police, ferreting out violations of bylaws, and acted as judges in cases involving the members and regulations on brewing. The members of the Haarlem guild were to report all wrongdoing to the officers who in turn were to hear cases on a fixed day and then apply penalties laid down in the bylaws where deserved. Their powers were extensive. At Dordrecht the guild superiors could with cause, such as non-payment of dues or failure to pay a fine, suspend a brewer from his trade. Where there was price legislation the officers were to see that was enforced as well. Officers typically had the right of visitation at any time of any brewery. In the case of Haarlem, the officers and their assistants met weekly to plan their inspection of breweries. At Gouda the guild officers by the early sixteenth century were authorized to appoint five finders, men who visited the breweries and saw that brewers used the legislated types and quantities of grain. Tasters in Haarlem at the same time maintained the quality of beer and the town reprimanded those tasters in 1519 for failing to do their job. That led to a court suit which the tasters lost.¹⁵

In the late seventeenth century, in their own interests, the Amsterdam brewers' society designated two men to judge the quality of hops brought into the town, to see whether it was good enough to make beer. Delft from early in the sixteenth century had an officer responsible for overseeing the sale of hops. He had the dual function of making sure the legislation on hops, such as the prohibition of mixing the new harvest with the old before Christmas, were followed and to collect the tax due on the sale of a quantity of hops.¹⁶ The Delft hops official, though, was appointed by the town and not the guild.

One of the principal tasks of guild officers was seeing that excise tax was properly paid and administered. The job was often made explicit in the ordinances or guild letter of the brewers' guild.¹⁷ The presence of guild officers did not supplant or eliminate the agents or officers of the government and the tax farmers. At Haarlem after a 1558 regulation set the number of barrels to be got from each

¹⁴ G. A. Delft, 1922, first, #6[before 1571]; G. A. Dordrecht, Archief van de Gilden, #930, 18, 32, #931, first [1582], third [1583]; "De Haarlemsche Brouwerij 1575-1600," pp. 37-38; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 108.

¹⁵ G. A. Dordrecht, Archief van de Gilden, #930, 30 [1597], #931, 14 [1597]; Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, p. 278 [1518]; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 40-41, 110.

¹⁶ van Eeghen, *Inventarissen der Archieven van de Gilden en van het Brouwerscollege*, p. 127; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 425.

¹⁷ G. A. Dordrecht, Archief van de Gilden, #957, 1 [1583].

brew, Philip II appointed three barrel-men to be sure the correct quantities went into the barrels. There was an assistant as well who checked that the barrels were of the right size. The officials were generally hated by brewers who did what they could to make the officials' job difficult. In Holland the farmers of the provincial impost on barrels of beer insisted their sworn agents, imposed by law in 1584, be present when beer went from the fermenting troughs into the casks. The towns were obviously unenthusiastic about having more officers involved in brewing and, as late as 1589, the major brewing towns had not appointed the men to oversee the transfer to barrels. The agents' function was very similar to the fourteenth century Delft officials or to the officers in a number of Holland towns, such as Hoorn in 1472, who were responsible for the proper administration of the excise. Precedent certainly existed. The sworn agents could apparently be guildsmen and chosen by the guild for the job. They had to be available and present at a fixed place so that brewers knew where to find them when they were needed. Each inspector also had to supply a statement of how much beer was brewed, establishing in that way the tax due from the brewer.¹⁸ The system was old and well-established by the 1620s, bounded over time by ever more regulation.

The other principal task of the guild officials was to administer the funds of the guild. At the end of each year they were to submit a full and accurate accounting to their successors. Income came from the entry-fines, membership dues, fines for misbehaving at the meeting or violating guild regulations and also, where such charges existed as at Dordrecht,¹⁹ a payment for each brew. Outlay went principally for the festivities surrounding meetings. The amounts involved were never sizeable, the size of the treasuries never impressive. Town governments took an interest in the accounts in some cases but often they did not even bother and left it as an internal guild matter.

The officers reported to the town government. There was no doubt about the origin of their authority or power nor was there any doubt about the purpose of the officers. The counterweight against the government which the brewers enjoyed was that often, and especially in export centers, some members of the town magistracy were brewers. Through their guilds but more often simply through personal presence, brewers could on occasion influence town legislation. Brewers found themselves as aldermen or mayors in towns in Holland and in towns throughout northern Europe but having influence among the powerful of

¹⁸ G. A. Haarlem, *Archief van het Brouwersgilde*, #90, 6, 9-19 [1622]; G. A. Hoorn, #304; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 100-101; Timmer, "De Impost op de Gijlbieren...," pp. 363-366.

¹⁹ G. A. Dordrecht, *Archief van de Gilden*, #930, 28 [1594], #931, 14 [1597].

towns was obviously not always enough. Brewers were in court now and again already in the sixteenth century, trying to overturn action by their governments. The arbitrary nature of urban guild legislation, often stated baldly in the close of guild regulations put brewers in a weak position and made them conscious of the need to accommodate the other interests represented in urban governments.²⁰

Guilds had to have regular meetings, at least annually for the entire membership and more often for the officers. The Dordrecht guild had a meeting of all members each Saturday morning and there was a guild servant, an employee who reminded the members forcefully. Failure to appear at the meeting led to a fine but that guild was unique in having gatherings so often. The Delft guild met quarterly and there too as elsewhere there were fines for missing the meetings.²¹ Since the functions were as much social as business occasions, it is surprising that the organizations had so much trouble getting members to come. For a meeting site, using taverns, in rotation, or the hall of another guild were possible options. The more prosperous and successful of guilds bought their own house, their own building for their public functions. It was the largest capital investment the organization would make. The Amsterdam beer porters' guild may have had their own house by 1456.²² Brewers' guilds in Holland, on the other hand, seem to have been slower than their counterparts in the rest of the Low Countries in buying or renting property for their functions. The Haarlem guild, which had few if any of the usual social functions of other brewers' organizations, did have a building. The Haarlem brewers also as early as 1457 had a place for infirm and retired members. A donation of land in 1472 gave the guild a permanent place for the retirement home for women who had worked in the trade. The guild was responsible for the upkeep of the group of dwellings. Annual contributions from the membership paid for maintenance and the brewers paid for rebuilding the *hofje* in 1586 after it was destroyed in a fire a decade earlier.²³ The ability to move from tavern to tavern for meetings may have been enough for brewers' needs in Holland and as their numbers contracted in the seventeenth century, the need for a permanent site declined as well.

The guilds of brewers, like most guilds, had religious origins and kept the religious and social functions that arose from those origins at least until the Reforma-

²⁰ G. A. Dordrecht, Archief van de Gilden, #957, 12; Houwen, "De Haarlemsche Brouwerij 1575-1600," pp. 37-38.

²¹ G. Delft, Eerste Afdeling, #1922, ninth [c. 1600]; G. A. Dordrecht, Archief van de Gilden, #930, 27 [1584], 31 [1600], #931, 15 [1600].

²² Ter Gouw, *Geschiedenis van Amsterdam*, 3, p. 243.

²³ T. Magré, "De Brouwening in Haarlem van 1700-1800," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1936), p. 5; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 112.

tion. The guilds of the fourteenth and fifteenth centuries typically had a patron saint and often maintained an altar devoted to that saint in a local church. In Leiden the brewers' altar was devoted not only to Mary and St. Stephen but also Saints George, Anthony and Cecilia. Five brewers set up the society in 1461, promising that they would provide tables at the altar, see that vigils were held and, in general, behave like all other brotherhoods for the living and dead. It came to be called the St. Stephen's guild because he was the most popular among the brewers and because a *hofsfe* endowed by a brewer in 1487 was named for the saint. The Delft brewers supported church services, paid for by annual donations from the membership and also performed an annual miracle play. Haarlem brewers had an altar to their patron, Saint Martin, in the largest church in town before 1401. The entry-fees and one third of all fines levied by the guild officers went for the upkeep of the altar and to pay the chaplain. The town of Haarlem was a patron of churches elsewhere, for the sake of her brewers. In 1518 it donated an elaborate glass window to the church in Edam, showing the pope, the emperor, Mary, St. Martin and other figures along with the arms of Haarlem among other things. The inscription stated clearly that the gift was in thanks for all the Haarlem beer that was drunk in Edam. The same reason was given for gifts of windows to churches in Enkhuizen in 1522 and to Workum in Friesland in 1529.²⁴ Before the Reformation Holland towns held religious processions. The guilds participated and carried candles which they had to contribute themselves. Brewers' guilds were no exception and often had a role in those religious displays.

Despite evidence of continuity, the Reformation did mean that the religious aspects of the brewers' guilds in Holland, and throughout Protestant Europe, were sharply diminished or dropped. Delft did continue to keep up an altar in the Nieuwe Kerk and to participate in annual processions, but even those religious requirements of the 1571 ordinance may have been dropped over time. The mutual assistance that was part of the religious heritage did not disappear. If anything guilds concentrated more on caring for the sick and the poor and seeing to the burial of deceased members. Not all guilds had sickness or poor funds for their members. The Haarlem guild did not have provision for a funeral or a funeral mass for a dead brother or sister which made them different from most guilds in the town and from many brewers' guilds in Holland. By the early seventeenth century, though, burial of members was at the cost of the guild. Before the Reformation, the Delft guild insisted on a contribution from each member so

²⁴ G. A. Delft, *Eerste Afdeling*, #1922, first, 3, 4, 5 [before 1571]; G. A. Leiden, *Archieven van de Gilden*, #181 [1461]; Hallema and Emmens, *Het bier en zijn brouwers*, p. 60; R. Ladan, "Leidse Brouwers Anno 1500," *Leids Jaarboekje* (1989), p. 40; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 39, 111; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 426.

that 30 masses could be said for the departed guild brother or guild sister.²⁵ Relieved of maintaining religious functions by the Reformation, the annual dues and other guild income could be allocated to poor relief or to paying for funerals. Even so, compared to other guilds of tradesmen, the brewers' organizations had few provisions for mutual assistance or for aiding members. The economic problems of the industry and the long term decline in the number of breweries and brewers may help to explain the sparse benefits for members.

Guild bylaws had little to say about health and welfare, but they did have something more to say about practices in the trade. The *pegel*, which set the type and quantity of grains to be used in making beer, and the *peil*, which set the amount of beer to be produced from that grain and the frequency of brewing, were common topics of guild rules. Guild letters included legislation on a broad range of issues to do with the way beer was made. The size of the kettle or of other equipment was of concern to governments and so restrictions on those appeared in the paragraphs of guild bylaws. More common, though, were rules on hours of brewing and times of brewing during the year, regulations which may have been first laid down by the town, but were part of guild legislation. In some cases, however, it is possible that the setting up of the guild, and the granting of monopoly rights to a group of brewers formed the occasion for the town government to legislate much more strictly many aspects of the trade.

The bylaws of brewers' guilds reveal goals other than just proper collection of taxes. Fire was a constant threat in the largely wooden towns of late medieval and Renaissance northern Europe. Malteries and breweries had to generate a great deal of heat and the fires they made could, if not properly handled, cause extensive damage. Under rules set down in Amsterdam in 1497, the oven could not be against a wall, unless the wall was of stone. The fire had to be put out at night and could not be lit again until people were up and about.²⁶ In some instances there was even discussion of moving all breweries to the same part of town, keeping them close together and concentrating the danger from fire. That never fully succeeded though the brewers themselves often gathered in certain districts or blocks²⁷ because of easier access there to some raw material like

²⁵ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, pp. 276-277; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 37; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 112; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," pp. 426-427.

²⁶ Breen, *Rechtsbronnen der Stad Amsterdam*, 1497, 22, 23; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 25; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 7.

²⁷ Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 10; Hugo Soly, *Urbanisme en Kapitalisme te Antwerpen in de 16de Eeuw De stedbouwkundige en industriële ondernemingen van Gilbert van Schoonbeke*, Gemeentekrediet van België, Historische Uitgaven Pro Civitate, reeks in-8°, 47 (Antwerp, 1977), pp. 288-297.

water. That made legislation to push them into the same place redundant. Just at the time brick and stone were replacing wood as the building materials for Dutch houses around 1600, brewers realized savings to be gained from concentration of heat and so better control of fire. The decline in the industry also meant that rules to contain fire became less pressing and so less worthy of inclusion in guild bylaws.

Guilds got the job, in some instances, of making sure that the right size of barrel got used²⁸ and they also took an interest in the proper use of barrels. From the fifteenth century on, brewers and consumers complained about barrels, about the quality of the wood which might hurt the taste of beer, about leakage because of poorly made casks, and about the size of the containers. Barrels had too many other uses and consumers often kept them for filling with everything from rainwater to butter to milk to sauerkraut. In Amsterdam in 1528 a watchman caught drinking Hamburg beer while on duty was required to march in a procession the following Sunday with the beer cask on his head. The uses of barrels were, indeed, varied. Brewers themselves worried about the availability of barrels and their cost. Guild legislation was often concerned with keeping barrels in circulation and preventing their being hoarded by anyone, especially brewers, and by customers.²⁹ Rules on barrel use would become much more common in the seventeenth and eighteenth centuries but in the sixteenth century legislation, at the inspiration of town and county governments, was more concerned with the size of the containers.

At the urging of brewers and especially those of Delft, the province of Holland tried to standardize the size of barrels before the Revolt. The Delft beer barrel was most commonly used and, in the course of the fifteenth and sixteenth centuries, it became something of a standard. The regulations requiring all brewers to use that size of cask remained in force through the 1580s³⁰ and were, now and again, subject to renewal and, after the Revolt, subject to change.

The shape of the barrel mattered too. Dordrecht brewers got the town to agree to change the form of the local barrel since a fat shape made it harder to load casks on boats, wagons and carts than if the sides were straight. The town agreed to a thinner barrel and probably a slightly smaller one in the process. The change may be the reason Gouda went over to using the Dordrecht barrel as the town standard in 1606. The government of Holland promoted the Dordrecht

²⁸ G. A. Dordrecht, Archief van de Gilden, #930, 35 [1614].

²⁹ G. A. Dordrecht, Archief van de Gilden, #930, 39 [1620]; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 141-142; Ter Gouw, *Geschiedenis van Amsterdam*, 5, p. 43; Unger, *Bronnen tot de Geschiedenis van Middelburg*, 3, #846 [1568].

³⁰ Pieter Hendrik Engels, *De Belastingen en de Geldmiddelen van den Aanvang der Republiek tot op Heden* (Utrecht, 1862), p. 61.

barrel in subsequent years, apparently having success at Leiden.³¹ Despite long term provincial efforts an investigation of 1613 revealed considerable differences in barrel size. While Rotterdam, Haarlem and Dordrecht seem to have had the same size barrel, those of Leiden, Schoonhoven, Enkhuizen, Delft, Hoorn, Alkmaar and Amsterdam were all of different sizes. The variations could be significant. The Leiden barrel, for example, was 9% larger than the Alkmaar barrel. Since there was a Holland-wide tax on beer per barrel, the differences bothered various authorities including guilds. Amsterdam in 1514 set the units in which brewers could sell beer. The concern was principally that brewers not sell in units of less than a quarter barrel, effectively keeping them out of the retail trade. It may be that brewers refilled casks from other jurisdictions which saved having to buy new ones. Town regulations made that illegal so brewers could not take advantage of the smaller size of barrels from elsewhere. Using such foreign cooperage was specifically outlawed at Amsterdam.³²

Brewers always provided a significant portion of the work for barrel-makers who were numerous in Holland towns. Amsterdam in 1570 boasted no fewer than 150 coopers.³³ By 1544, if not before, Haarlem brewers were required to buy their barrels from coopers in the town. To combat errors, accidental or purposeful, in 1567 that town ordered all barrels to be brought within eight days to town officials responsible for marking them. Those officials measured and marked them again, and got rid of any that were different from the legislated sizes. In 1614 the brewers made known their dissatisfaction with the quality of the barrels they got and requested some action by the town.³⁴ The problems of Haarlem were repeated in all towns in Holland. Amsterdam had to respond in 1579 to complaints about cooperage, and laid down strict size limits with heavy penalties. The repetition of such bylaws, within guilds and outside, in a number of towns suggests that the rules were never fully effective.³⁵

The marking of barrels, designed to prevent fraud, could be used to commit fraud. A Dordrecht brewer was caught using Rotterdam barrels and the Dordrecht coopers' guild took him to court and won, forcing him the brewer to pay

³¹ G. A. Dordrecht, Archief van de Gilden, #964 [1606]; G. A. Gouda, Archief van het Stadsbestuur, #296, 77v-78r; G. A. Leiden, Archieven van de Gilden, #195.

³² van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #13 [1514], #264 [1541]; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 22.

³³ Ter Gouw, *Geschiedenis van Amsterdam*, 5, p. 405.

³⁴ G. A. Haarlem, Archief van het Brouwersgilde, #40, 2; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 21; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 103-104.

³⁵ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #672 [1579]; René van Santbergen, *Les Bons Métiers des Meuniers, des Boulengiers et des Brasseurs de la Cité de Liège* (Liège, 1949), p. 292.

a penalty. Marks on casks could serve to generate confusion. In 1593 Holland outlawed the reuse of parts of old brewers' casks to make new ones. That deterred the breaking up of casks, which brewers favored to keep supplies up, and also prevented the old mark or brand from appearing on a new cask of a different size and from a different place.³⁶

The guild was responsible for regulating labor relations within the trade. The masters always employed a small number of assistants, in addition to their own families. Often the brewer left the day-to-day operation of his brewery to an employee. The most skilled of those employees were experts at making beer and they tried to distance themselves from the manual laborers over time. Such divisions in the workforce became more common as brewers invested in related trades and the scale of brewing operations increased. A small team operated the brewery. The skilled leader was in charge of three or four men and women, each with specific tasks to perform and at a specific wage per brew. Perhaps because they worked in small units even by the standards of the day, or perhaps because they often worked with the brewer and members of his family, brewery workers did not develop a strong or strict distinction between the wealthy owner and the dependent worker. The split between owner and worker did occur in other trades but brewing retained much of the form and organization of a medieval craft.³⁷

Guilds were typically strict about preventing brewers from recruiting the workers of their fellow guild members. At Haarlem, when an employer let a worker go, the worker had to wait a week before any other brewer could take on the helper. Anyone contracted to work for a brewer had to fulfil that contract. If the worker did not the guild officials wanted to know why. If the old employer gave consent then, of course, the transfer could take place. In Delft the similar rule was a product not of the guild but of the town. The goal was to prevent the bidding up of wages and internal competition among guild brothers and sisters for the available supply of skilled labor. With profits under pressure because of adverse economic conditions, towns and brewers were interested in keeping wages from rising.³⁸

More common in guild regulations than matters to do with labor relations were bylaws, rules, and restrictions that regulated relations of brewers with pub-

³⁶ G. A. Dordrecht, *Archief van de Gilden*, #931, 20 [1614], #956 [1579], #959 [1593].

³⁷ Aerts, "De Zuidnederlandse brouwindustrie tijdens het Ancien Régime...", p. 14; Noordergraaf, "Betriebsformen und Arbeitsorganisation im Gewerbe der nördlichen Niederlande 1400-1800," p. 63.

³⁸ Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 42 [1592]; Langer, "Das Braugewerbe in den deutschen Hansestädten der frühen Neuzeit," p. 79; Timmer, "Grepes uit de geschiedenis der Delftsche brouwning," pp. 363-364.

licans. Towns themselves always produced masses of regulations on the retail trade in beer. Taverns were not only places where large amounts of tax were paid but also potential sources of trouble, disturbances, singing, playing or even subversive activity. Complaints about taverns in the countryside were predated by the bad reputation of taverns in towns. As early as around 1420, the date of the oldest surviving Rotterdam regulations, drinkers in taverns had to stop at a specified time. Skippers who went through the town looking for fares and cargoes were not allowed to solicit business in a pub. Weapons were forbidden in pubs. With the regulation of pubs the town interest was always with proper taxation and so the unit of drink served and the collection of money owed to publicans were topics of legislation. Sixteenth century records of crime show that some pubs were brothels and many were places where dice or more commonly card games and later backgammon were played. On rare occasions, seditious and politically dangerous songs were sung in pubs. It was uncommon for anyone to get into trouble over what was said in a tavern. Drunk and disorderly patrons, however, led to most of the appearances of taverns in court records. Patrons complained about the service, about the quality and price of the beer and the temperature. Such complaints led on occasion to a disturbance.³⁹ Some towns had rules against publicans allowing customers to run up too big a debt, a practice known in ports where sailors could be forced to sign on a ship in order to work off debt. In many towns any sale or business transaction contracted in a pub was not valid until 24 hours had passed so that the parties had a chance to recover from drinking and reconsider their actions. In the winter of 1613-1614 no less than 105 of the 518 pubs in Amsterdam were closed for short or long periods for violations of various rules. Some of those closed were simply illegal beer sellers who were not authorized or licensed to sell beer. If caught the poor violator could not possibly pay the fine.⁴⁰

In Holland there was always a separation between places serving tax free beer and those serving taxed beer. Increasingly in the sixteenth century distinctions were made between taverns serving different types of beer, that is beer of different prices. In 1548, out of frustration with disorder in pubs and problems with sales, Haarlem divided both beers and taverns into three types but the experiment does not appear to have lasted. A report done for Leiden in 1607 showed that there were 111 retail sellers of beer but they varied from serving a weekly average of 30 liters to 1,390 liters with a broad range in between. The name

³⁹ G. A. Leuven, #11592. 80r-96r [1607]; Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, pp. 278-280; Deursen, *Plain Lives in a Golden Age*, pp. 104-105; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 51-52; Murray, "Oud-Rotterdamsch Kroegleven," pp. 41-78.

⁴⁰ van Deursen, *Plain Lives in a Golden Age*, pp. 102, 106.

“inn” was usually applied to the bigger sellers, but the three with the highest sales were called taverns. In addition to the 111 there were also 64 sellers of small beer, of little interest to the authors of the report since they sold beer too cheap to attract tax.⁴¹ The 518 alehouses in Amsterdam in 1613 translated into one for every 200 inhabitants. The ratio remained stable over time despite consumption changes. In 1800 there was a tavern for each 234 residents.⁴²

The rising grain prices of the sixteenth century put pressure on credit. Tavern owners often turned to their principal suppliers, brewers, for financial help. Since the brewers needed outlets for their beer, they were often willing to accommodate. In bad times, publicans simply could not pay for their beer so undercapitalized, and that usually meant smaller, brewers were forced into bankruptcy. The result was a series of regulations in brewers' guilds and also from towns on publican debt held by brewers.⁴³ In 1592, for example, Haarlem insisted that tavern keepers make payments to brewers within six months, that to prevent debt mounting up. If a publican did not pay the supplier, then the brewer cut her or him off. There was also often, as at Delft and at Dordrecht, a rule that no brewer could sell beer to a publican until he had paid all outstanding debts to any other brewer.⁴⁴ The rule had the dual effect of forcing tavern keepers to fulfil their obligations and of preventing brewers poaching customers. The flow could be in the opposite direction where a small brewer supplied just one customer but in towns in Holland, as breweries grew, most brewers found themselves producing for a number of pubs as well as individual households. The common division through the sixteenth century seems to have been that about two-thirds of output went to publicans and the remainder to citizens. At least at Haarlem there was a shift toward home consumption so that by the 1580s and 1590s publicans were buying only about one-third of the total beer sold.⁴⁵

The mutual reliance of pub owners and brewers created great potential for friction. Complaints were usually about late payment or non payment of debt and about failure to supply beer on time. Further causes of difficulty were bribes

⁴¹ G. A. Haarlem, Archief van het Brouwersgilde, #40, 6; G. A. Leiden, Secrétaire Archief na 1574, #4337, 12v-25r [1607].

⁴² van Deursen, *Plain Lives in a Golden Age*, p. 101; Schama, *The Embarrassment of Riches*, p. 191; Yntema, “The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development,” p. 88.

⁴³ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, pp. 282-283; Houwen, “De Haarlemsche Brouwerij 1575-1600,” p. 44; Soly, “De economische betekenis van de zuidnederlandse brouwindustrie in de 16e eeuw...,” p. 111.

⁴⁴ G. A. Delft, Eerste Afdeling, #1922, 6; G. A. Dordrecht, Archief van de Gilden, #930. 21-23 [1583], #970 [1618]; Doorman, *De Middeleeuwse Brouwerij en de Gruut*, p. 51; Timmer, “Grepes uit de geschiedenis der Delftsche brouwering,” p. 363.

⁴⁵ Bing, *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*, p. 278; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 58-59.

to brewers and publicans' attempt to bargain down the prices they paid for beer. In a number of towns in Holland there were middlemen and women so that brewers did not sell directly to home owners and also did not have direct contact with publicans. Towns worried constantly about collusion between brewers and beer sellers. The towns rather than the guilds usually insisted that transactions between publicans and brewers take place during broad daylight, again to stop fraud. At Amsterdam all imported beer had to be handled by designated dealers whose trade was closely regulated, down to the wage they got for each barrel of each type of imported beer they handled. In Haarlem the beer brokers were to see that specific consumers remained tied to specific suppliers, each brewer getting something like three or four taverns. Rules at Amsterdam after 1621 were similar. The guild presumably insisted on such ties to prevent poaching. In general, guilds outlawed member brewers taking away the clients of their guild brothers and sisters and penalized them if they did.⁴⁶ The goal was to protect smaller brewers from the expanding bigger operations. The effect, especially in the era of declining numbers of brewers, declining profits and falling expenditure on beer, was to create something like a system of tied houses.

Once in place, brewers' guilds became part of the urban system of regulation of the food trades. That forced them into a close and potentially uneasy relationship with other guilds, especially those who supplied food to the citizens of the towns and those who supplied the brewers with raw materials. The guilds of coopers were obvious candidates for potential conflict over the quality and size of barrels. Grain suppliers could also cause serious difficulties for brewers, whether organized in guilds or not. By 1557 in Haarlem the officers of the brewers' guild were buying grain and selling it to members, presumably to guarantee the guildsmen the quantities and types of grain that they needed.⁴⁷ Guilds could also come take on responsibility for seeing that other tradesmen did not pollute their supply of another principal ingredient, water. That was the case at Haarlem, where the brewers went to court in the late sixteenth century with bleachers and linen makers.⁴⁸ The bread makers were the most similar to brewers in their role in towns. They both used grain, water and yeast to make an edible product critical to the daily diet. Relations between brewers and bakers appear to have

⁴⁶ G. A. Gouda, *Archief van het Stadsbestuur*, #296, 47r-48r; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #453 [1618]; Houwen, "De Haarlemsche Brouwerij 1575-1600," p. 43; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 72-75; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, pp. 1189-1190, #3.

⁴⁷ Houwen, "De Haarlemsche Brouwerij 1575-1600," pp. 47-48; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 98; Ravesteyn, *Onderzoekingen over de Economische en Sociale Ontwikkeling van Amsterdam...*, pp. 146-151.

⁴⁸ See above, chapter VI; Houwen, "De Haarlemsche Brouwerij 1575-1600," pp. 49-58.

been amicable into the seventeenth century. Increasingly, though, brewers insisted on the right to supply bakers with yeast, a source of profit for the hard-pressed brewers and a nuisance and expense for bakers.

Beer wholesalers, in towns where there was such a legislated group inserted between brewers and consumers, could be organized into a guild, as was the case in Amsterdam after 1621. There had already been some legislation for the group in 1576 and 1581. The battery of regulations of 1621 were similar to those of other guilds, setting entry fines and a structure of administration. One of the first rules laid down was that no wholesaler would supply a publican unless the retailer had paid all his debts to any other wholesaler. It was exactly the type of regulation familiar to brewers' guilds. By the middle of the seventeenth century, the guild lent support to a poor house through its entry fines⁴⁹.

Amsterdam beer porters, who numbered 48 in 1570, were part of the general porters' guild as early as in 1437, but it was not until around 1533 that they separated and formed their own guild. Only in 1540 did they get the full documentation of a proper guild. They got sets of rules at least five times between 1558 and 1612 covering many of the usual issues⁵⁰ including their monopoly for moving beer and their cooperation in the enforcement of the rules on excise taxes. At Alkmaar a guild of beer porters did not turn up in the records until 1619 though regulations preceeded the establishment of the guild.⁵¹ In the cases where there was a delay in giving formal organization to beer porters it was perhaps because of the extent and strictness of the town regulations under which they always had to function. Guilds of retailers and wholesalers of beer were rare, though, even more rare than guilds of brewers.

Governments put great stock in oaths to guarantee the reliability of their officers and citizens. They required oaths of almost everyone with a public function. They relied on oaths given by brewers, their employees, publicans and beer porters, to insure that the many regulations of the trade were followed. The guild officers often got the task of administering oaths. After 1620 an annual oath was required by the States of any brewer in Holland. The text of the brewers' oaths got typically more complex over time. Usually such oaths included promises to abide by all bylaws and ordinances to do with the sale of beer, to pay in full all taxes owed, to abide by the rules on receipts, to let only sworn porters take beer

⁴⁹ G. A. Amsterdam, *Gilden Archieven*, #24; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen...*, pp. 1189-1190 [1621]; Ravesteyn, *Onderzoekingen over de Economische en Sociale Ontwikkeling van Amsterdam...*, p. 141; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 8, p. 399, 9, pp. 118-120.

⁵⁰ G. A. Amsterdam, *Archieven van de Gilden*, #32, #33; Ter Gouw, *Geschiedenis van Amsterdam*, 5, p. 405; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 9, pp. 115-118.

⁵¹ Bruinvis, *De Alkemaarsche Bedrijfs — en ambachtsgilden*, p. 38.

from their breweries and always to represent their beer for what it was in both quality and quantity.⁵² Amsterdam brewers as well as their apprentices and anyone in their house who had to do with brewing had to swear such an oath twice each year before town officials who also had to swear their own oaths.⁵³ The rules applied to both men and women. If the oath was not sworn the brewer could not brew, as at Gouda from 1366 on. Where there were specific requirements about the use of certain grains, as there were in most towns, the brewers had to swear to abide by the *pegel*. If someone complained that a brewer had violated the excise tax rules then the brewer could respond, but under oath.⁵⁴

In the 1549 reform of Charles V which set the maximum number of barrels to be produced from each brew there was also an oath requirement. Brewers had to swear that they would not go over the limit and if they did then they would report it. Haarlem brewers especially did not like the burden that placed on them and so went to court. In 1558 the *Groote Raad* at Mechelen agreed and so in place of the oath about beer brewed the town appointed sworn officials to oversee and even carry out the placing of beer in barrels. That arrangement proved unpopular with brewers too, more because of the surveillance and associated difficulties than for the burden of the oath.⁵⁵

Oath requirements were not unique to brewers. In a number of Holland towns beer porters had to report under oath how much beer they had transported in a day or in a week. Beer sellers too could be subject to an oath that they would abide by excise tax provisions. At Leiden not only the seller but his wife had to take the oath, that is up to 1589 when wives were exempted. Even inspectors who oversaw beer put in barrels and tax men gave oaths.⁵⁶

Though guilds of brewers expanded the scope of their activity in the seven-

⁵² G. A. Amsterdam, Archieven van de Gilden, #33, 30-31[1586]; G. A. Dordrecht, Archief van de Gilden, #957, 7; G. A. Leiden, Secretaire Archief na 1574, #4337, 26r-26v [1606]; Breen, *Rechtsbronnen der Stad Amsterdam*, 1497, 2; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #608; Timmer, "Grepren uit de geschiedenis der Delftsche brouwnering," p. 429.

⁵³ Breen, *Rechtsbronnen der Stad Amsterdam*, [1497]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #18, 13 [1514]; Philipsen, "De Amsterdamsche Brouwnijverheid tot het Einde der Zestiende Eeuw," p. 17.

⁵⁴ Couquerque and van Embden, *Rechtsbronnen der Stad Gouda*, pp. 135, 276; Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 23; Pinkse, "Het Goudse Kuitbier...," p. 105.

⁵⁵ G. A. Haarlem, Netresoluties van de Haarlemse Vroedschap, Kasten 3/4, 3; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 45.

⁵⁶ G. A. Dordrecht, Archief der Gemeente Dordrecht, Keur- en Handvestboeken, 5, fol. 153v [1401]; G. A. Haarlem, Archief van het Brouwersgilde, #90, 6, 20 [1622]; G. A. Leiden, Archieven van de Gilden, #191, 22 [1616], Secretaire Archief na 1574, #4337, 25v-26r [1562, 1589], 27r-28r; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, p. 444n. 4 [1622].

teenth century their principal tasks and goals remained unchanged. The essential facts which separated brewers from other tradesmen in the towns of Holland and the towns of Renaissance Europe continued to dominate not only the practice of the trade but also relations with any public authority. The importance of income from taxing beer made government take a very different view of brewing. It also led governments always to maintain a body of legislation and a group of administrators outside of the guild structure to make sure that brewing was carried on in the best interests of the town and so not necessarily in the best interests of brewers. Guilds were never the exclusive vehicle for regulation of brewing. Other government legislation pre-dated and post-dated the guilds. Towns laid down rules outside the guilds, enforced by their own officers, even when there were guilds in place. Brewers themselves did, on occasion, ask governments at various levels take certain matters out of their own hands. The town of Dordrecht in 1620 made illegal the sale of beer from one brewer to another.⁵⁷ The action was arbitrary, contrary to the interests of brewers and totally ignored the guild. Such events were neither common nor rare. Even with guilds, the legislation of those trade organizations reveals only part of the framework within which brewers worked. The lack of development of brewers' guilds, the brewers' limited interest in them, can in part be explained by the presence of extensive rules and restrictions made by government and outside the scope of the guilds.

Town authorities always had a role in regulating brewing and never surrendered that role. In addition, guilds were urban institutions and so did not replace or abrogate regulations laid down by the count of Holland. Nor could guilds replace regulations of the States of Holland either before or after the Revolt. The trade in beer across borders, the use of brand marks and the desire to standardize containers pushed Holland to take an interest in the surveillance of all brewers. Export brewers, as at Gouda⁵⁸ and Haarlem, were often subject to separate legislation in the fifteenth century. In the sixteenth as those who brewed just for the local market went out of business, virtually all brewers were involved in trade beyond the jurisdiction and therefore beyond the surveillance of their home towns. If that was not enough, the expansion of excise taxing by Holland from the 1540s gave higher authorities even more reason to legislate limits to brewers' actions. Town authorities and all authorities because of taxation saw brewers in a sense as public servants.

Towns imposed other rules and laws on top of guild regulations. That was especially true in matters of collecting excise taxes. The rules were directed as much to the tax farmers as to the producers and dispenser of beer. The methods

⁵⁷ G. A. Dordrecht, *Archief van de Gilden*, #931, 25 [1620].

⁵⁸ Pinkse, "Het Goudse Kuitbier...", p. 105.

or forms of enforcement were complex, increasingly bureaucratic and a source of ever lengthier legislation. The extensive regulation by towns and by even higher authorities seriously circumscribed the actions and effects of guilds. As with other trades, brewers' guilds were the products of civic governments and their agents for the regulation of the craft. But unlike other trades, brewers' guilds were more likely to suffer intervention by town officials and their members were subject to and answerable to other authorities which could supersede the powers of the guilds.

Brewers' guilds could not function as cartels in the way in which the guilds in other trades could. The brewers' organizations were cartels in that all producers joined together and limited access to the market to themselves. Prices were fixed, though not by the producers, and the producers competed for shares of the market. They acted together to improve supplies of raw materials including grain, hops and water. However, it was on matters of technology that they parted company with other trades that had similar guild structures emulating cartels. Brewers and their guilds could not regulate the methods used. They could not choose or even insist on standards of technical knowledge for admission to the trade. They could not collectively or individually make choices about methods used in making beer. The restrictions set down by governments at various levels on price, on the proportions of raw materials used, the size of the kettle, even the location of the fire in breweries were so extensive that innovation was not possible without lengthy discussion and appeal. The discussion was not with brewers but with politicians and the considerations were to only a limited degree commercial. In other guilds, the limitations on entry, the requirements of technical knowledge, the forum for the exchange of information, and the ability to cooperate and even go into partnership with other skilled craftsmen could promote technical improvement.⁵⁹ In brewing the overwhelming importance of capital to finance purchase of raw materials, to buy and maintain equipment and to lend to sellers of the product combined with the intrusion of government in virtually every aspect of the trade, kept guilds from acting to promote technical advance. Brewers found themselves sharply confined. One possibility open to them was to go into some related but less controlled trade such as vinegar making, a trade that could be forced on them by the failure of a brew. More commonly through the seventeenth century and more important for the long term development of the industry, brewers could move into distilling and the production of spirits.

The first signs of difficulty for brewing in Holland date from the closing years of the sixteenth century. After 1620 and especially after 1650, those difficulties

⁵⁹ R. W. Unger, *Dutch Shipbuilding Before 1800: Ships and Guilds* (Assen, 1978), pp. 78-82.

generated a disaster for brewers. The contraction which began around 1590 or 1620 proved detrimental to everyone involved in the industry and generated a number of efforts to stem the collapse of brewing. Diagnosis of the problem rarely proved correct and so organizations, governments and guilds responsible for regulating brewing, proved incapable of finding a strategy to stop the decline.

CHAPTER EIGHT

THE DATA OF DECLINE, 1600-1800

Production of beer in Holland decreased in the seventeenth and eighteenth centuries. There can be no doubt that the industry suffered from a long term decline. The deterioration in brewing is reflected in the few surviving production figures, in the falling number of breweries, in data from taxes on consumption of beer and even from anecdotal evidence from a number of places and from a few observers. Some towns were especially hard hit by the decline, especially those that had been devoted so much to export of beer like Gouda and Delft. Amsterdam and Rotterdam fared better being larger ports and so poised to supply the rapidly expanding shipping industry, Rotterdam becoming one of the principal brewing towns of Holland in the first half of the seventeenth century. By 1650 Haarlem, Rotterdam and Amsterdam together accounted for more than 60% of the income from the provincial excise tax levied on beer. The brewers at Delft, Dordrecht and Leiden each contributed something under 10% and the residual was shared among a number of small producers, Gouda among them. The shift to the major ports was even more obvious by 1670 when Haarlem fell out of the first rank leaving only Rotterdam and Amsterdam as the large contributors to the shrinking county income from the beer excise.¹

Haarlem, among the export centres, appears to have staved off troubles longer than the others. Though the number of breweries went down the use of larger kettles made it possible for the town to increase output to record levels in the first half of the seventeenth century. Haarlem brewers also held onto markets in nearby provinces like Friesland and Overijssel, at least for a few years. The number of brewers rose sharply in the first two decades of the seventeenth century and remained above 50 until the 1660s. From 1620 to 1650 annual production varied between about 46,000,000 and 65,000,000 litres. The exact estimate of output depends on the size of the brew since only brews, not barrels are reported. Assuming 65 barrels for each brew would give such impressive figures and that average size for the brew is probably not far from the mark. Those were impressive levels and did compensate for the losses, at

¹ Jan De Vries and Ad van der Woude, *The First Modern Economy: Success, Failure, and Perseverance of the Dutch Economy, 1500-1815* (Cambridge, 1997), p. 320.

Table VIII-1

Number of Breweries in Holland Towns 1600 — 1858

<i>Town</i>	<i>Year</i>	<i>Number of Breweries</i>	<i>Town</i>	<i>Year</i>	<i>Number of Breweries</i>
Alkmaar	1850	2*	Haarlem	1600	20
	1620	52			
	1623	54			
Amsterdam	1620	15		1629	54
	1621	18		1634	50
	1685	23		1640	49
	1734	19		1645	53
	1749	17		1650	55
	1765	13		1655	55
	1786	12		1660	47
	1802	13		1663	37
	1811	7		1665	35
	1830	7		1668	34
	1852	4		1670	32
				1680	27
Delft	1600	82		1685	26
	1643	27		1689	21
	1667	15		1692	20
	1674	15		1699	15
	1679	17		1700	14
	1690-99	15		1740	8
	1708-17	16		1752	7
	1722-31	15		1786	3
	1737-46	13		1800	1
	1750	11			
	1753-58	10	The Hague	1786	2
	1688	3			
	1762-68	8			
	1770-72	6	Leiden	1627	33*
	1772	6		1633	26*
	1783	4		1637	24*
	1786	4		1646	15
	c.1805	2		1647	13*
				1657	12*
Dordrecht	1600	23		1668	13
	1607	28		1746	13
	1610-21	25-26		1786	3
	1622-33	20-24		1795	2
	1633-57	17-20		1800	2
	1657-97	14-16			

<i>Town</i>	<i>Year</i>	<i>Number of Breweries</i>	<i>Town</i>	<i>Year</i>	<i>Number of Breweries</i>
Dordrecht	1700	14	Rotterdam	1609	15
	1701-27	13-14		1621	30
	1729-38	11-12		1623	30
	1740-79	9		1637	28
	1782	7		1648	28
	1786	6		c.1750	12
	1787	5		1772	9
	1808	4		1786	9
Geertruiden- berg	1747	6	Schiedam	1749	3
	1774	4			
	1786	1			
Gouda	1616	14	South Holland	1819	27
	1786	3		1858	29
	1811	0			
North Holland	1819	12			
	1858	11			

*Number of brewers and brewsters who were full members of the Brewers' Guild

Sources: G. A. Amsterdam, *Archief van de Brouwerscollege*, #1668; G. A. Delft, *Eerste Afdeling*: #263, #1962; G. A. Dordrecht, *Gilden Archief*, #943; G. A. Haarlem, *Archief van het Brouwersgilde*, 30; G. A. Leiden, *Archieven van de Gilden*, #182, #266, #280; R. Bijlsma, *Rotterdams Welvaren 1550-1650* (The Hague, 1918), pp. 101-102; H. Blink, "Geschiedenis en verbreiding van de bierproductie en van den bierhandel," *Tijdschrift voor economische geographie* 10 (1914), p. 105; Jasper J. Brasser, *Beschryvinge der Stadt Vlissingen* (1769), in ms., never published — G. A. Vlissingen, pp. 628-629; J. C. Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid, II Bierbrouwerijen," *Nederlands Fabrikaat Maandblad der Vereniging Nederlands Fabrikaat* (1921), p. 75; C. W. Bruinvis, *De Alkemaarsche Bedrijfs — en ambachtsgilden* (Haarlem, 1906), p. 93; Léon van Buyten, "Verlichting en traditie. De Leuvense stadsfinanciën en hun economische grondslagen onder het Oostenrijkse Regiem (1713-1794)," unpublished doctoral dissertation, Catholic University of Leuven (1969-70), p. 73; J. L. van Dalen, *Geschiedenis van Dordrecht* (Dordrecht, 1931-1933), 1, p. 389; J. A. Faber, H. A. Diederiks and S. Hart, "Urbanisering, Industrialisering en Milieuaantasting in Nederland in de Periode van 1500 tot 1800," *A. A. G. Bijdragen* 18 (1973), p. 264; G. van der Feijst, *Geschiedenis van Schiedam* (Schiedam, 1975), p. 140; Richard T. Griffiths, *Industrial Retardation in the Netherlands, 1830-1850* (The Hague, 1979), p. 96; H. Halbertsma, *Zeven Eeuwen Amersfoort* (Amersfoort, 1959), pp. 50-51; A. Hallema and J. A. Emmens, *Het bier en zijn brouwers. De geschiedenis van onze oudste volksdrank* (Amsterdam, 1968), pp. 87, 164; P. Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1935), pp. 2, 29; J. J. Horks, "Enige Taken van Bedrijvigheid in Amersfoort in de Achttiende Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economische Geschiedenis, 1957, p. 16; Gerrit Z. Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie* (Haarlem, 1933), pp. 37-39; J. A. F. De Jongste, *Onrust aan het Spaarne Haarlem in de jaren 1747-1751*

(n. p., 1984), p. 13; T. Magré, "De Brouwning in Haarlem van 1700-1800," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1936), p. 4; F. A. Schwartz, "De Sociteyt der Brouwers in de XVIIIe Eeuw," *Jaarboek Amstelodamum*, 38 (1941), p. 68; E. M. A. Timmer, *De Generale Brouwers van Holland Een bijdrage tot de geschiedenis der brouwening in Holland in de 17de, 18de en 19de Eeuw* (Haarlem, 1918), pp. 2-3; E. M. A. Timmer, "De Impost op de Gijlbieren. Bijdrage tot de Geschiedenis der Bierbrouwerij in Holland in de 16de en 17de Eeuw," *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde*, vijfde reeks, 3 (1916), p. 741; Rik Uytterhoeven, *Leuven, Bierstad Door De Eeuwen Heen. Een uniek brokje lokale geschiedenis rond Brouwen en Drinken met documenten van de XVII de tot de XXste eeuw* (Leuven, 1983), pp. 5-6; Cornelis Visser, *Verkeersindustrieën te Rotterdam in de Tweede Helft der Achttiende Eeuw* (Rotterdam, 1927), pp. 64, 78; Jan Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen, voorregten, koophandel, Gebouwen, kerkenstaat, scholen, schutterye, Gilden en Regeeringe* (Amsterdam, 1760-1768), 8, p. 229; Th. F. Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden: Delftse Bierbrouwers en Plateelbakkers in de Achttiende Eeuw," *Economisch- en Sociaal-Historisch Jaarboek* 44 (1982), pp. 66, 68-69; Richard J. Yntema, "Een kapitale nering De brouwindustrie in Holland tussen 1500 en 1800," in: *Bier! Geschiedenis van een volksdrank*, R. E. Kistemaker and V. T. van Vilsteren, eds. (Amsterdam, 1994), p. 77.

least through to the 1650s, in production in Gouda and Delft where brewing collapsed.²

The difference between the numbers from the fifteenth and sixteenth centuries, listed in Tables III-1 and III-2, and from the period of decline are striking. In 1748 Holland still had more than 100 breweries with 1200 workers but by 1773 the number was down to 70 and the number of workers to 1000. The average number of workers had gone up from 12 to 14 per brewery, a sign of increasing average size among the survivors. In 1748, the average number of people working in a Haarlem brewery was 12 but that number was something like a half what it was two centuries before since that town had some very large breweries in the early seventeenth century. In 1786 there were just 57 breweries left in Holland. The former great centers of beer export had all but disappeared from the industry. Delft had 4 breweries, Haarlem and Gouda 3 each. Smaller places like Geertruidenberg, which had more than 30 breweries in the seventeenth century had a handful by the 1770s. Of the total of 57 breweries in 1786, 12 were in Amsterdam, 9 in Rotterdam and 6 in Dordrecht, that is 27 or almost half were in the large port towns. What is more, on average the 27 used 1.8 times as much grain as the other 30, so they produced significantly more beer. Rotterdam, for example, had 10% of the breweries but used 19% of the total grain.³

² Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 42; Yntema, "Een kapitale nering De brouwindustrie in Holland tussen 1500 en 1800," pp. 76-78.

³ Faber, Diederiks and Hart, "Urbanisering, Industrialisering en Milieuaantasting in Nederland in de Periode van 1500 tot 1800," p. 264; Hallema and Emmens, *Het bier en zijn brouwers*, p. 164; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 10; van Loenen, *De Haarlemse*

There was also a good deal of variation in the size of breweries. The largest Amsterdam brewery used three times as much grain as the smallest. At Delft the ratio was over five. Such wide variations did not exist in all the towns of the 1786 survey but it is clear from the data that a few breweries produced a strongly disproportionate share of all the beer made. Even back in 1662-1666 at Haarlem the largest brewer in one month used four times as much grain as the smallest brewer though still the largest brewer on average used only 7.5% of the total grain bought by all producing brewers.⁴ The long-established tendency toward concentration became more extreme over time. The scale of operations went up. The largest breweries in the late eighteenth century were producing almost three times as much as the largest of the late sixteenth and more than seven times as much as the largest of breweries around 1500. The 57 breweries surviving in Holland in 1787 used on average almost 500,000 litres of malt. In the port towns the figure was higher, for Amsterdam breweries reaching almost 800,000 liters.⁵ Even at the low estimate of 1.2 liters of beer for each liter of malt, that still meant that some brewers were making an average of more than 18,000 liters of beer each week.

The relative wealth of Amsterdam brewers and brewsters reflected the distribution of production. In 1742 the richest beer maker boasted an income ten times that of the poorest. There were 17 brewers who belonged to the top 6% of income earners in the town. The high levels of income and the great distinction of income among brewers seem to have been more dramatic in Amsterdam than in the smaller and less prosperous centres where brewers struggled to carry on. Overall, the few surviving Dutch brewers appear to have done well. In 1742 96 brewers in Holland had an income over 600 guilders and so were subject to tax. The average income was 3,116 guilders putting them second only to soap makers among people involved in manufacturing.⁶

The smaller numbers of breweries in the eighteenth century reflected the bankruptcy of one brewery after another, driven out of business by undercapitalization, by poor management, lack of technical knowledge and, above all, by the poor state of the market. The shrinking number of breweries led to requests to town governments for permission to lower the number of workers in the brew-

Brouwindustrie voor 1600, pp. 125-126; Timmer, *De Generale Brouwers van Holland*, pp. 2-3; Cornelis Visser, *Verkeersindustrieën te Rotterdam in de Tweede Helft der Achttiende Eeuw* (Rotterdam, 1927), p. 64.

⁴ G. A. Delft, Eerste Afdeling, #1963; G. A. Haarlem, Archief van het Brouwersgilde, #30; G. A. Leiden, Archieven van de Gilden, #296.

⁵ G. A. Delft, Eerste Afdeling, #1962; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," pp. 176-177.

⁶ De Vries and van der Woude, *The First Modern Economy*, p. 578; Yntema, "Tot welvaren der brouwers...", p. 127.

eries and the number of beer porters who delivered the beer. The latter fell at Delft from 48 in 1617 to 40 and then in 1715 to 30. A request to drop the number to 20 in 1769 was denied but in 1793 the lack of work to share was so obvious that the town had to agree to limit the number of porters to 10. At Gouda the porters went from 13 in 1621 to 6 in 1723 down to a mere 4 in 1743.⁷

A very few towns in Holland saw not a decrease, but increase in the number of breweries at least in the one hundred years after 1650. That was for technical reasons to do with location. Amsterdam, the extreme example, enjoyed an expansion of brewing in the second half of the seventeenth century because the town was a center of consumption. Concerted efforts there to improve the quality of beer did reap rewards in sales but at the expense of producers elsewhere in Holland. The 20 or so brewers of Amsterdam at the end of the seventeenth century needed a full 28% of all grain brought into the town, while incidentally the 400 bakers used 38%. Amsterdam had 15 brewers from 1701 through 1706 but in 1707 the number went up to 17, falling back to 16 in 1722 and to 15 again in 1728. In 1733 the number jumped to 19 and it varied from 17 to 19 until 1750. After that, however, decline was continuous. The number reached 13 by 1760, 12 by 1776, 10 by 1791 and, in stages, six by 1796. What little expansion there was in places like Amsterdam brought complaints from towns which had relied heavily on brewing in the past. They saw their competitors in port towns enjoying what they thought was an unfair advantage. Even back in 1631 the nearby small town of Weesp claimed that whereas there were once 13 breweries there, the number was now down to five.⁸ The advantage enjoyed in the port towns was in low quality and, therefore, presumably low profit beer. At Amsterdam the large operation of the United East India Company (VOC) gave access to a market created by company shipping and such an advantage was not available outside the big ports. The Company in the eighteenth century bought high quality beer as a good for trade as well as low quality ship's beer for crews. The expenditure on beer fell as a percentage of total outlays by the VOC, the largest commercial entity in Europe, from .88% to .50% between 1700 and 1796. The absolute expenditure on beer fell by a third from 1700 to 1780.⁹ The scale of

⁷ G. A. Gouda, Archief van het Stadsbestuur, #308; E. M. A. Timmer, "Uit de nadagen der Delftsche brouwering," *De Economist* (1916), pp. 748-749; Visser, *Verkeersindustrieën te Rotterdam in de Tweede Helft der Achttiende Eeuw*, pp. 78-79.

⁸ G. A. Weesp, 10 September 1631; Brugmans, *Opkomst en Bloei van Amsterdam*, p. 114; J. G. van Dillen, *Van Rijkdom en Regenten. Handboek tot de Economische en Sociale Geschiedenis van Nederland Tijdens de Republiek* (The Hague, 1970), p. 202; C. C. J. Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #117 (1936), pp. 28-31; Yntema, "Een kapitale nering...", pp. 78-79.

⁹ J. P. De Korte, *De Jaarlijkse Financiële Verantwoording van de VOC* (Leiden, 1984), Bijlage 12A & 12B.

brewing did draw investment as merchants did, on occasion, buy breweries in Amsterdam and then expand them by adding facilities. Breweries producing for the Indies and West Africa were typically larger, with 20 workers or more, and were often owned by members of prominent families.¹⁰

1673 was a rather unique year because of the French invasion. However, in that year Amsterdam, Rotterdam and Dordrecht generated fully 55% of the total excise tax income from beer production levied by Holland. In the following year it was almost 58%.¹¹ In both those years, though, Delft paid more to the province than did Dordrecht, and in 1674 Delft paid more than Rotterdam. The old brewing center had not been completely overwhelmed, at least not yet. For many years Delft resisted the expansion of brewing in The Hague, a natural outlet for Delft beer, but in 1687 agreed to allow a third brewery be established in what was effectively the capital of the Dutch Republic. Sales must have grown with the population and the business of government. The agreement ran for 75 years and was renewed in 1762 so it was clearly a success.¹² Data from the countryside is rare so it is very difficult to establish what happened to production in villages and small towns with the exception of The Hague, but it is fair to assume brewing shrank there as much as it did in the bigger production centers. It seems likely that the province of Holland saw a decline in the number of country brewers, similar to what happened in neighboring provinces.

The varied forces which acted on beer production and consumption make it hard to identify the start of the decline in beer production. There are strong signs of a selective recovery in output in the first half of the seventeenth century and then a break about mid century ushering in a sustained decline. Like many towns Hoorn, certainly a small player, made it through the early years of the seventeenth century with a prosperous and stable brewing industry. Excise tax data indicate a consistent level of production and consumption from 1630 to 1648 with, if anything, an increase in the mid 1640s.¹³ After mid century typically the income from excises on beer consumption fell there and throughout Holland.

The provincial excise tax on beer was a principal source of income for the government of Holland. The tax was part of the *gemene landsmiddelen* established by the States of Holland in 1583. The number of different goods increased over time and rates went up now and again, always as part of a renewed war effort as

¹⁰ Anon., "Van Vollenhoven's Bierbrouwerij Verdwijnt," *Amstelodamum Maandblad voor de Kennis van Amsterdam* 36 (1949), p. 75; H. Schippers, "Bier," *Geschiedenis van de Techniek in Nederland De wording van een moderne samenleving 1800-1890*, volume 1, H. W. Lintsen, ed. (Zutphen, 1992), pp. 177-178.

¹¹ G. A. Delft, *Eerste Afdeling*, #1944.

¹² G. A. Delft, *Eerste Afdeling*, #263.

¹³ G. A. Hoorn, #305.

in 1605-07, the 1620s, after 1672 and in 1683.¹⁴ Figures for income from the tax on beer are continuous from 1650 to 1805, except for a break in 1748 and 1749. Excise tax figures are notoriously difficult to use as an indicator of production. The level of government revenue does not reflect the exact amount of beer sold in each year. First, the government farmed the tax up to 1748 so for the first 98 years the stated amount reflects the tax farmers' expectations of what they could get from the brewers. The farms lasted for only six months and taxing districts were small so at least the estimate of potential income was always recent and often based on local knowledge. Second, not all beer was taxed at the same rate. Under the law, beer could be sold at different prices, the differential being 10 stuivers. That meant that beer was sold for $f1$, $f1\frac{1}{2}$, $f2$, $f2\frac{1}{2}$ and so on per cask. The tax rate for each type was different. The sliding scale increased only up to the higher-priced beers and then above a certain price the tax was the same on each cask. The lowest priced beers escaped tax entirely. The revenue total included the take from a tax on beer brought in from other districts. Third, tax avoidance was a recurring problem as the legislation on the beer tax shows. Brewers passed off beer of middling value as cheap beer not subject to tax. Beer from Flanders was smuggled in and passed off as native beer. The list of subterfuges was lengthy. Fourth, many individuals and institutions as in the late Middle Ages enjoyed tax freedom. These included, among others, members of the House of Orange, the towns themselves, civic officials, hospitals, orphanages, religious organizations and universities. By 1752 in Delft, for example, a lengthy list of individuals had established tax freedom from the mayor and aldermen through various town officials to Calvinist ministers. Beer used at official functions was also free of tax. In the first half of the seventeenth century the already long list of those free of taxes in Holland included as well the "Winter King" — the Protestant who had been driven off the throne of Bohemia in 1619 and thereafter lived in The Hague — all ambassadors, and houses for lepers. Fifth, when tax income from the beer excise proved less than anticipated efforts were made to reform or tighten enforcement. Those efforts might be effective and so cause a change in excise income data, but did not necessarily reflect an increase in consumption or production. The decrease in excise income, on the other hand, may have truly reflected a fall in beer drinking rather than successful fraud.¹⁵ So even though there is a nearly complete record of the income from the

¹⁴ De Vries and van der Woude, *The First Modern Economy*, p. 102.

¹⁵ G. A. Haarlem, Archief van het Brouwersgilde, #90, 4 [1604]; G. A. Leiden, Archieven van de Gilden, #231 [1687], #232 [1688]; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1632-1643 [1604-1653]; Engels, *De Geschiedenis der Belastingen in Nederland...*, pp. 98-100; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 124, 114-115, 137-140; Timmer, *De Generale Brouwers van Holland*, pp. 4-10; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 424.

provincial beer excise similar numbers might well come from very different levels of consumption.

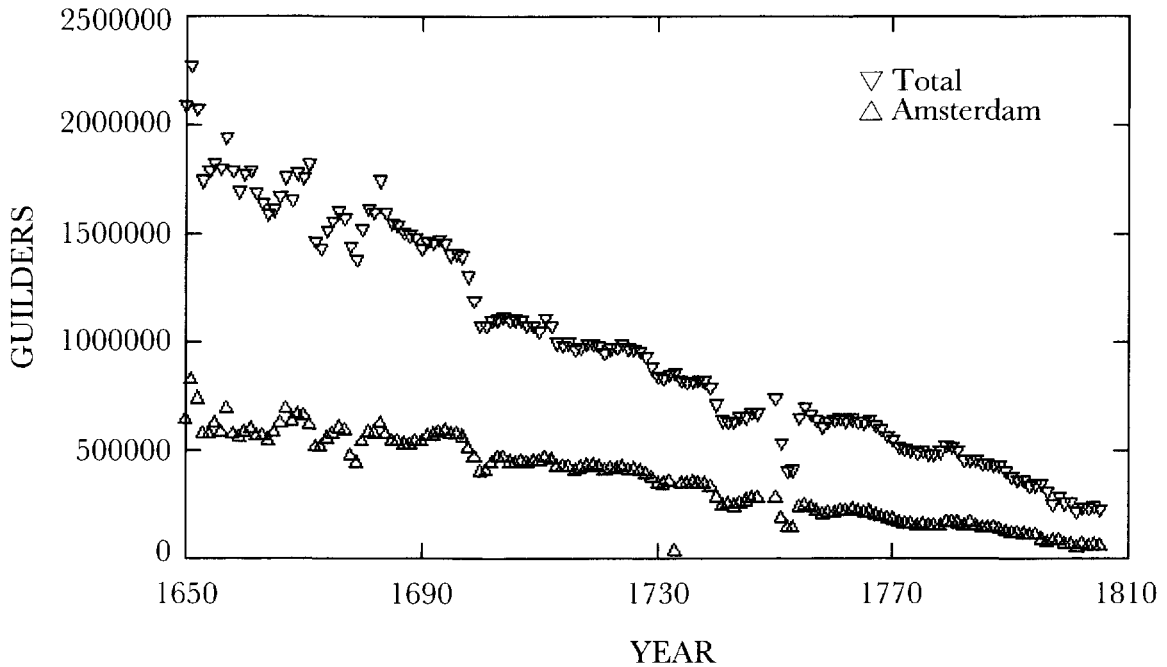
The tax for the province of Holland was farmed on the basis of an estimate of population and an estimate of per capita consumption. In 1689, for example, the government expected adults to drink about 310 liters and children about 155 liters of beer.¹⁶ Bidders for the right to collect the tax had to make offers consistent with the estimate no matter how right or wrong it was. The final offer, based on perhaps a specious estimate, is the one that appears in the excise tax records. For some excises if no farmer could be found at what the town thought was a reasonable price, then the government in question took on the task of collecting the taxes itself. This changed the type and character of administration and possibly may have affected the relationship between the amount collected and the volume of beer made or consumed. In addition to all those problems, rates changed, for example at Amsterdam in 1653. It appears that changes in tax rates were often designed to help the industry since governments were deeply concerned about the decline of brewing. There was also a short-lived reduction in rates for the general tax charged throughout Holland from 1751 to 1754 and a change in the administration of the excise taxes.¹⁷ All governments, local and provincial seem to have reconsidered the beer excise occasionally.

The state income from the excise on beer as part of the general excise was then a reflection of the general trend in beer production rather than an exact measure of output. The tax returns show an unmistakable long term decline in brewing. They also show that the pattern was one common to all towns in Holland. There was some slight divergence between northern towns — Hoorn, Enkhuizen, Alkmaar — and those further south such as Dordrecht but especially Rotterdam. The decline in the tax income in the towns on the Maas was not as great, nor did it move as consistently on an annual basis with the total tax income as did the revenue from other towns. The greatest difference was between Rotterdam and places such as Hoorn, Enkhuizen, and Alkmaar. But even in those cases the difference was always small. The pattern of decline in Amsterdam was virtually the same as that for the total income from the tax. The correlation of the two was extremely high ($r=.97$). On average over the 157 years from 1650 to 1805 the Amsterdam tax brought in more than 36% of the total for Holland.

¹⁶ H. A. Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij N.V. 1873-1948* (Utrecht, 1948), p. 9.

¹⁷ Bontemantel, *De Regeering van Amsterdam soo in 't civiel als crimineel en militaire*, 2, pp. 439, 444-445; Buijs, "De Bierbrouwer...", p. 2; J. A. F. De Jongste, *Onrust aan het Spaarne Haarlem in de jaren 1747-1751* (n. p., 1984), pp. 13-14.

Figure VIII-1

Income from the Provincial Tax on Beer, 1650-1806Source: A. R. A., *Financien van Holland*, #826

While the consumption taxes showed a high degree of correlation the production taxes did not. The records for the *gijlimpost*, the tax so much disliked by brewers, from 1650 through 1675 indicate wide variation in the pattern of output not only in different regions of the province but also in different towns. The income from the tax at Amsterdam was highly correlated with that at Leiden, less so but still strongly with that at Haarlem and even less so with that at Rotterdam. With other towns the correlation was very low and even negative. Leiden also showed a high correlation with Haarlem but with virtually no other town. The close movement of production between Alkmaar and Rotterdam submits to no easy explanation other than a statistical artefact. Indeed the sample of years and character of the tax along with potential for fraud suggests that its value as an indicator of production patterns is limited.

In Amsterdam the tax on consumption dropped about 20% from 1636 to 1662. The income from the excise on grain and beer rose markedly in Amsterdam in the 1630s and 1640s but then began to fall in 1652. Despite an increase in the rate of tax two years later, the average income from the tax fell by 15% in

Table VIII-2

Correlation of Income from the Gijlimpost for Towns in Holland, 1650-1675

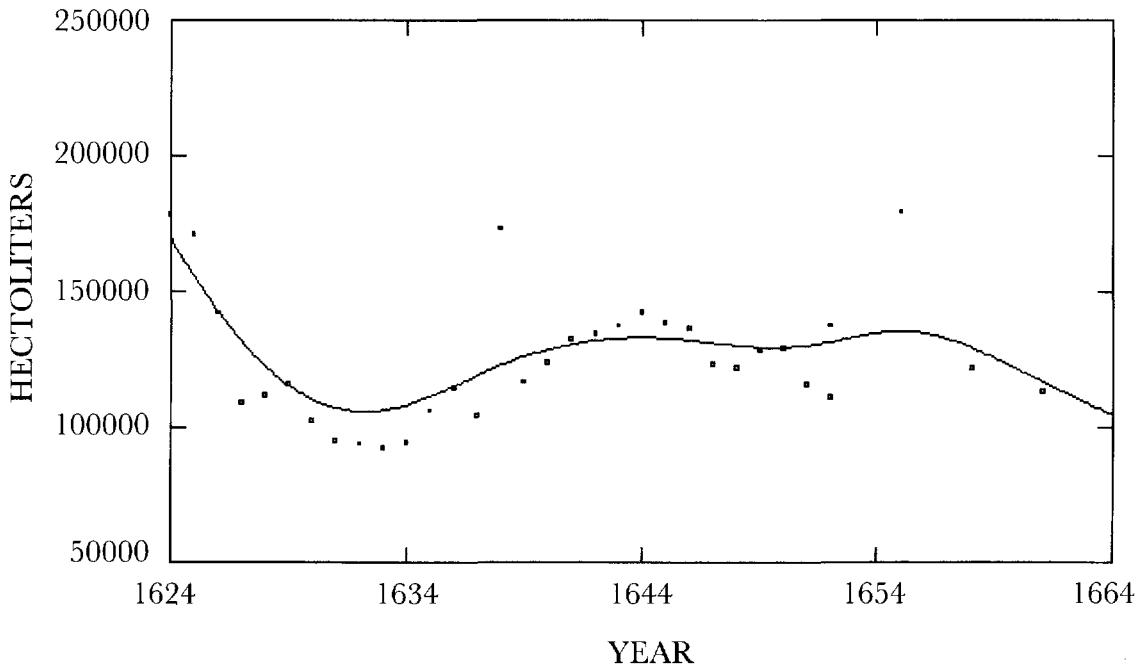
Pearson Correlation Coefficients

	<i>Alkmaar</i>	<i>Amsterdam</i>	<i>Delft</i>	<i>Dordrecht</i>	<i>Enkhuizen</i>
Alkmaar	1.000				
Amsterdam	0.401	1.000			
Delft	0.520	0.004	1.000		
Dordrecht	0.214	0.201	0.594	1.000	
Enkhuizen	0.498	0.223	0.507	0.203	1.000
Gouda	0.084	-0.215	0.046	-0.581	0.324
Haarlem	0.494	0.777	-0.113	-0.025	0.027
Hoorn	-0.130	-0.333	0.586	0.133	0.281
Leiden	0.433	0.903	-0.055	0.038	0.262
Rotterdam	0.749	0.531	0.453	0.520	0.291

	<i>Gouda</i>	<i>Haarlem</i>	<i>Hoorn</i>	<i>Leiden</i>	<i>Rotterdam</i>
Gouda	1.000				
Haarlem	-0.154	1.000			
Hoorn	0.455	-0.465	1.000		
Leiden	-0.064	0.822	-0.337	1.000	
Rotterdam	-0.430	0.392	-0.379	0.465	1.000

Number of observations: 26

Figure VIII-2

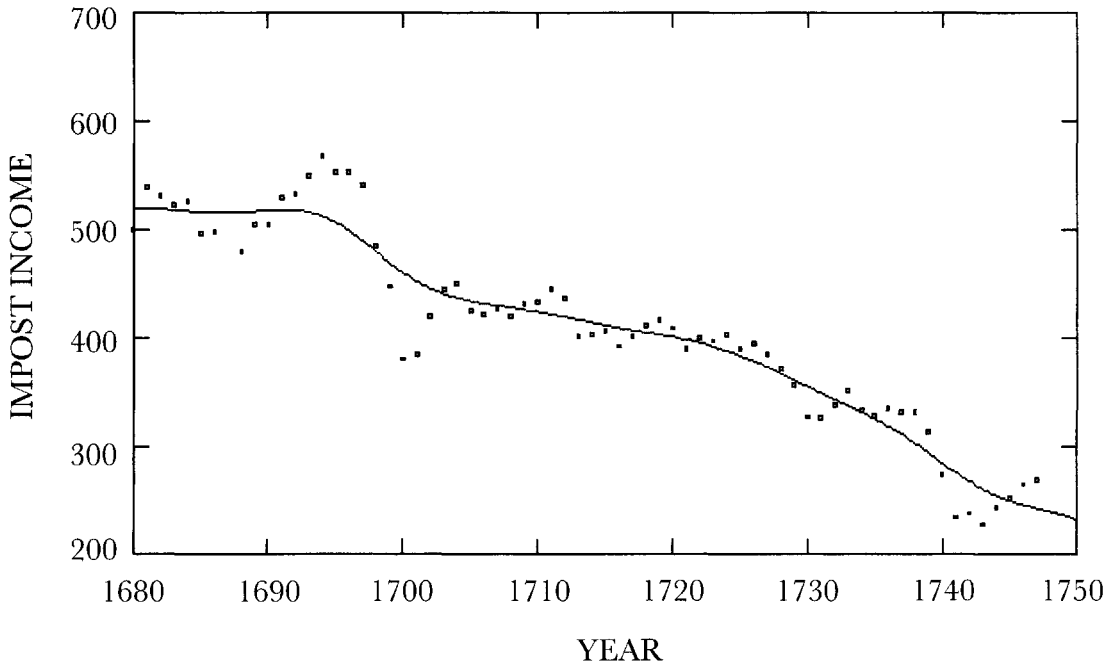
Beer Impost Income: Amsterdam, 1624-1661

Source: J. A. Ten Cate, "Verslag van een onderzoek naar de geschiedenis van het Amsterdamse brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #118, (1940), pp. 13-15

the period 1654-1662 compared to the years 1644-1652.¹⁸ In the years from 1624 to 1661 the levy on each barrel of beer produced at Amsterdam did not vary a great deal. The tax was farmed so that the revenue does not report actual production but only reflects it. Adjusting for an increase in the tax of 33% in 1654 and assuming 155 liters to each barrel produced, the average annual production for the period would have been about 12,600,000 liters. The income from the tax went down in the 1620s, perhaps because of high levels of output at nearby Haarlem. But output at Amsterdam revived through the 1640s and 1650s. That would have been part of a general recovery. More important, though, it was part of the pronounced long term trend of a shift in production away from the old exporting towns to the big harbors. Production reached as much as 180,000 barrels or better than 27,000,000 liters by 1669 and that may

¹⁸ Bontemantel, *De Regeering van Amsterdam soo in 't civiel als crimineel en militaire*, 2, pp. 431-447.

Figure VIII-3

Income from the Amsterdam Beer Impost, 1680-1747

Source: C. C. J. Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #117 (1936), pp. 28-31

be an underestimate.¹⁹ But even in the face of such record output there were in the 1660s signs of decline.

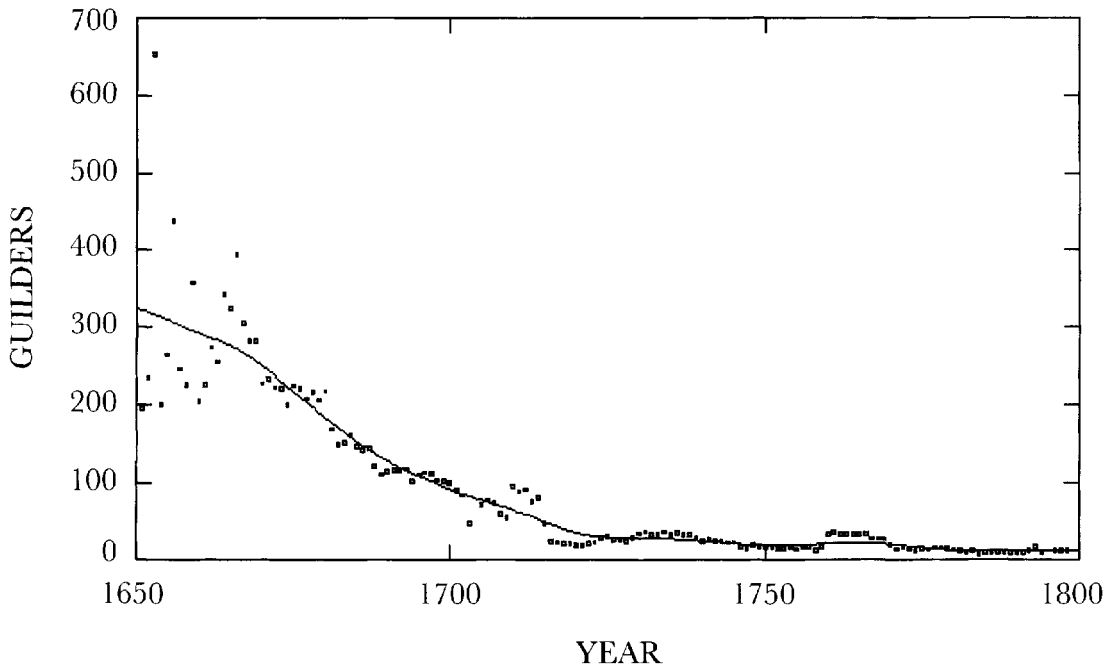
Later at Amsterdam the income from the tax on beer fell by about a third from 1727 to 1747 and the decrease was a full half during the first half of the eighteenth century.²⁰

At the much smaller town of Brouwershaven the results were similar. Despite its original purpose of being a center for the beer trade it never became a large beer consumer. More telling than the fall in gross tax income was the declining importance of beer tax income to the fiscal health of the government. In the late seventeenth century beer contributed 10-20% of annual revenue. That share dwindled to under 5% for most of the eighteenth century and under 2% by end of the century.

¹⁹ Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 49.

²⁰ Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 31.

Figure VIII-4

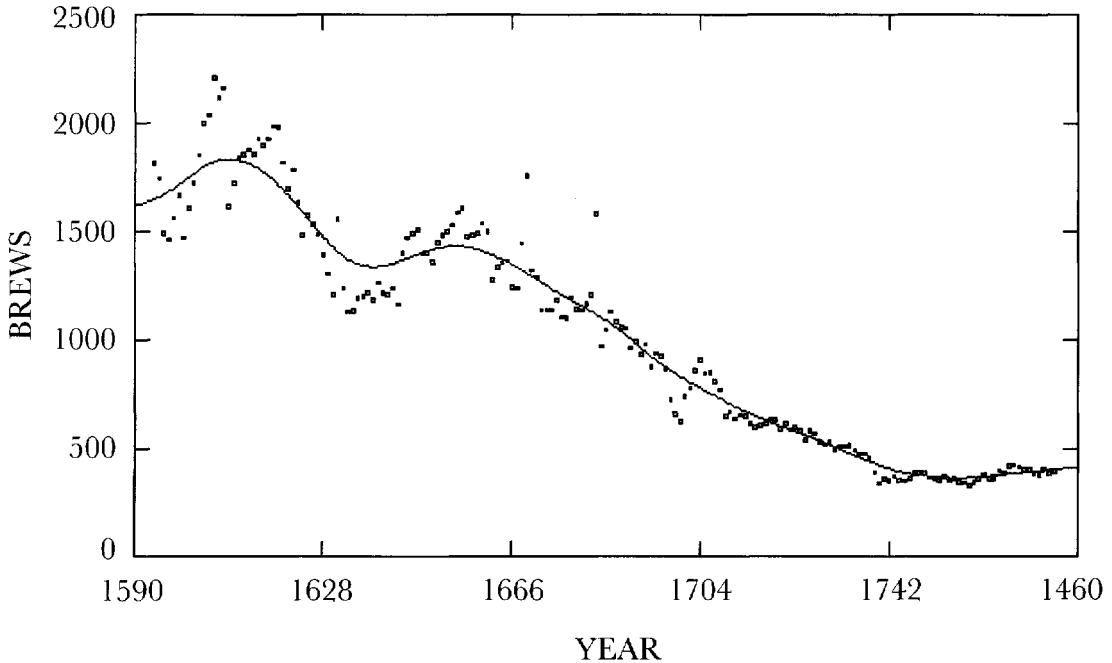
Beer Excise Income: Brouwershaven, 1651-1798

Source: G. A. Brouwershaven, *Stadsrekeningen en staten, 1626-1809*: 88-#105

For Dordrecht figures for production from the brewers stretch from 1594 down to 1776. The first half of the seventeenth century saw fluctuation though hints of a downward trend. There was even a resurgence in the 1640s and 1650s before the relentless slide took hold. By the mid eighteenth century production was a third or less what it was 100 years before. After 1776 the decline continued.

The figures may be misleading, however, since the town farmed both the tax of 25 sts./brew and also a tax of three sts./barrel of beer produced. From 1660 to 1748, the period for which data survive, the income for the two varied significantly with the tax on brews falling through the second half of the seventeenth century and then remaining stable at a low level after about 1710. On the other hand the tax on each barrel produced fell precipitously through the seventeenth century and, after a slowing at the turn of the century, continued its fall. The implication is that the size of the brew actually fell during the period and, therefore, that the decline in production was even greater than the returns to the tax indicate.

Figure VIII-5

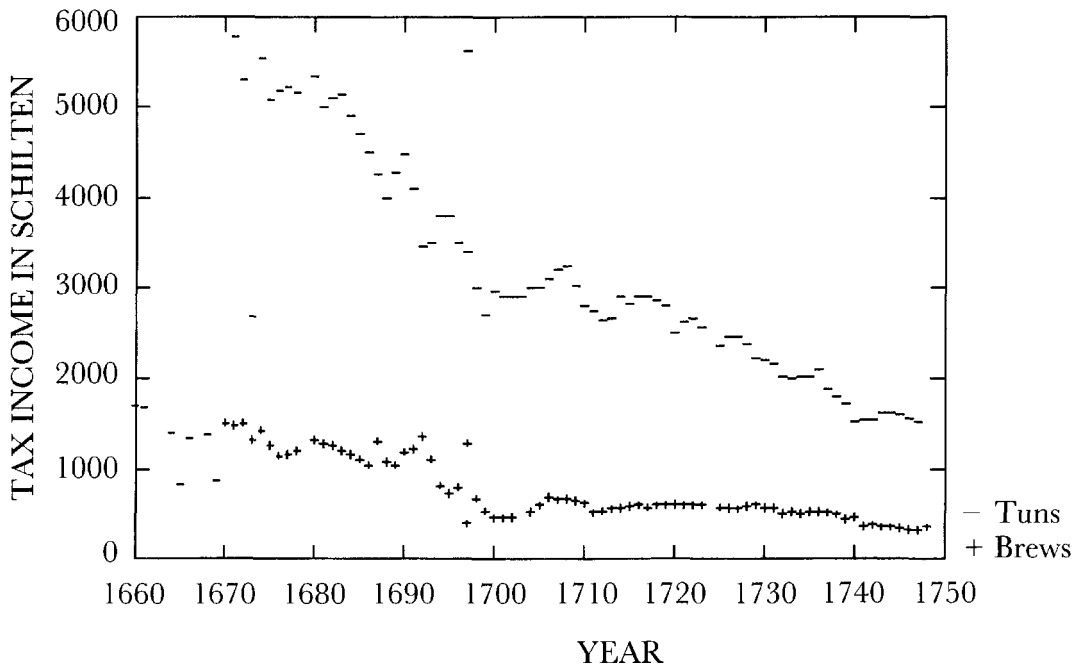
Number of Brews at Dordrecht, 1594-1776

Source: G. A. Dordrecht, *Gilden Archief*, #943

At least it is clear that the largest brewery did not come to dominate production, and that in spite of the long term decline. In the seventeenth century the share of the largest brewery fluctuated between about 6% and 12%. In the following century it was between 10% and 18%. In years when production was down the share rose and by the 1770s there were few breweries. Even so they appear to have remained of much the same size with no single one dominating the trade, that is not until the nineteenth century.

A Dordrecht survey covering the years from 1777 to 1787 showed that there were only nine breweries left in the town in the first year and just six still produced by the last year. Of the six in 1786-1787 just two produced 52% of all beer brewed. One brewery, *De Sleutel*, showed that producers could prosper even in difficult times. The brewery dated from at least 1433 and remained in the hands of the same family from at least the 1530s down to 1727. In 1612 and again in 1659 the brewery expanded. Even that brewery, though, saw a decline in output in the eighteenth century, and production fell from 550,000 liters per year on average from 1710-1729 to only 164,000 from 1770-1789. Even being

Figure VIII-6

Return from Farmed Taxes at Dordrecht, 1660-1748

Source: G. A. Dordrecht, Archief der Gemeente Dordrecht, #3620-3624

innovative did not overcome the long term problem of contraction, as one brewery learnt when it introduced *Paulus Jonaszier*. That beer was named for the American naval officer John Paul Jones who visited the Netherlands in 1779. It was heavily sugared and flavored with spices for the winter market in warm drinks, but the new product did not stop the fall in sales.²¹

In Leiden in the first half of the eighteenth century the largest brewer on average produced more than twice as much as the smallest but better than half of the firms were clustered around producing about two brews each week. The figures can be read as signs of some equality among the producers or of the tendency toward concentration.

The guild recorded production by brewery and so also recorded total output in the period. The wars against Louis XIV's France around 1700 hurt Leiden industry in general and brewing was no exception. The years after the war saw

²¹ G. A. Dordrecht, Archief van de Gilden, #944; Alleblas, "Nieuw Leven in een Oud Brouwerij...", pp. 6, 9, 14, 20.

Table VIII-3

Average Annual Beer Production of the 12 Leiden Breweries, 1709-1742

<i>Brews</i>
153.882
138.324
132.559
99.882
94.941
94.676
94.559
92.529
88.294
87.176
84.324
80.636
77.765
77.059
69.794

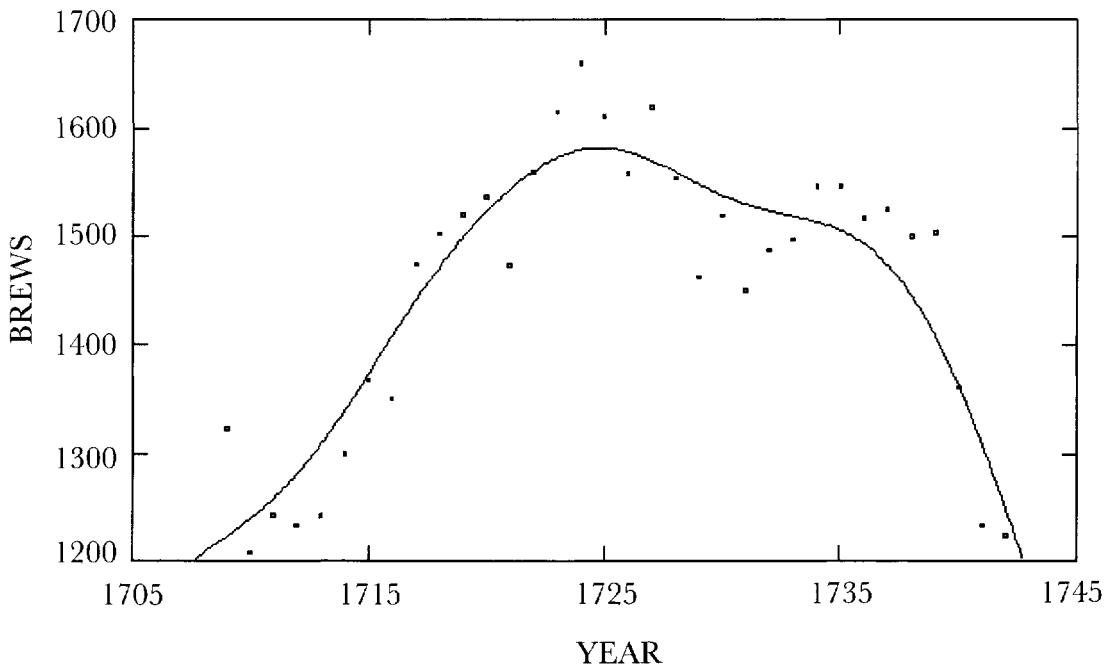
Source: G. A. Leiden, *Archieven van de Gilden*, #258, *Memorie van Deken en Hoofdlieden van het Brouwersgilde...*, *Overzicht van het Aantal Brouwsels van de Verschillende Brouwerijen 1709-42*

significant revival but that was to be short lived and by the 1740s the same tendency toward decline, obvious in other towns throughout Holland became apparent.²² At 65 barrels per brew, which is a reasonable if conservative estimate, and 155 liters per barrel, then average annual production for the period was some 14,600,000 liters. The total was impressive given the general trends of the period and even in 1742 production was still over 12,000,000 liters.

The 1742 report confirmed the long run and rather unusual development of brewing at Leiden. There was a tax, still called *gruytgeld* even though brewers had not used *gruit* for more than 100 years, levied on each brew from the beginning of the seventeenth century to the end of the eighteenth. Almost no records survive after the 1720s however. Leiden brewing appears to have enjoyed prosperity in the first half of the seventeenth century with output climbing and reaching a peak in the 1650s and 1660s. The 1670s were a disaster not only because of war which disrupted the entire economy but also because brewing did not recover its

²² Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 53.

Figure VIII-7

Beer Production at Leiden, 1709-1742

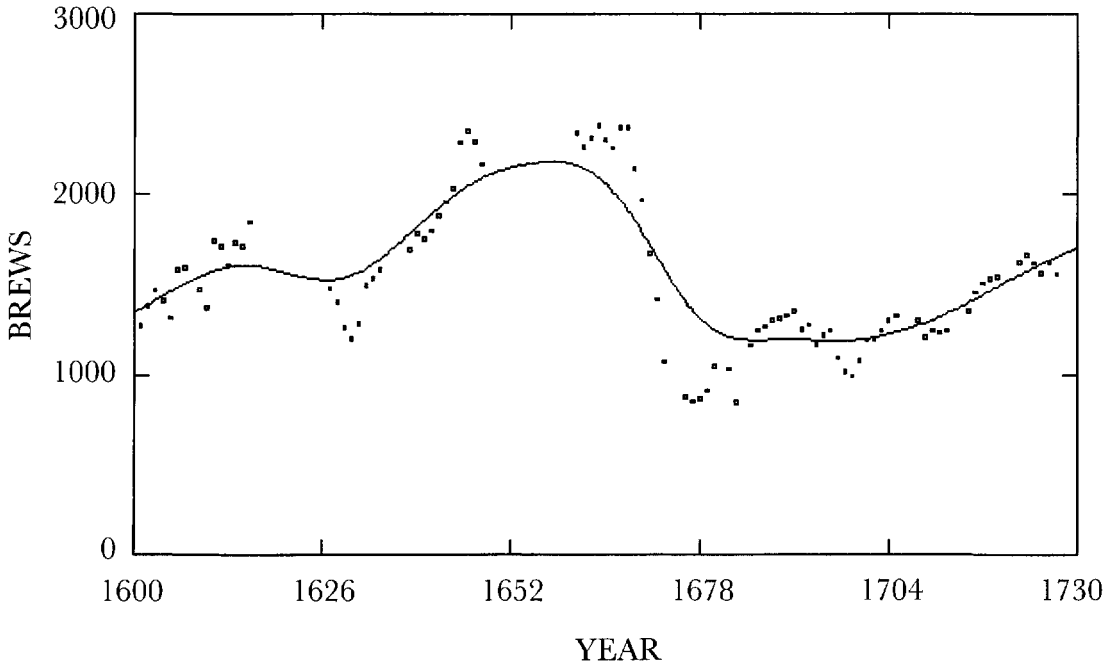
Source: G. A. Leiden, *Archieven van de Gilden*, #258, *Memorie van Deken en Hoofdliden van het Brouwersgilde...*, *Overzicht van het Aantal Brouwsels van de Verschillende Brouwerijen 1709-42*

earlier health. It languished, rising slightly but then falling back in the wars around 1700. After 1715 there were some signs of recovery. The data confirm the other figures on Leiden production. Making the same assumptions about size of brew and barrel size production in the 1720s averaged over 16,100,000 liters. Production in the 1660s had been 44% greater so the recovery was a mild one. Still the Leiden industry seems to have held on better and longer than those in the great exporting towns. It would not fare well beyond the 1740s and by the close of the eighteenth century it too was a shadow of earlier operations.

A survey of 1795-1811 showed that the two remaining breweries in Leiden were brewing almost twice a week and consistently so throughout the year. The frequency tended to go down in August, September and October and went down in the first decade of the nineteenth century.²³ The industry by then was hardly a reflection of its predecessor two centuries before or even 100 years earlier.

²³ G. A. Leiden, *Archieven van de Gilden*, #280.

Figure VIII-8

Beer Production at Leiden, 1601-1727

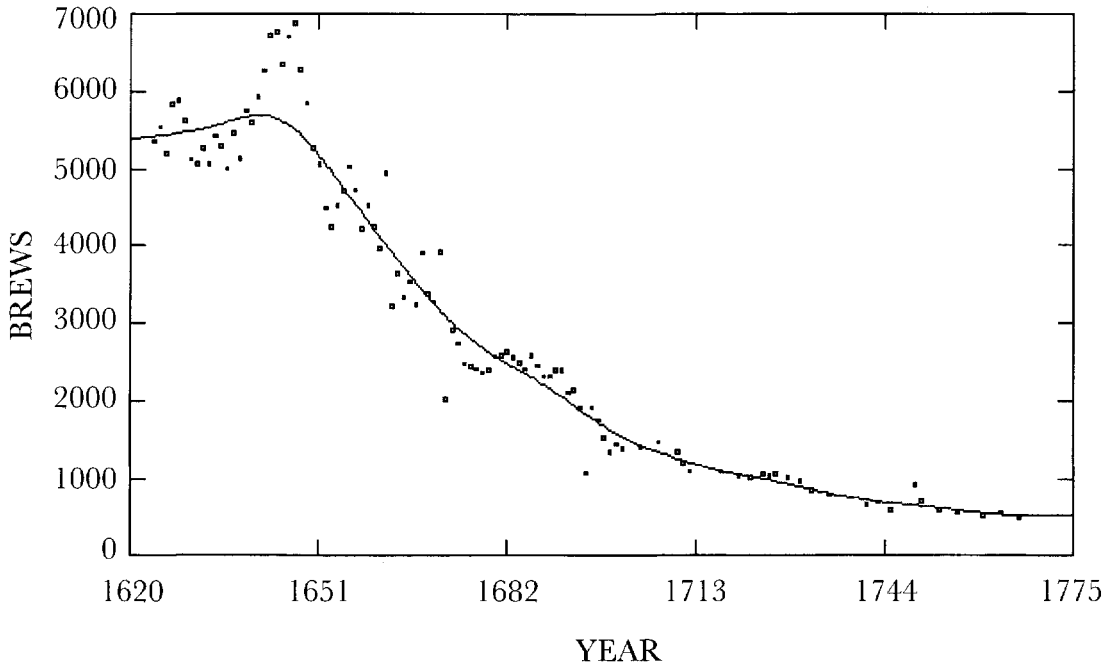
Source: A. R. A., Archief van de Grafelijkheids Rekenkamer, #426, Ontvangen van Anderen Renten in Rijnland

In the 1680s production of beer at Delft rose slightly, ignoring the sharp annual fluctuations, but there was a steep drop to the early years of the eighteenth century. Production levelled off through the 1720's and 1730's at about 75% of the earlier peak, but from 1730 on the drop was continuous and precipitous. By the 1760s output was less than 50% of the high. Average production per brewery rose as total output fell.²⁴ The drop in Haarlem, another town that relied heavily on exports, was equally dramatic if a little earlier. While the closing years of the sixteenth century and beginning of the seventeenth had seen a revival in the fortunes of brewing there, the fall after about 1650 was dramatic.

The brew may have grown in size but certainly not by a great deal and even massive increases in the number of barrels made from each brew could not compensate for the big fall in the number of times brewers made beer. The town

²⁴ Th. F. Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden: Delftse Bierbrouwers en Plaatbakkers in de Achttiende Eeuw," *Economisch- en Sociaal-Historisch Jaarboek* 44 (1982), pp. 68-69; see figure IX-5.

Figure VIII-9

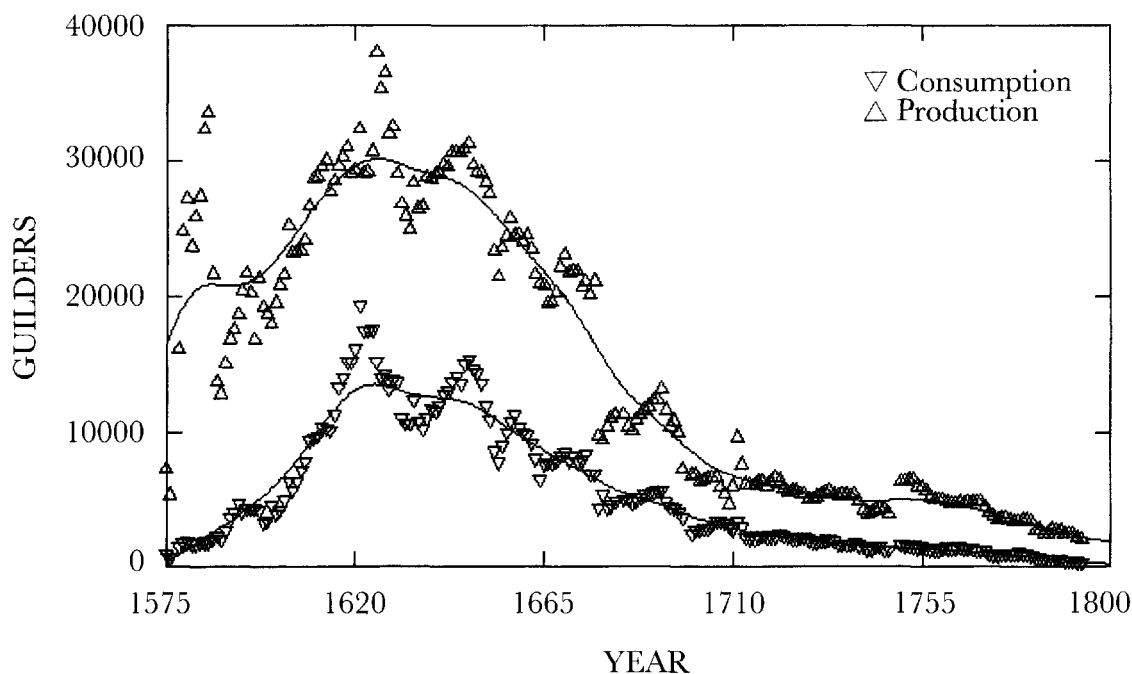
Brews Taxed at Haarlem, 1624-1766

Sources: P. Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1935); T. Magré, "Be Brouwering in Haarlem van 1700-1800," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1936)

levied a tax on the grain used in the production of beer, that from 1575. The original intention was to charge per brew but the members of the guild got the option of paying a small sum for each sack of wheat, rye, barley, oats, buckwheat or spelt that they used. From 1582 the payment was based only on grain used and other than a change in rates in 1714 the tax remained in place through the eighteenth century. Even though the amount of grain for each brew did decrease over the long run income from *brouw- en schrijfgeld* as the tax was called still indicates the general trend of Haarlem brewing production. The town also levied an excise tax on beer consumption at different rates for different types and depending on whether it was drunk at home or in a pub. The income from that tax indicates the pattern of consumption at Haarlem.

By the eighteenth century the collapse was so complete that production settled at a very low level. The number of breweries dropped by 20 or 36% in just ten years between 1655 and 1665. By the 1690s brewers produced 30% of what they

Figure VIII-10

Brouw- en Schrijfgelt and Beer Excise Income at Haarlem, 1575-1794

Sources: Jacques C. van Loenen, "Structuur der accijnsen van de stad Haarlem over de 17e en 18e eeuw, vanaf 1575-1795," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #143 [n. d.], pp. 13-59

had around 1645 and by 1745 a mere 12% of the level a century before. The quality of the beer produced fell too, as brewers got more beer out of each unit of grain. The loss of export markets explains in part the sharp drop in the seventeenth century but the continuing slow erosion in the eighteenth suggests declining consumption in the town as well. 1645 was the high point of production in the seventeenth century and as output shrank the largest breweries and the smallest tended to disappear, leaving an ever greater share of production to those in the middle range. Haarlem did not follow the pattern of other towns, especially the major ports, of an increasing average size of breweries and greater concentration of production in a few breweries. The size of Holland breweries even with concentration was still well behind that of English breweries. The normal production figure for a brewery in England in 1636 was taken to be over 900,000 litres a year,²⁵ a figure that even the largest of Dutch breweries would not match even at the end of the eighteenth century.

The decline in the number of breweries and in brewing also led to a decline in

the role of brewers in town governments. Brewers entered governments in the fifteenth century and by the sixteenth were regular members of town councils throughout northern Europe. The presence of such men as mayors and aldermen had solidified the common interests of brewers and governments. In exporting towns like Delft, Gouda, and Haarlem brewers down through the first half of the seventeenth century played a major role in government. Brewery owners in Amsterdam in 1585 were typically from prominent and wealthy families. Brewers even dominated the top positions at Haarlem where the brewing industry prospered longer than in other towns. By the late seventeenth century, though, there was only a handful of brewers left in positions of authority.²⁶ The pattern was the same only more dramatic in a many other places across northern Europe.

The income from the beer tax was already under 6% of total receipts for Delft by 1650. That share fell through the rest of the seventeenth century and after 1700 rarely exceeded 2% of all town revenues.²⁷ Circumstances were very different from the sixteenth century financially and, as a result, politically. At Gouda the share of town government income from beer taxes went from being critical to being incidental in the years 1575 — 1806. From something like 40% of all income the share declined down through the first half of the seventeenth century. It could still be as much as 10%, that in 1645, but already that was rare. By the 1670s the figure did not even reach 5%. For the eighteenth century 2% was a maximum. In general through the first half of the seventeenth century beer tax revenue held up but it did not grow at anything like the rate of total town income. The general prosperity of the golden century made beer less important to the finances of the town. When consumption began to fall the importance of tax receipts from beer to the fiscal health of Gouda dropped sharply, so much so as to become insignificant.

At Hoorn as late as the 1690s and first years of the eighteenth century beer excise tax income contributed 6-8% of the total town revenue. By the 1720s it was down under 1% and never got beyond 1.5% through the rest of the century. By the 1790s it was generally under .5% so the pattern there was the same as other Holland towns. Presumably the political effects were the same.

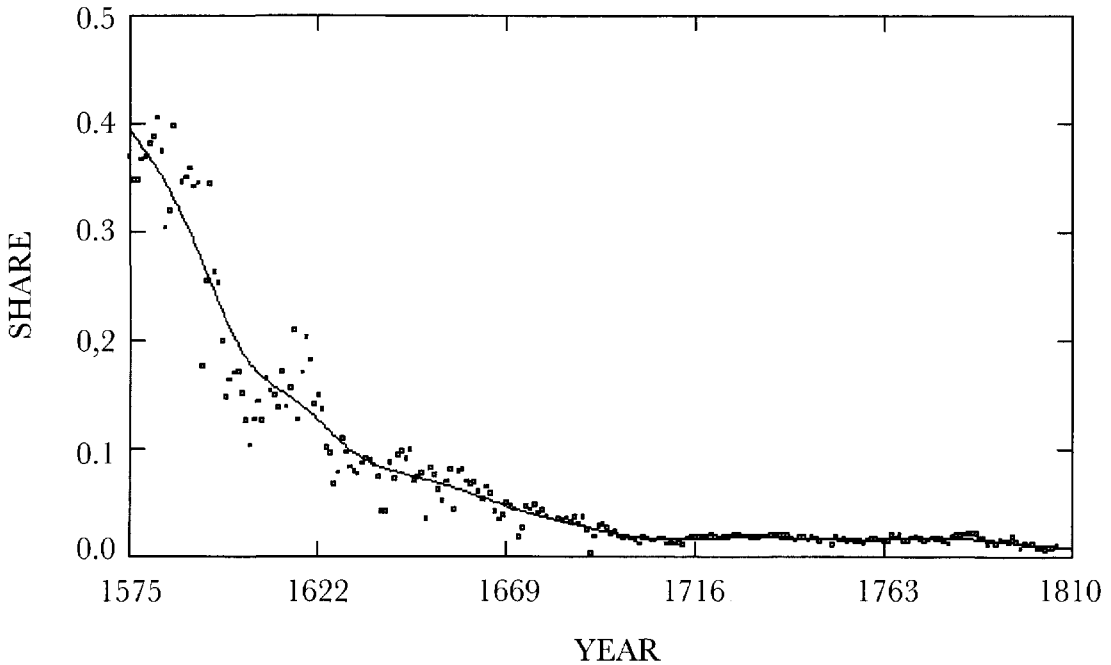
Per capita consumption of beer certainly went down overall in Holland. How much it went down and where and when is as hard to calculate for the eighteenth century as it is for the Middle Ages. The 1689 government estimate of about 310

²⁵ Public Records Office, London, SP 16/341/124.

²⁶ De Vries and van der Woude, *The First Modern Economy*, p. 319; Yntema, "Tot welvaren der brouwers...", p. 126.

²⁷ G. A. Delft, *Eerste Afdeling*, #678.

Figure VIII-11

Share of Total Tax Income from Beer: Gouda, 1575-1806

Source: G. A. Gouda, Oud Archief, #1222-1466

liters for adults and 155 liters for children was consistent with sixteenth century figures. Leiden per capita beer consumption fell from over 200 liters each year in the 1650s to about 90 liters in the opening decade of the eighteenth century and to around 40 liters by the last decade. A writer trying to promote beer drinking claimed that in the 1790s people in Utrecht drank only half as much beer as they had in 1750 and only one-fourth as much as they had in 1700. Per capita beer consumption in Holland declined from something around 300 litres per year in the mid seventeenth century to as low as 40 litres by the end of the eighteenth. One estimate for the second decade of the nineteenth century put consumption for all of the Netherlands, which then included what is now Belgium, at a maximum average level of 82 liters.²⁸ No matter the method of calculation the fall in consumption from 1650 to 1800 was dramatic. So was the fall in production.

²⁸ Hallema and Emmens, *Het bier en zijn brouwers*, p. 165; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," pp. 95-96, 109-110; Yntema, "Een kapitale nering...", p. 80.

CHAPTER NINE

EXPLANATIONS FOR DECLINE, 1650-1800

Economic prosperity and cultural activity gave the seventeenth century in Holland the name the Golden Age. Beer was still very much a part of Dutch life and the signs of decline in brewing, now clear in retrospect, seemed to contemporaries no more than transient changes or gradual, hardly perceptible adjustments. Beer was easily available through breweries and taverns. Tax free *scharbier*, a popular drink with children and the poor, could even be bought on the street. Beer was recommended as beneficial for the health of both adults and children. It was such a part of life that practical arithmetic problems used in school texts included story problems which involved beer. Literary figures such as Jacob Cats and Constantine Huygens wrote about the positive value of beer as did the great theorist of international law, Hugo Grotius. The Latin poem by the Leiden professor was not his most memorable effort. Cats worried more about the quality of water that was used to make beer and about the effect on the final product. Beer was also a topic of popular songs, Christmas songs and verses.¹ At the end of the seventeenth century the poet and engraver, Jan Luyken, published a book in Amsterdam that extolled the virtues of hard work. Etchings in the book showed 100 different trades and brewing had to be one of them.² The book was not alone and making beer showed up in virtually all the works which catalogued various trades.

Brewers produced images to represent themselves indicating what they thought of their trade and what was important about it. Brewers' guilds, like most others, distributed coins to members every year to show they belonged to the organization. Few have survived. Most are from the late seventeenth and eighteenth centuries. They were not of great artistic quality, and the design was rarely inventive. The Haarlem guild penny of 1749 had the arms of the town and date but was also festooned with a malt rake and a fork as well as a hamper or large sieve and hangers for barrels. Brewers at Maastricht, 's-Hertogenbosch and Leeuwarden fol-

¹ Jacob Cats, *Nuttelyck Huys-Boeck. Behelfende eene Bespiegeling des 's Mensche...En wat het nuttigste is, om lang Gesont te Leven &c.* (Leiden, 1769), pp. 193-194; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 99-101, 105-109; Schama, *The Embarrassment of Riches*, p. 172.

² Hans-Joachim Raupp, *Wort und Bild: Buchkunst und Druckgraphik in den Niederlanden im 16. und 17. Jahrhundert* (Cologne, 1981), pp. 79-80.



16. Jan Luyken, the brewer, from *Spiegel van het Menselyk Bedrijf*, drawing, before 1694. In the book each depiction of a trade was accompanied by a short poem. In the case of the brewer the poem praised a beverage made of hops and malt. The brewer is shown filling barrels from a large pitcher with other workers in the brewery hauling water up from a well in the background.
Source: Amsterdams Historisch Museum SA 13413



17. Jan Luyken, the cooper from *Spiegel van het Menselyk Bedrijf*, drawing, before 1694. The short poem in this case only says that cooperage produces positive results. The cooper is pounding hoops into place on a barrel while in the background a man is burning the inside of a nearly completed barrel. That would act both to seal the interior and also remove potential sources of impurities.
Source: Source: Amsterdams Historisch Museum A13404



18. Jan Victors, the feeding of the orphans, ca. 1660, oil on canvas. At the bottom right is a list of the deaconesses of the Dutch Reformed Deaconess' Orphanage which indicated that the painting depicts circumstances between June, 1659, and June, 1660. The meal consists of soup, bread and beer, the last being served from a keg on the far left. The officials of the institution obviously thought showing their charges having beer would indicate how well they saw to their responsibility for proper care of the children.

Source: Amsterdams Historisch Museum SB5398, property of the Diaconie der Hervormde Gemeente te Amsterdam



5.1



19. Guild penny of the St. Martin or Brewers' guild of Haarlem, 1749. The arms of the town are on the obverse with the date and on the reverse are a beer barrel, a fork and a malt rake, crossed under a crown. There was a number on each coin which identified the owner.

Source: D. A. Wittop Koning, *De Penningen der Noord-Nederlandse Ambachtsgilden* (Amsterdam, 1978) plate 65.

lowed the pattern of combining some symbol of the town with a few of the more simple tools of the trade. Where there were barrels, as there often were, the brand or mark of the town brewers was shown clearly.³ Kettles or cooling troughs almost never appeared. This suggests that hand tools still impressed brewers and that brewery workers' direct involvement at every stage of the process still dominated brewers' imaginations about what they were doing.

Beer drinking had long been common in the Netherlands and by the late seventeenth century drinking, like smoking, had become almost characteristics of an emerging Dutch national culture. Yet, scenes of beer drinking and associated drunkenness in Dutch art appear to have decreased in the closing years of the seventeenth century. Dutch genre painting declined in general and style also changed more and more as French art influenced Dutch.⁴ The drinkers of beer were not the buyers of paintings nor were they of a class that deserved a place in the paintings of the newer style. Above all though beer consumption continued to fall. By the end of the century the long term decline in the industry, the failure to meet various challenges, meant there was less reason to include beer in any depiction of daily life.

The principal problem facing Holland brewing through the sixteenth century had been the spread of hopped beer brewing to other parts of northern Europe and with that the loss of export markets for Dutch brewers. The pattern of technical change generating the substitution of a domestically produced good for an imported one which had been the basis of the prosperity of Holland brewing in the fifteenth century was a pattern repeated elsewhere in the sixteenth. Just as the Hamburg brewing industry had been hurt by the loss of the export market in the Low Countries so Holland brewing lost markets as hopped beer brewing developed in Flanders, Brabant and England.⁵ The adverse effects in Holland were mitigated, if only temporarily, by the boom that followed in the wake of the Revolt. The influx of immigrants from the southern Low Countries who brought skills, capital, and commercial connections generated unprecedented economic expansion, but by 1650 there was no such source of growth to save brewing from steep decline. Entrepreneurs who had become prosperous in the 1580s and 1590s in brewing found themselves by the 1630s and 1640s selling off their assets⁶ and turning their attention elsewhere.

³ D. A. Wittop Koning, *De Penningen der Noord-Nederlandse Ambachtsgilden* (Amsterdam, 1978), pp. 36, 87, 121, 139, 157; Supplement (Amsterdam, 1981), pp. 19, 21.

⁴ Schama, *The Embarrassment of Riches*, p. 200; Peter C. Sutton, "Introduction," in: *Masters of Seventeenth-Century Dutch Genre Painting*, J. I. Watkins, ed. (Philadelphia, 1984), p. lvii.

⁵ R. W. Unger, "Technical Change in the Brewing Industry in Germany, the Low Countries, and England in the Late Middle Ages," *The Journal of European Economic History*, 21, 2 (1992), pp. 281-313.

⁶ Bijlsma, "De opkomst van Rotterdams Koopvaardij," pp. 78-81.



20. Johannes Natus, interior in Middelburg, Zeeland, with smoker and drinker, 1661. The artist puts the new vice of using tobacco face-to-face with the old one of drinking beer. Disorder surrounds the two men, presumably a result of their indulgence.

Source: Gemäldegalerie, Preussischer Kulturbesitz, Staatliche Museen zu Berlin.

Holland brewers made beer for nearby towns even before Flanders and Brabant became the most important of export markets. Some of those nearby towns such as Hoorn at the end of the sixteenth century and Veere in Zeeland in 1539 set up protected brewing industries and promoted the development of local beer production.⁷ The presence of those breweries, as their quality improved and their numbers grew, cut into sales by the towns with larger export industries. The same thing happened in Flanders and Brabant, only earlier. Flemish cities such as Ghent and Bruges, major importers of hopped beer first from Germany and then from Holland, turned gradually in the sixteenth century to their own or to hopped beer produced in nearby rural centers. Imports, especially of better Haarlem beers, declined through the second half of the fifteenth century. There was some compensation but only some and temporarily in the rise of sales of *kuit* from Gouda. In England the process of replacing beer from Holland with domestic beer took slightly longer but by the second half of the sixteenth century the effect was unmistakable. Consumers by then had almost completely accepted hopped beer, with a small minority still preferring ale, that is beer without hops. Not only did English brewers replace imports of Dutch beer into their country but, by the mid sixteenth century they competed effectively in third country markets and even exported beer directly to towns in Holland. Lighter taxation at home gave English beer an obvious advantage. The Amsterdam regulation of the import of English beer indicates the import had developed a loyal following and showed that the town, a transport center for German beer up to the mid fifteenth century and for beer from Haarlem, Gouda and Amersfoort from then on was becoming something of a transfer point for English beer. By the 1590s virtually all imports of beer into Haarlem came from England.⁸ In 1617, the English traveller, Fynes Moryson, claimed that English beer was preferred in the Netherlands and in lower Germany. He claimed that towns there prohibited the sale of English beer to protect their own brewers and in Delft brewers tried to imitate English beer. Their failure to create anything comparable to the English product he attributed to the sea voyage which gave it a better taste. Not everything he said was reliable.⁹

Protectionist tendencies in foreign markets hurt Holland beer makers and the protectionist tendencies in smaller Holland towns restricted access to nearby markets. The vigorous attack on rural brewing which was common among beer

⁷ G. A. Veere, #311, 112v-113r.

⁸ van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 78-79; Ter Gouw, *Geschiedenis van Amsterdam*, 3, p. 254.

⁹ Corran, *A History of Brewing*, p. 66; Fynes Moryson, *Itinerary*, London, 1617, in: *Harrison's Description of England in Shakspeare's [sic] Youth*, Frederick J. Furnivall, ed. (London, 1908), pp. 263-264, 269.

exporting towns and their brewers in the sixteenth century could in part be explained by the clear sense of loss of a valuable export market. The decline in exports from Holland implied a greater interest in domestic markets and often, over the long term, a decline in total production. In the 1430s and 1440s Haarlem exported some 55% of beer produced. That fell to just less than a third of output in the 1450s and 1460s. By the 1490s the share was up to 74%, though that reflected a decline of local consumption more than a rise in exports. As late as 1596 Haarlem still exported 69% of output. Exports were more volatile than local consumption. This was in part because of the stiffer competition and in part because of the more extensive regulation in importing towns. Rising incomes lead consumers to prefer high quality imported beer which limited the home market as well.¹⁰ Imports from England as at Amsterdam were joined by imports from Antwerp and even Westphalia, for example at Dordrecht. Brewers in the town petitioned and got from 1583 the right to prohibit those imports. The right was renewed in 1617.¹¹

The towns heavily committed to export such as Haarlem, Delft and Gouda suffered most as external markets shrank. As early as 1514 Gouda, in explaining the decrease in the number of breweries, pointed to the spread of brewing to towns and villages in Flanders, Brabant and Holland. In 1580 Gouda exports had fallen to less than 1% of their level 20 years before.¹² The Revolt and the disruption of commerce was the reason for the change being so extreme. After the Revolt sales recovered for many towns, though not for Gouda and few brewing centers in Holland returned to anything like their earlier levels of export. Haarlem was the exception. Brewers in Breda and elsewhere in North Brabant presented a new problem too. They could produce good quality beer with lower labor and capital costs. Tied politically to Holland, they tried to export their beer to the growing towns of the Dutch Republic, creating another threat to sales. The exporting towns of Holland turned to their own governments for help, using their importance to the economies of those towns for leverage. Direct employment was only part of the contribution. Brewers imported large quantities of grain and peat or coal and in the process gave work to ships and shippers. Malt-makers, millers and coopers relied on brewing to give them work. Many other skilled labourers in the building trades got some employment from brewing. At

¹⁰ Hockstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 26; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 59-60, 63-66, 77-78; Niermeyer, *De Wording van Onze Volkshuishouding*, p. 98.

¹¹ G. A. Dordrecht, Archief van de Gilden, #930, 40-42.

¹² Fruin, *Informacie up den staet, faculteyt ende gelegentheyten van de steden ende dorpen*, p. 385; Noordegraaf, "Nijverheid in de Noordelijke Nederlanden," p. 20; Pinkse, "Het Goudse Kuitbier...", pp. 91-92.



21. Jacobus Storck, view of the River Spaarne at Haarlem, oil on canvas, mid seventeenth century. The view shows a number of breweries including the *Starre*, the *Clock*, the *Twee Haringen*, the *Bourgonsche Cruys*, the *Pellecaen*, the *Aecker mette drye Sterren* and the *Hollantsche Tuyn* or the *Twee Veenen*. The *Twee Haaringen* and the *Bourgonsche Cruys* are easy to recognize, On the far right is a small vessel for carrying peat from the bogs in the east and north of the Netherlands to the breweries.
Source: Private Collection

Delft the total of those dependent on the breweries was put in the thousands.¹³ The greatest relief that towns could give their exporters was lowering taxes. Brewers in, for example, Haarlem had to pay excise long before and at higher rates than brewers in virtually all the places to which they tried to export beer. The brewers could usually point to a town with lower rates of tax and could, on occasion get some relief at least from taxes on beer exported.¹⁴

Despite the problems of the industry and despite the competition, both in Holland and beyond, Delft beer still enjoyed an excellent reputation at the end of the sixteenth century. It was known for being heady and a bit strong. It could also make the consumer drunk quickly and at a lower cost than wine. By the 1620s, though, Rotterdam beer was held in better repute. This was both a reflection of and a cause of the decline of Delft brewing.¹⁵ The advantages which had made Delft brewers successful in the first place such as access to raw materials and easy, low cost transportation to markets had not disappeared completely. They could fall back on old privileges, like the exclusive right to supply residents of part of south Holland, a right which Dordrecht had and lost and was always interested in restoring. Delft maintained the right to virtual control of production in The Hague, licensing and regulating the single brewery there. Brewers could blame the difficulties of the brewing industry on the Revolt and the war that went with it. They could also blame members of brewing families for losing the entrepreneurial spirit and being simply satisfied to live off their interest income.¹⁶ They did, in the process, ignore new dangers in the competition from alternative drinks.

Rising incomes did mean more people could buy beer but also meant an ability for more people to drink more wine. The cost of wine in the sixteenth century, as in the fifteenth, made daily use out of the reach of the common laborer. One of the reasons for the continuity of beer sales was the high cost of wine. At Ghent in the 1570s, well-paid workers would have had to part with at least a third of their daily wage for a liter of wine. For a liter of good beer, not the cheapest small beer, it was only about 5% of that income. The prosperity of the seventeenth century in Holland made it possible to buy more beer, but consumers

¹³ Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 731-732; Hallema and Emmens, *Het bier en zijn brouwers*, p. 69; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 10; Schama, *The Embarrassment of Riches*, pp. 192-193.

¹⁴ G. A. Dordrecht, Archief van de Gilden, #955 [1574]; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, pp. 68-69.

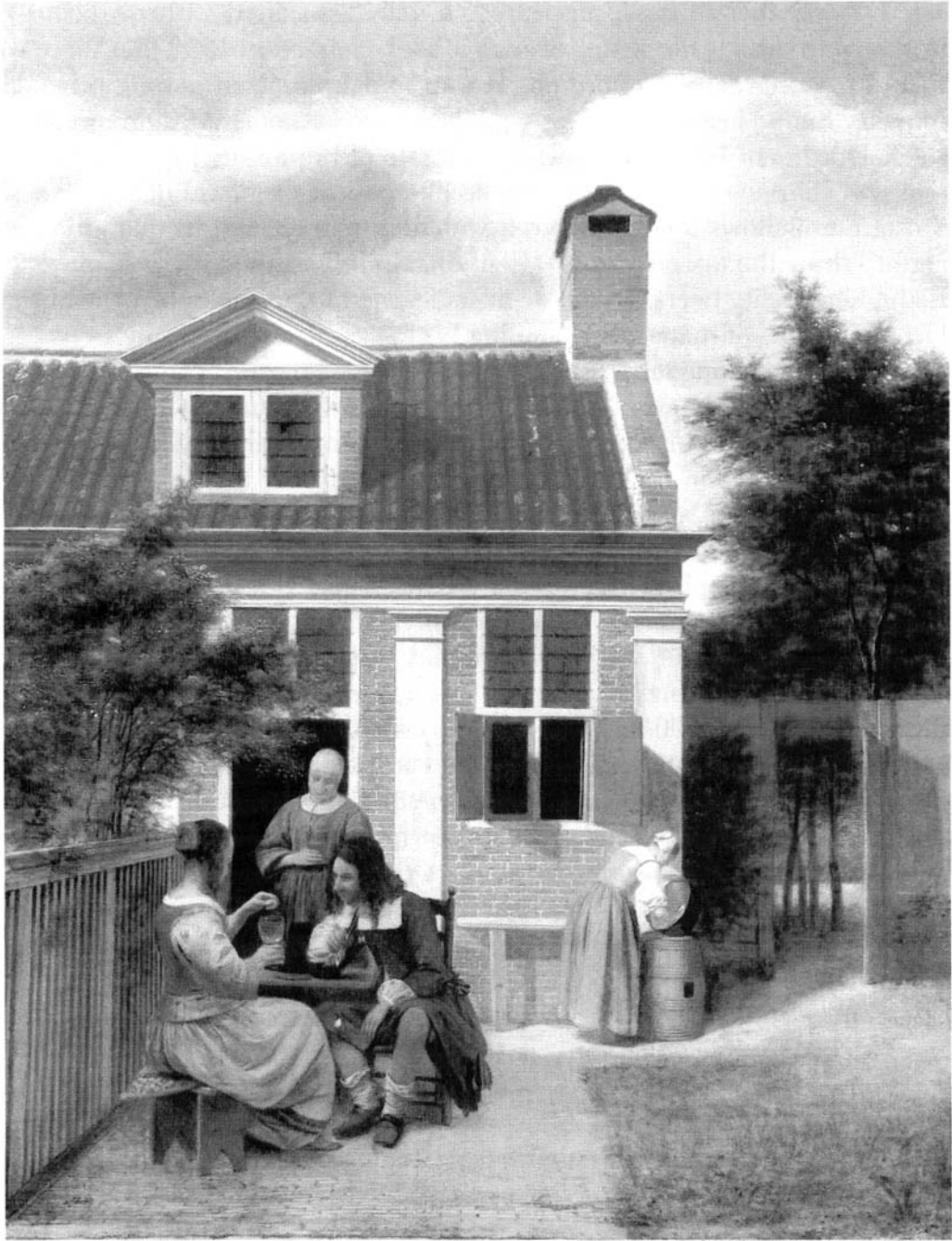
¹⁵ van Deursen, *Plain Lives in a Golden Age*, p. 102; Grolsch Bierbrouwerij, *Merckwaerdighe Bierolgie*, p. 102.

¹⁶ G. A. Delft, Eerst Afdeling, #971[1612]; van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 732-733.

took it as an opportunity to turn to the higher quality drink. Dutch merchants who invaded the ports of French Atlantic coast promoted the production of wine as a good to join salt, the traditional export, for transport to the Low Countries and then on into the Baltic. The volume of wines of all sorts shipped through the Sound rose markedly from about 1617. There were many technical reasons for the increase and the total volume was small compared to total production in France, the Rhineland and the Mediterranean, but one cause was the greater commerce in wine through Holland. A good portion of the French drink went to markets in Dutch towns. Wine did remain more costly than beer and enjoyed a higher status but the price differential between beer and wine narrowed in the seventeenth and eighteenth centuries while, at least in the seventeenth, rising incomes made wine accessible to more Dutch drinkers. The gradual change to putting wine in bottles and the development of the corkscrew around 1700 made the drink even more accessible. Complaints about shifts in taste in the seventeenth century tended to be about the drinking of wine in place of beer. It was the well-to-do who drank wine which left people of middling income as beer drinkers. The influx of Huguenot refugees from France in the wake of the revocation of the Edict of Nantes in 1685 may well have also increased the demand for wine relative to beer. At one Jesuit establishment, in Bergen, expenditure on beer from 1640 to 1770 remained a constant 11% of the budget. But in the same period expenditure on wine rose from 13%, just a bit more than on beer, to 34% of total outlays.¹⁷ The shift indicates a change in drinking habits and one which worked to the detriment of beer.

Along with wine came brandy from French coastal districts, distilled there in part to recycle the unusable products of the wine industry and in part to decrease the volume for shipment and so decrease unit transport costs. Brandy had been known since the high Middle Ages and made in Italy already by the thirteenth century. It was an export good by 1332, when some was sent to Paris, but then it was only used in small quantities and typically for medicinal purposes. Brandy sales in taverns in Holland were prohibited in 1536, though it could be sold to individual customers. Through the sixteenth century, however, the market

¹⁷ Aerts and Put, "Jezuïetenbier...", p. 112; J. M. Bizière, "The Baltic Wine Trade," *Scandinavian Economic History Review* 20 (1972), pp. 121-126, 132; De Commer, "De Brouwindustrie te Ghent, 1505-1622," pp. 83, 91-94; J. J. Horks, "Enige Taken van Bedrijvigheid in Amersfoort in de Achtienide Eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economische Geschiedenis, 1957, p. 17; van Loenen, *De Haarlemse Brouwindustrie voor 1600*, p. 57; Monckton, *A History of English Ale and Beer*, pp. 142-143; Soly, "De economische betekenis van de zuidnederlandse brouwindustrie in de 16e eeuw...", p. 103; Ten Cate, "Verslag van een onderzoek naar de geschiedenis van het Amsterdamse brouwersbedrijf in de 17e eeuw," p. 17; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 70.



22. Pieter de Hooch, three figures at a table in a garden, oil on canvas, c. 1663-5. The younger and better dressed woman seated is drinking wine while the woman standing is drinking beer suggesting that beer was the more ordinary drink and wine reserved for special occasions and the well-to-do.

Source: Rijksmuseum, Amsterdam

changed. A number of books appeared, usually associated with medicine, discussing how to distil. One writer of such a book claimed in 1588 that there were distillers in Amsterdam, Rotterdam, Hoorn and Enkhuizen among other Holland towns. Such “heated wine” was subject to excise tax at Amsterdam as early as 1504. Dordrecht laid down laws on the sale of brandy in 1518 and by 1563 Leiden was charging excise on it as well. The periodic renewal of such taxes, as at Amsterdam, shows it was sold to a widening market and in quantities great enough to draw the tax collectors’ attention. Brandy formed a viable alternative to the higher quality beers. Dutch distillers learned to produce their own brandy and from all kinds of materials, including beer.¹⁸

The more serious long term threat to beer makers, however, came from distilled spirits in the form of genever, gin with some flavoring of juniper. In a work dated 1552 which appeared in Brussels a writer described in detail how to distil. He recommended the addition of juniper, *geneverhout*, because of the medicinal benefits. The use of juniper and some differences in production methods separated genever from London dry gin, a type that appeared only at the start of the eighteenth century. The development of brandy distilling had created the necessary technology, expertise, equipment and market for the slightly different drink. Genever was made from malt, oats, rye, wheat or barley but it may be it was originally made from distilling wine. In the sixteenth century the distinction between gin and brandy was hardly made. Delft in 1590 made an effort to establish a distinction saying that distillers could not use grain but had to use wines and beers to make brandy. At Haarlem similar rules were laid down in 1593 prohibiting the six distillers from making drinks from grain. The concern was with town tax income since the town taxed grain as well. The regulations thus created a separate group of distillers who would produce a somewhat clear, flavored drink made from grains. Genever was a drink not for the upper ranks of society which remained loyal to wine and brandy nor for students who remained loyal to beer. But it was an alternative for laborers, that from its introduction to a wider market in the late sixteenth century. From 1583 there was a province-wide tax on “all heated wines” levied by the States of Holland. The number of distillers was clearly on the increase around 1600. By 1604 Rotterdam distillers had started an export trade. Already in 1608 at Schiedam a distiller was warned to make sure that the pig manure of his operations did not pollute local waters. Pigs were fed on spent materials from making spirits.¹⁹

¹⁸ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 1, #478 [1561]; Pieter Jan Dobbelaar, *De Branderijen in Holland Tot Het Begin der Negentiende Eeuw* (Rotterdam, 1930), pp. 10-20, 250; Engels, *De Geschiedenis der Belastingen in Nederland*, pp. 97-98; Hallema and Emmens, *Het bier en zijn brouwers*, p. 157.

¹⁹ Dobbelaar, *De Branderijen in Holland*, pp. 21-27, 265-266; van der Feijst, *Geschiedenis van Schiedam*, p. 140; Hallema and Emmens, *Het bier en zijn brouwers*, p. 158.

The advantages of gin to drinkers, as noted by English consumers in the 1720s and 1730s, had been learned and understood by Dutch drinkers as much as a century before. Production of genever rose briskly in the seventeenth and eighteenth centuries in Holland as the drink became more popular. Certain towns became centres for making and distributing the gin regionally and even internationally. Distilling grew rapidly from the 1640's. Regulations of 1671 and 1672, presumably implemented because of war with France, seriously limited the importation of French wines and brandy. Those regulations proved a long term advantage to Dutch distillers. Leiden got 13 new distilleries alone between 1670 and 1672. Despite the favorable legislation the pace of growth seems to have slowed from about 1675 but then picked up again after 1750. Expansion of gin production in Holland predated that in England but also revived in the second half of the eighteenth century when English output levelled off. In England the government charged excise tax on no less than 4,500,000 liters of distilled spirits in 1696 but that figure was dwarfed by the 32,000,000 liters subject to tax in 1751. Admittedly the level fell back by 1758 to 8,400,000 liters. London alone in 1736 had 7,044 gin shops. That was one house in every six in the city.²⁰ The Holland industry did not go through such dramatic changes, in part because it was not subject to sharp changes in taxation policy. It did probably surpass the English industry in output in the seventeenth century and approach it in output on occasion in the eighteenth so Dutch per capita production was always much higher than English.

Over time the industry in Holland came to be concentrated in ports with imported grain at hand and with the potential for exporting the final product. In 1691 it was estimated that distillers in Holland used almost 28,000 tonnes of grain each year. That compared to more than 66,000 tonnes of rye and wheat shipped out of the Baltic in the same year.²¹ For at least much of the seventeenth century government regulation and taxation of distilling was neither as stringent nor as effective as with brewing. Since it was a relatively new industry the government could not fall back on a long tradition of supervision. By the second half of the eighteenth century, when the industry underwent a second period of growth, Rotterdam, Delfshaven and especially Schiedam had established themselves as centres for the production of genever. In the 1670s Schiedam had only 10 distilleries at most, in 1700 only 34, but by 1730 the number was up to 121. It fell to 111 in 1750. The early years of the eighteenth century were not always

²⁰ Dobbelaar, *De Branderijen in Holland*, pp. 26-27, 59, 65; King, *Beer Has a History*, p. 97; H. A., Monckton, *A History of the English Public House* (London, 1969), p. 66.

²¹ Nina Ellinger Bang and Kund Korst, eds., *Tabeller over Skibsfart og Varetransport gennem Oresund 1497-1783* (Copenhagen, 1906-1953), 1, part 2, 1930.

good for distillers, but that changed as time went on. In 1771 Schiedam had 122 distilleries while Rotterdam and Delfshaven had 22 each. In 1775 Schiedam boasted 120 distilleries but by 1792 the number was 220, by 1798 260 and the total for Holland was about 400. The level of output grew even faster than the number of distilleries since there was a tendency toward large scale production. The geographic concentration, which led to a decline in distilling in Dordrecht, Delft and Weesp, was mirrored in the concentration of firms. Professional commercial distillers with multiple kettles expanded while small domestic distillers closed. There were exceptions as at Schiedam in the 1790s but such exceptions were rare. In 1805 Schiedam and Delfshaven together still boasted 268 distilleries.²² The great majority of the Schiedam distillers relied on sales to foreign markets. In 1771 only 15% of total output in Holland was sold at home, a fact of some but little comfort for brewers.

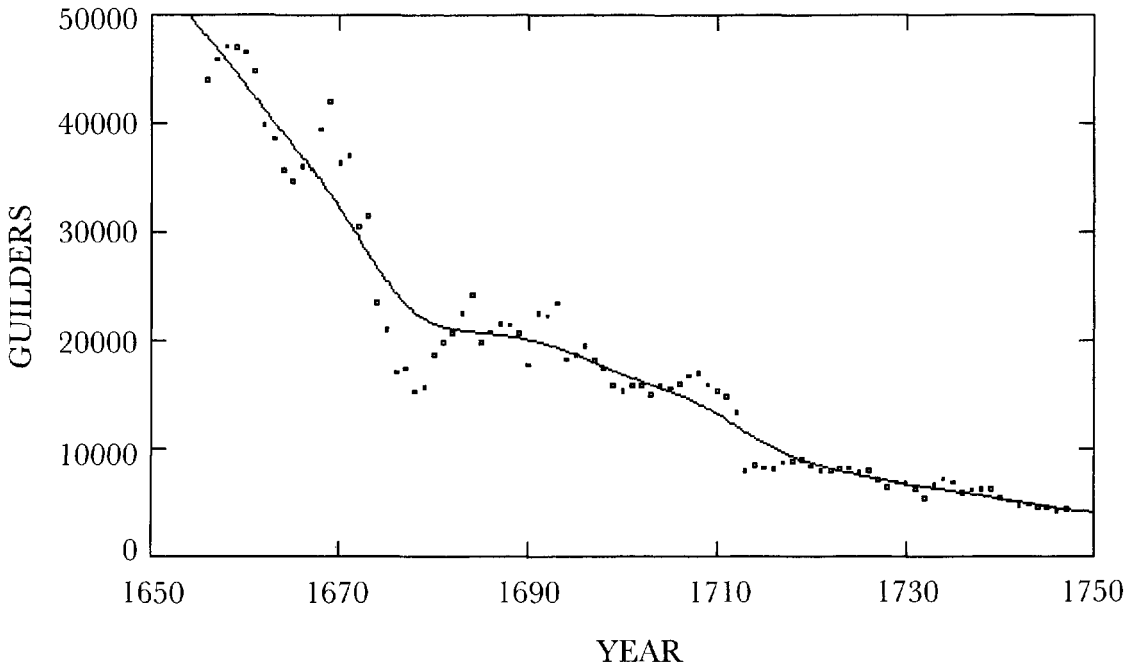
Brewers had access to the raw materials for making gin and could use some of the same equipment so many set up distilleries alongside their breweries. Three of the 111 Schiedam distillers in 1750 were also brewers. At Delft expansion of distilling compensated to a limited degree for the decline in brewing. The success of Dutch gin on international markets depended on its high quality. The success of distilled spirits in general depended on its lower price for an equal volume of alcohol found in beer. Spirits took up much less space for the same quantity of alcohol. They could also last longer than beer. Those considerations were especially important on board ship. Through the eighteenth century European navies replaced their beer ration with spirits. It became common to give crewmen on Dutch naval vessels a very small daily dose of brandy but later that changed to lemon juice or genever. Sailors' complaints about exhaustion of beer supplies and the souring of beer made the shift to spirits all the more logical.²³ Presumably commercial shippers changed to genever from ship's beer even before the navies did in the middle years of the eighteenth century.

It was with the poor that spirits found their greatest popularity and so formed the greatest threat to beer. For comparable levels of alcohol intake beer drinking gave the consumer more calories, vitamins, and minerals which was one reason for the complaints about the consumption of spirits. It was also a reason why distilling did not enjoy the "moral legitimacy" that brewing did at least in Holland. In about 1688, the brewers of Leiden in explaining why their trade had fallen on

²² Dobbelaar, *De Branderijen in Holland*, pp. 50, 68, 87, 103-104, 139, 188-189, 203, 209, 255; van der Feijst, *Geschiedenis van Schiedam*, pp. 129-130; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 118-119; Johannes De Vries, *De economische achteruitgang der Republiek in de achttiende eeuw*, second edition (Leiden, 1968), pp. 91-92.

²³ Bruijn, "Voeding op de Staatse Vloot," pp. 178-180; Dobbelaar, *De Branderijen in Holland*, pp. 104-109, 117-119; van der Feijst, *Geschiedenis van Schiedam*, pp. 131-132.

Figure IX-1

Income from the Tax on Great Beers at Leiden, 1656-1748

Source: G. A. Leiden, *Secretaire Archief* na 1573, #4338-4341

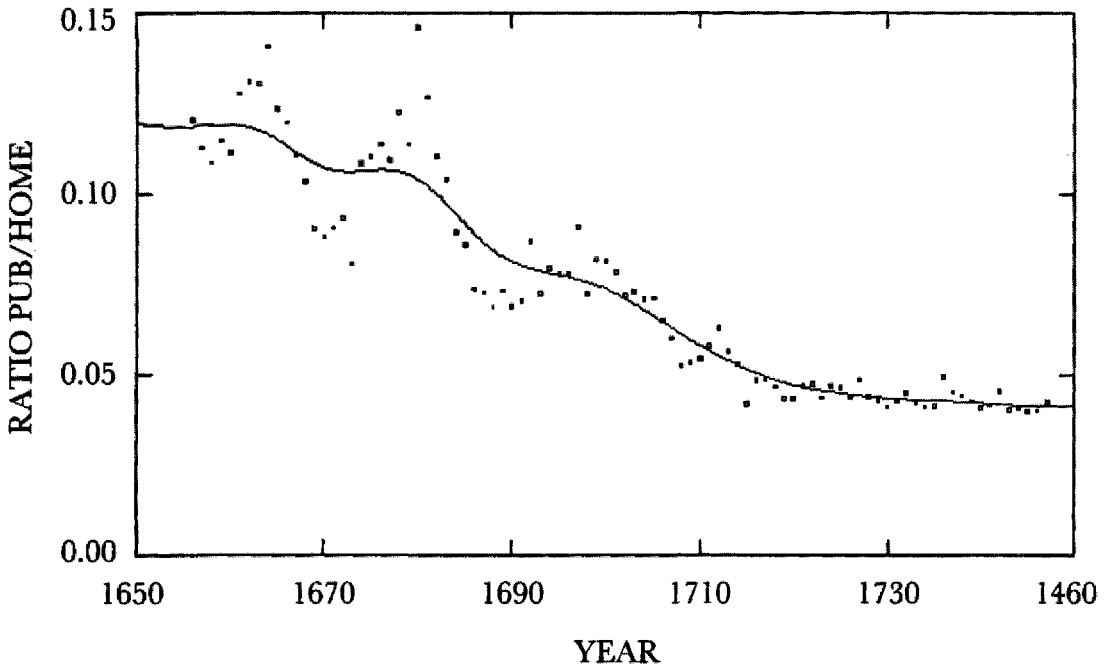
hard times, said that tradesmen, skilled laborers now spent their evenings and days in gin shops, spending their money to the detriment of themselves and their families, and of the brewing industry as well.²⁴ The observations of the Leiden brewers are given some limited support by data for the income from excise taxes in their town on different types of beer. The annual figures from 1656 to 1747 for the tax on Leiden or Delft, later called big, beers confirm the general pattern throughout Holland. They also conform to the record of declining beer production at Leiden in most of those years.

The excise taxes were levied at different rates depending on where the beer was drunk. Citizens taking beer home for domestic consumption paid at a lower rate than if they drank it in a pub. The income from taxes on beer consumed in taverns fell more rapidly in the period. Not only did Leidenaars drink less beer they found themselves in pubs less often doing that.

People may have spent more time at home, probably a sign of rising incomes.

²⁴ G. A. Leiden, *Archieven van de Gilden*, #232; Schama, *The Embarrassment of Riches*, p. 191.

Figure IX-2

Ratio of Pub to Home Consumption at Leiden, 1656-1747

Source: G. A. Leiden, *Secretaire Archief* na 1573, #4338-4341

Drinkers may also have spent more of the time they were in pubs drinking gin. Even so, the sharp fall in the ratio indicates some loss of conviviality and perhaps of the sense of cohesion among people in neighbourhoods in Leiden and by implication in other Dutch towns. They also imply hard times for the owners of pubs.

The long term dangers from gin and other drinks did not seem serious in 1600 or even 1620. Beer was a part of the diet and its production was important to the economy in Holland. Confidence in the beneficial powers of the drink were shared throughout northern Europe and especially by Dutchmen, that is if stories about Dutch drinking habits are to be believed. The beer container was said to be on the table in Dutch homes four times a day at each meal including the one at 4:00 in the afternoon. Consumption levels remained in the range of 0.7-1.0 liters each day for every man, woman and child.²⁵ Brewing and beer drinking

²⁵ van Deursen, *Plain Lives in a Golden Age*, pp. 100-101; Grolsch Bierbrouwerij, *Merckwaerdighe Bierolgie*, p. 99; Soly, "De economische betekenis van de zuidnederlandse brouwindustrie in de 16e eeuw...", p. 102.

were deeply embedded in the popular culture of Holland. The arguments from brewers about their contribution to employment in towns were still valid in the first decades of the seventeenth century. The complex system of distribution for beer guaranteed employment for a number of officials and workers and also gave to urban streets distinctive characters. The growth in population and the economy through the closing years of the sixteenth and early seventeenth century generated a prosperity but also a false sense of success and certainly a reluctance to address the deep-seated structural, technical and commercial problems of the brewing industry. Brewing survived the long period from the close of the fifteenth century to the early decades of the seventeenth with apparently few scars and not much changed. There were fewer brewers, it is true. The firms that survived were bigger and more robust with bigger kettles, more efficient plants and the potential for making better beer. Breweries did close, as at Delft where some 58 shut down between 1600 and 1640. But 15 of those after a period of being closed reopened.²⁶ The total volume of production and the revival of some units assuaged fears of disaster.

The general decline of Dutch brewing began some time in the first half of the seventeenth century and continued through into the nineteenth. It was part of the general decline of Dutch industry. Brewing contracted from the 1650s at a time when many other industries and trades were still booming. At first the trend was not clear, but by the 1670s there could no longer be any doubt. The decline cannot be blamed on the 80 Years War, on the Revolt against Spanish rule, despite what at least one staunch supporter of the Dutch Republic argued.²⁷ Brewing, though disrupted by fighting in the early days of the war, revived and expanded in a number of towns down to the 1620s and in some places even to the 1650s. It was after that when problems for brewing became serious and obvious. The explanations for the collapse lie in declining demand for beer, deteriorating quality of beer and high costs of brewing. All were connected, since the shrinking market and high costs forced brewers to thin their beer and so make it a less appealing drink. The amount of grain used in Holland to make a liter of beer by the 1770s may have been as much as a quarter of the amount used two centuries before. Along with the grain input the alcohol content fell for lesser beer from 3-4% down to 2-3% and for beer of good quality from about 9% to between 5% and 7% throughout the Low Countries despite efforts, like those at Haarlem in 1749, to keep brewers from lowering the quality of their beer.²⁸ A report on the propor-

²⁶ van Bleyswijck, *Beschryvinge der Stadt Delft*, pp. 734-736.

²⁷ van Bleyswijck, *Beschryvinge der Stadt Delft*, p. 732.

²⁸ Magré, "Be Brouwning in Haarlem van 1700-1800," p. 2; C. Vandenbroecke, *Agriculture et alimentation*, Centre belge d'histoire rurale 49 (Ghent and Leuven, 1975), p. 536.

tions of grain brewers used, from around 1628, suggested little change from the sixteenth century. Brewers still used oats but the proportion was smaller than in the previous century. If the barley component went up while that of oats went down, which is not an unreasonable assumption, then brewers used more grains which were easier to work with and which were more likely to produce vegetable matter for fermentation. That would have made brewers more productive by the 1620s compared to the middle or late sixteenth century. It was not a shift in the types of grain used to make beer that bothered consumers. It was the decrease in the quantity of grain, a process that went on through the eighteenth century.

Around 1735 the Leiden brewers' guild declared that it was pleased to offer reasons for the fall in beer consumption which was ruining brewing. The brewers blamed strict enforcement of the beer tax, unlike the lax treatment in Haarlem. They blamed the fee they had to pay beer brokers, a fee which did not exist elsewhere. They blamed the need to pay tax on much of the beer supplied to ships. They blamed the imposition of heavy taxes, unlike the practice at Gouda. They blamed the prohibition on producing small beer of somewhat better than the worst quality. They blamed the drinking of spirits and wanted the sale of such beverages limited in the morning and evening. They were fearful that vinegar makers set up in a nearby town would make beer instead. They asked to be allowed to sell beer on Sunday. They asked for taxes on coffee and tea since consumption of those had gone up.²⁹ The litany reveals a strange contradiction. Among perceptive observations about the shifting tastes of potential consumers there are petty matters which could have little long term effect on the industry. Dordrecht brewers, when faced with the same question about the long term decline of brewing in 1784, added the high cost of land, the high cost of maintaining a stock of barrels and the high cost of raw materials. The passage of time may have given them a better perspective since they did not dwell on minor issues. They were still most deeply and directly concerned with matters of tax and of barrels. Earlier, in 1688, when complaining about a new government restriction on their doing business, Dordrecht and Rotterdam brewers said brewing was in decline because of the rising consumption of wines, coffee and tea. All they asked was the situation not be made worse by subjecting brewers to even more and crippling regulation. In no instance did they mention the deterioration in the quality of their beer, something an Amsterdam beer importer and a publican said in 1665 had driven them to find sources of supply outside of Dordrecht, despite contractual ties to brewers there.³⁰

²⁹ G. A. Leiden, *Archieven van de Gilden*, #250.

³⁰ G. A. Dordrecht, *Archief van de Gilden*, #1021 [7 June, 1784]; G. A. Rotterdam, *Oud Archief*, #2187 [1688]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsteven en het Gildewezen van Amsterdam*, 3, #1543 [1665].

Table IX-1

Proportions of Grains Used to Make Beer, in % about 1628

<i>Town</i>	<i>Wheat</i>	<i>Oats</i>	<i>Eastern Malt or Buckwheat</i>	<i>Native Malt</i>
Delft	13	13	13	61
Leiden	14	14	14	58
Amsterdam	10	21	20	49
Weesp	10	10	10	70
Rotterdam	9	9	18	64

N. B.: Neither Rye nor Barley are mentioned as being used to produce beer.

Source: G. A. Haarlem, *Archief van het Brouwersgilde*, #90, 17.

High rates of tax and restrictions on their actions were the reasons brewers often gave for the decline of the industry. However, since buying grain typically constituted around two-thirds of direct costs to the brewer the price of barley and other food grains presented the most immediate problem for brewers. In general grain prices were stable to the middle of the seventeenth century when they began to fall but in the eighteenth, and especially from the 1730s, they rose. From the 1730s to the first decade of the nineteenth century the average price of the chief food grains in the Netherlands rose 265% which must have placed a heavy burden on already threatened brewers.³¹ When grain prices went down, a 1636 English report said, brewers increased their profits but when grain prices went up they used less grain to keep profits at the former level.³² The first reaction of eighteenth century Dutch brewers to rising grain prices was almost undoubtedly to thin their beer. Requests for short term increases in beer prices first appeared in the 1750s. Requests for general increases appeared from the 1770s and for pervasive and permanent price increases toward the close of the century. The arguments in favor were always based on the rising cost of grain. By the 1790s brewers became more insistent and called for big price jumps. The unstable political circumstances and the

³¹ Abel, *Agricultural Fluctuations in Europe...*, pp. 147-152, 173-175.

³² Public Records Office, London, SP 16/341/124.

wars of Revolutionary France contributed to their higher grain costs and increased the pressure.³³

The import of grain from the Baltic was one of the sources of prosperity for the Dutch Republic in the sixteenth and through the first half of the seventeenth century. Part of the grain coming out through the Sound, past Helsinor castle where the King of Denmark taxed shipments, was destined for brew kettles in Dutch towns. Those imports from the Baltic began to decline in the closing years of the seventeenth century just as the brewing industry continued its sustained contraction. The causes for the decline in imports of grain from the Baltic, though, are not to be found in the shrinking of the market for brewing malt in Holland. Since the beer consumption pattern at Amsterdam was much the same as elsewhere in the province and since Amsterdam was at the end of the Baltic grain route, then the relationship between payments of the provincial beer excise tax, the *gemeene landsmiddelen*, and shipments of grain out of the Baltic, as recorded by the tax collectors of the King of Denmark, indicate the effects of decline in beer consumption on that grain trade. The yield from the tax on beer in Amsterdam was not correlated with the export of rye from the Baltic ($r=.04$; r =the Pearson correlation coefficient which describes the degree of linear association between the two variables). The relation was stronger but hardly impressive compared with the tax yield in all Holland towns ($r=.09$). Rye was not used typically in brewing so the results are not surprising. The tendency over time was to use more barley. By the end of the eighteenth century it had become the premier brewing grain and so the barley harvest was what interested brewers, both in its timing and in its quantity. With total Baltic wheat exports, excise tax income was negatively correlated (for Amsterdam, $r=-.35$, for all towns, $r=-.27$). The relationship was still not strong, not even as strong as the relationship between rye brought out of the Baltic in Dutch ships and the rate of change in the tax income (for Amsterdam, $r=.32$, for all Holland towns, $r=.39$). A closer examination of the year-by-year performance of total wheat shipments compared to the tax income shows that the relationship was even more random than the correlation coefficients suggest. Back in 1526 the brewers of Gouda said that because of the bad state of the Baltic grain trade, they would have to raise beer prices.³⁴ If the

³³ G. A. Vlissingen, *Archieven der Gilden*, #134, 19 Jan., 1758; Timmer, *De Generale Brouwers van Holland*, pp. 233-237, 247-248, 251-252; Vandenbroeke, *Agriculture et alimentation*, p. 539; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 69.

³⁴ Bang and Korst, *Tabeller over Skibsfart og Varetransport gennem Oresund*; Brünner, *De order op de buitennering van 1531*, p. 108; Buijs, "De Bierbrouwer...", pp. 23, 64-67; J. A. Faber, "The Decline of the Baltic Grain Trade in the Second Half of the 17th Century," *Acta historiae Neerlandica*, 1 (1966), pp. 108-131; R. W. Unger, "Brewing in the Netherlands and the Baltic Grain Trade," in: *From Dunkirk to Danzig Shipping and Trade in the North Sea and the Baltic, 1350-1850*, W. G. Heeres, L. M. J. B. Hesp, L. Noordegraaf, R. C. W. Van Der Voort, eds. (Hilversum, 1988), pp. 429-446.

politically motivated claim was true, it appears that from 1650 through to the late eighteenth century the tie between Dutch brewing and Baltic grain exports was not as close as in the early sixteenth century.

Not only rye and wheat came out of the Baltic. Barley and malt were shipped from a number of ports but even where those other goods were important to total exports, as at Königsberg, their volume was still small, except in the rarest of cases, compared to rye and wheat shipments.³⁵ Between 1562 and 1657 on average in the 87 years for which data survive 4,200 tonnes of malt came westward through the Sound in all ships. If all the malt had an average specific gravity of .80 and if all the malt was converted to beer at a rate of 1.2 liters of beer for each liter of malt then brewers would have made a maximum of 6,300,000 liters of beer from those exports. The amount was not significant when compared to the amount of beer produced in just Haarlem, for example, so clearly Baltic malt was at most a supplement to western European supplies. In 47 of the 87 years total malt exports did not even reach 4,000 tonnes.³⁶ Exports of malt carried in Dutch ships only was very weakly correlated with beer production at Haarlem during the period ($r=.31$). In 1786 the 27 breweries in Amsterdam, Rotterdam and Dordrecht used almost 11,400 tonnes of grain. That quantity was less than 20% of the average amount of rye alone that came out of the Baltic each year in the 1770's. The amount of grain used by the declining breweries made it unlikely, especially by the second half of the eighteenth century, that their demand would affect the total of shipments out of the Baltic or affect the grain trade in general. The very slight relationship between the movement in the volume of Baltic grain exports and income from the tax on beer confirms that the contraction of brewers' grain consumption cannot be a major explanation for the decline in Baltic grain exports. The principal grain suppliers of Dutch brewers continued to be close by as they had always been, and changes in the Baltic grain trade had as always little effect on brewing.

There is another reason for the weak connection between brewers' demand and Baltic grain shipments. In the eighteenth century English malt exports rose dramatically. The English tax system made it advantageous to convert grain and especially low quality barley to malt before export. In addition, English wheat prices fell in the eighteenth century so that they were highly competitive with the prices asked in Gdansk, the principal export harbor for Baltic grains. Competition from that alternate source across the North Sea allowed Dutch brewers to meet their needs more easily while combating the tendency for prices to rise.

³⁵ Horst Kempas, *Seeverkehr und Pfundzoll im Herzogtum Preussen. Ein Beitrag zur Geschichte des Seehandels in 16. und 17. Jahrhundert* (Bonn, 1964), p. 357.

³⁶ Bang and Korst, *Tabeller over Skibsfart og Varetransport gennem Oresund*.

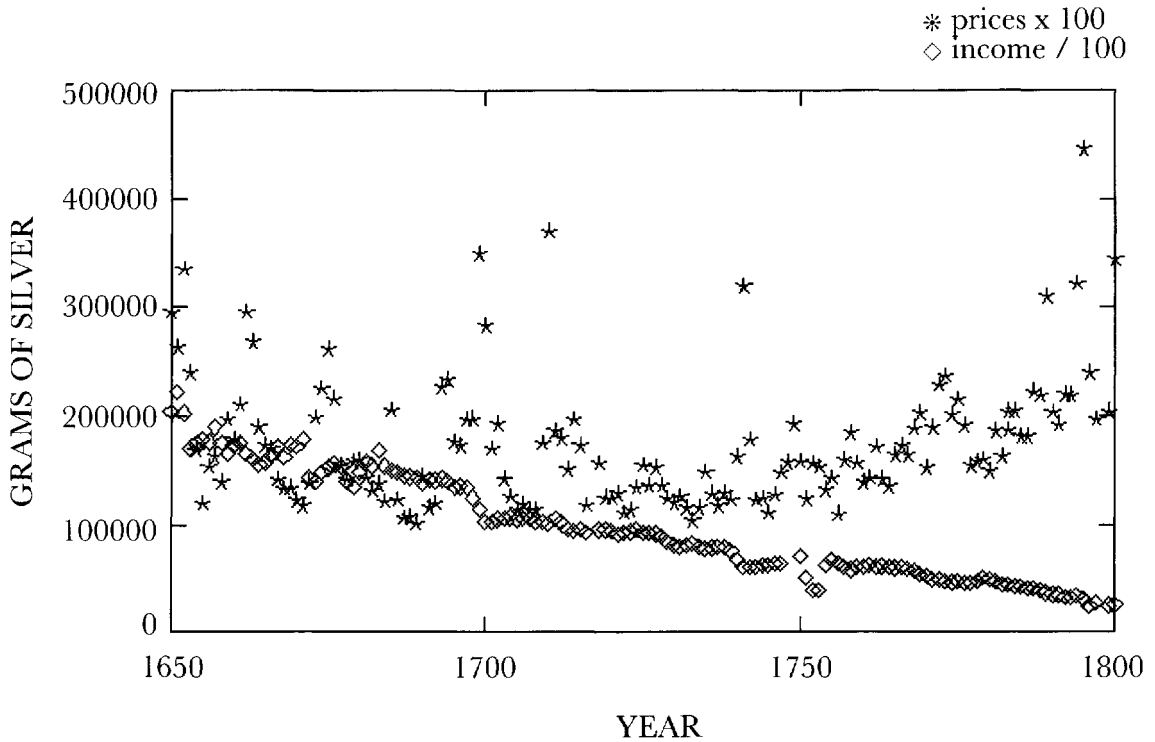
East Anglia became the principal source for malt going to Dutch brewers. The value of English malt exports grew 50 times from the 1660s to around 1700, admittedly from a very low base, but it continued to grow, more than threefold from around 1700 to around 1750. In the decade from 1746 to 1755 England exported an annual average of over 48,000 tonnes of malt. Holland, and especially Dutch distillers were the biggest market for all that English malt. England did not change from being an exporter to an importer of barley until the 1770's, when more barley was needed to feed England's rapidly rising horse population. The immediate effect of the reversal was a sharp rise in the price of barley malt in the Netherlands. English barley cost twice as much in 1784 as it had in 1730, a trend which further eroded Dutch brewers' competitive position.³⁷

Comparing the movement of grain prices with beer tax income yields different and more promising results, however. Comparison of prices for rye and wheat at Gdansk, Amsterdam and Arnhem to the annual changes in beer tax revenue for Amsterdam and for all towns in Holland for the years 1650 to 1800 show some higher levels of correlation.³⁸ In theory, a fall in the price of grain should lead to a rise in beer consumption. If buyers paid less for bread then presumably they had more money left to buy food grains in a different form, that is beer. Alternately or in addition, with lower grain prices brewers could increase the quality of their beer and so make it more attractive to potential buyers. On the other hand, a rise in the price of grains, especially the principal food grains of rye and wheat, should again theoretically have had the opposite effect. Using Arnhem prices there was no apparent connection between the price of rye and the income from the provincial excise tax on beer (for Amsterdam, $r=-.03$, for all towns, $r=.02$). Using Gdansk rye prices the results were only slightly better ($r=.03$, $r=.10$ respectively). The price of rye from Königsberg on the Amsterdam market did give the appearance of a weak and at least inverse relationship ($r=-.20$). Since a rise in grain prices should yield a fall in beer tax income, an inverse or negative relationship between the two is to be expected. The connection between Arnhem wheat prices and beer consumption through the period was

³⁷ A. H. John, "English Agricultural Improvement and Grain Exports, 1660-1765," in: *Trade, Government and Economy in Pre-Industrial England Essays presented to F. J. Fisher*, D. C. Coleman and A. H. John, eds. (London, 1976), pp. 49-53, 56-60; Peter Mathias, *The Brewing Industry in England 1700-1830* (Cambridge, 1959), pp. 426-430; Timmer, *De Generale Brouwers van Holland*, pp. 114-115; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 66; Charles Wilson, *England's Apprenticeship 1603-1763* (London, 1965), p. 146.

³⁸ N. W. Posthumus, *Inquiry into the History of Prices in Holland* (Leiden, 1946); Tadeusz Furtak, *Ceny W Gdansku W Latach 1701-1815* (Lwow, 1935), pp. 121-123; C. A. Verrijn, Stuart, "Overzicht van Marktprijzen van Granen te Arnhem in de jaren 1544-1901," *Bijdragen tot de Statistiek van Nederland*, nieuwe volgreeds 26 (The Hague, 1903), pp. 19-25.

Figure IX-3

Arnhem Wheat Prices-Holland Beer Tax Income 1650-1800

Sources: A. R. A., *Financien van Holland* #826, *Opbrengst van de gemeenelandsmiddelen* and C. A. Verrijn Stuart, "Overzicht van Marktprijzen van Granen te Arnhem in de jaren 1544-1901," *Bijdragen tot de Statistiek van Nederland*, nieuwe volgreeks 26 (The Hague, 1903)

apparently much stronger. The connection, no matter what form, appears to have increased over time. The income from the beer consumption tax and the price of 100 lasts of wheat, all reported in grams of silver, headed in opposite directions.

The price of Polish wheat in Amsterdam showed a higher negative correlation with beer sales in Amsterdam ($r = -.44$) and in all towns ($r = -.43$). The relationship with the price of wheat in Gdansk was even stronger (for Amsterdam, $r = -.49$, for all towns, $r = -.54$). For some towns, the correlation between beer tax income and Gdansk wheat prices was even greater (for Dordrecht, $r = -.61$, for Gouda, $r = -.65$). In all cases the sign is negative. The income to Holland from the tax on beer fell when wheat prices went up. Wheat was hardly used in making beer, but it formed part of a number of brews. It was not brewers' use of wheat so much as

the substitution among consumers of wheat bread for beer which is the logical explanation for the connection. The beer tax fell on higher priced varieties, not on the drink of the poor, people more likely to eat rye bread. The drinkers of taxed beer were better off and, though by no means all affluent, they would have been more likely to eat wheaten than rye bread. Because of the segment of the market involved, at least for wheat, the inverse relationship between grain prices and beer consumption predicted by theory seems to have prevailed. Direct evidence for such a consumption shift may be lacking but the connection between the two events is consistent with expectations and long run developments. As grain prices rose, no matter the grain, beer consumption went down.

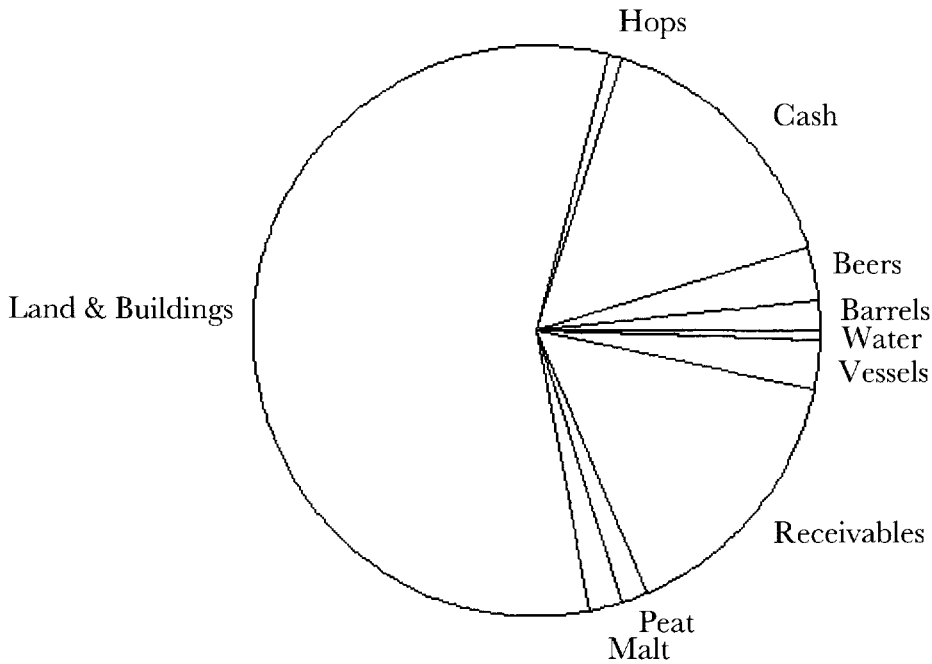
In addition to rising grain costs brewers faced increases in outlays for virtually all other items in their budgets. As early as the seventeenth century, the rising population and greater urbanization associated with the general prosperity of the golden century meant higher land costs. Capital expenditures in general rose. The town of Enkhuizen appraised four breweries in the town about every other year between 1774 and 1783 and then again in 1790 and 1791. They assessed the worth of the businesses by taking the value of land and equipment, adding annual outlays, subtracting debts, and adding cash on hand. The total estimated capital value of the four was written down by 500 guilders each year, an accounting convenience which may have had something to do with real depreciation. The cost of total materials over the entire period covered by the accounts was 18% of the capital value of the properties. The average value of a brewery at Enkhuizen was 4,250 guilders in 1774, down to 2,875 guilders by 1791.³⁹

Capital costs even at the end of eighteenth century during a period of sharply rising grain prices still weighed heavily on brewers' balance sheets. An outlay of more than 1,000 guilders to buy a brewery, even if the money could be borrowed at 4% or 3.5%, as the Groenlo brewer Harmen Jan Kuiper found in 1782,⁴⁰ still represented a considerable outlay for the business. The amount rose in an urban center, like Rotterdam, where the scale of brewing was higher and land cost more. A copper kettle able to hold over 22,000 liters, all the associated tools and containers as well as a maltery, a considerable expense given the size of the piece of land needed, could in the late eighteenth century drive the price up to 50,000 guilders. The average value of a brewery in Delft in 1710 was 24,000 guilders and the price rose slowly through the eighteenth century. By 1770 the average was up to 29,000 guilders with the highest priced up to 57,000 guilders. The equipment for an Amsterdam brewery sold in 1660 for just 8,000 guilders but that was only the kettles, troughs, two boats and other material

³⁹ G. A. Enkhuizen, #444, 9.

⁴⁰ Archief van de Brouwerij Grolsch, #136.

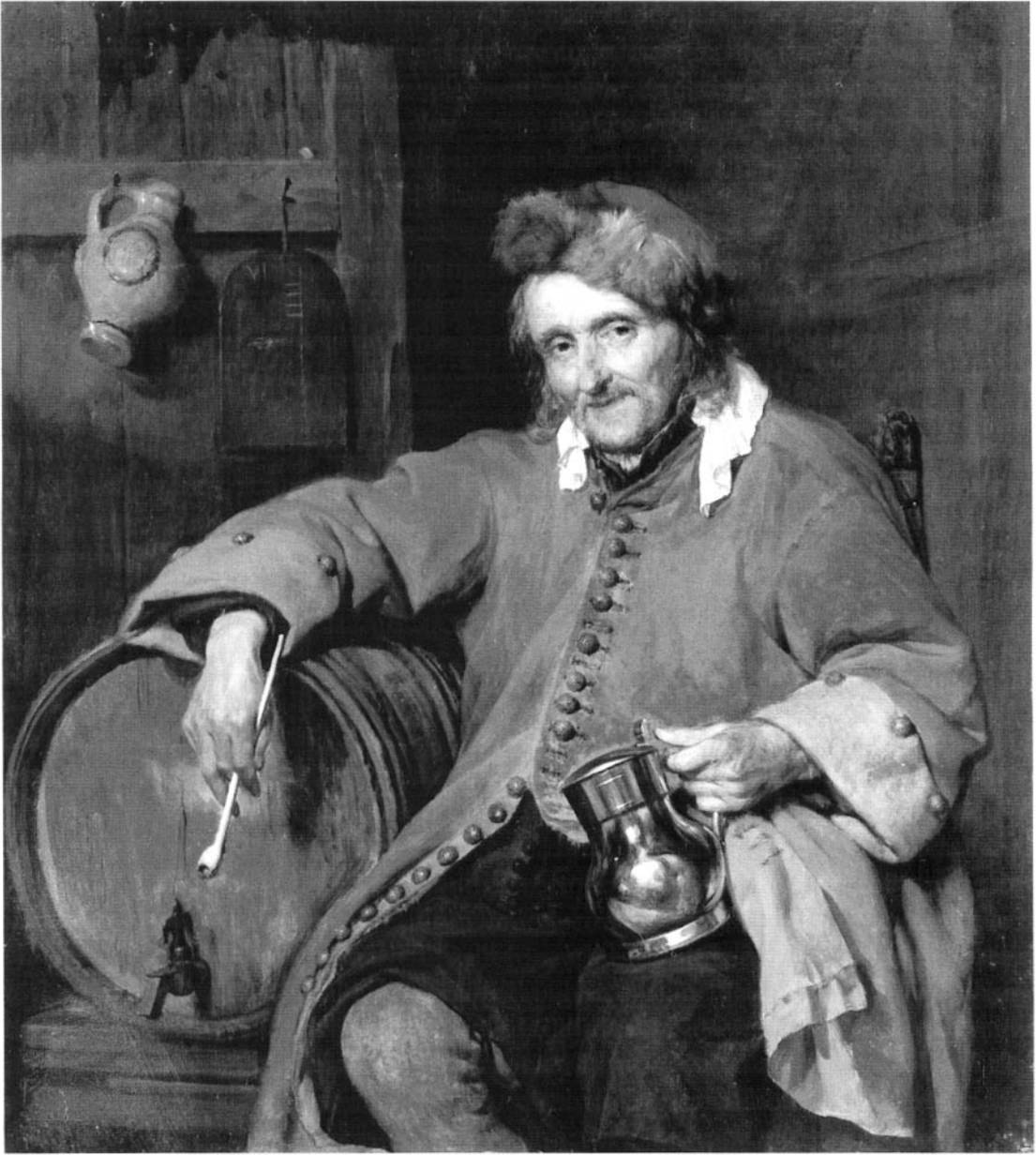
Figure IX-4

Composition of Capital of Enkhuizen Breweries, 1774-1791

Source: G. A. Enkhuizen, #444, 9

needed to make beer and did not include the building and ground.⁴¹ Not only was there the cost of plant and equipment, but also capital investment in stock. Typically in premodern industries turnover capital requirements were greater than fixed capital ones. That may not have been true of brewing, and certainly not true according to the assessors in Enkhuizen, but since it took some days to convert purchased grain into saleable beer and since beer could sit in the brewery for days or even a few weeks before it was sold, brewers always had sums in the hundreds of guilders tied up in goods in process. The latter explains the concern with advancing credit to beer retailers. It also helps to explain the concern over barrels, owned by the brewer but often in the hands of retailers and sometimes not returned. One Delft brewery in 1765 had about 5000 guilders invested in barrels. In addition brewers often contracted with suppliers for grain

⁴¹ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1439 [1660].



23. Gabriel Metsu, old man with pipe and tankard leaning on a beer barrel, panel, early 1660s. The sharp and precise characterization is a surprise. While the open collar, the two or three day's growth of beard and watery eyes all suggests decay and the exhaustion of old age the turn of the mouth and piercing eyes suggest something positive in the figure and in the life lived. Source: Rijksmuseum, Amsterdam

and heating fuel, paying in advance which put another burden on the capital budget.⁴²

Brewers in Holland did not buy other pubs. Legal restrictions probably counted less than financial limitations. They did not have the capital and found it hard enough to generate credit facilities for their customers, the publicans they supplied. A beer importer might lease a tavern to a beer-seller and designate himself the sole supplier of beer⁴³ but even such contracts appear to have been rare. At most, suppliers lent turnover capital to the operators of taverns and the operators either owned or leased the premises from a third party.

Brewing had always been capital intensive compared to other industrial pursuits and that did not change. Brewers' capital costs showed no sign of decreasing in the seventeenth or eighteenth centuries, though they did not have as much impact on the profitability of brewing as did rising costs of grain. No relief came from the capital side of the ledger to compensate for the pressure from rising grain prices. There was no relief from fuel costs either. The price of peat in seventeenth century Holland was said to be 2.5 times that in other parts of the Low Countries. One reason was taxation and the other was exhaustion of peat bogs. Holland towns relied on suppliers from throughout the Dutch Republic for peat. Not just any peat would do. Brewers needed heavier, darker, more dense types with less moisture content to get adequate heat intensity for their tasks. As regions in the western part of Holland were dredged for all their peat and the land converted to agriculture, suppliers turned to sources in Friesland. Access to those deposits required greater capital investment in canals and digging equipment. Peat production in the Dutch Republic fell by as much as 50% through the eighteenth century, in part because the remaining peat was farther from canals so more costly to transport. In addition, Frisian peat was said to give off less heat than the darker peat dug in Holland. All that affected prices directly. In the course of the eighteenth century the cost of heating fuel doubled for Delft brewers. By 1715 only 10% of total fuel supplies for brewers there came from peat, the rest coming from coal.⁴⁴ During the years from 1646 to 1806 the fall in town income from the beer consumption tax and from the peat tax paid by

⁴² Visser, *Verkeersindustrieën te Rotterdam*, pp. 69-70, 77-78; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", pp. 67-68.

⁴³ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1709 [1670].

⁴⁴ Faber, *Drie Eeuwen Friesland*, p. 246; Gerding, *Vier Eeuwen Turfwinning*, pp. 320-321; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 14; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 19, 32-33; R. W. Unger, "Energy Sources for the Dutch Golden Age: Peat, Wind and Coal," *Research in Economic History* 9 (1984), pp. 246-248; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 67.

brewers were very highly correlated ($r=.89$). It was almost as if it were the same tax.⁴⁵ The connection between the two was much stronger after 1715 so while brewers had already started substitution for peat in the early seventeenth century by the early eighteenth they had gone about as far as they could go in finding alternatives to peat.

The replacement fuel was coal. Once peat prices rose, suppliers of coal took advantage of the circumstances. They raised prices and reaped the benefits of declining access to high quality peat. The old prejudice against the use of coal did not disappear easily and either through fear of pollution or fear of lowering the quality of beer, the government of Amsterdam in 1638 insisted on the enforcement of old bylaws and required anyone with coal to get it out of their buildings within three days. The prohibition was repeated just four years later so it seems doubtful that it was fully effective.⁴⁶ The rules could be broken but such ordinances against the use of coal at the least limited the flexibility of those making beer in the face of changes in costs.

One reason that coal cost more was heavier export duties levied by the British government. Import duties on beer in the southern Netherlands rose in the eighteenth century which made it harder for Dutch brewers to sell their beer there.⁴⁷ Taxation overseas, however, was not as great a burden to Dutch brewers as the many and varied levies they faced at home. The brewers themselves repeatedly offered the level of taxation as the explanation for the decline of their industry. The explanation enjoyed wide circulation since taxation was subject to direct human control. Documents pointing to the evils of taxation were many because brewers tried to convince governments to change policies. The claims of self-interested brewers were of course suspect. Still they did pay taxes and those payments to governments took income and potential capital investment from the industry.

The direct threat to brewing and the more obvious explanation for the sustained decline was the competition beer suffered from other drinks. First, wine consumption held up and then increased in the course of the eighteenth century, from around 1600 genever consumption went up and then in the eighteenth century the battered brewing industry faced a new danger. Tropical drinks, coffee, tea and cocoa, offered real alternatives to beer. They all started as exotic beverages brought from far away, were hard to find and used almost exclusively for medicinal purposes. In the sixteenth century some doctors strongly advocated

⁴⁵ G. A. Delft, *Eerste Afdeling*, #678.

⁴⁶ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #349 [1638], #642 [1642]; Timmer, *De Generale Brouwers van Holland*, pp. 114-115.

⁴⁷ van Uytven, "De Leuvense Bierindustrie in de XVIIIe Eeuw," p. 211.

the healing powers of both coffee and tea. First it was apothecaries that sold those drinks. Second it was the owners of new institutions; coffee houses. Those first appeared in the 1640s and 1650s. Tobacco was sold in them along with another new product, newspapers. By the end of the century coffee houses had become places for well-to-do businessmen to gather. Prices were high. It was not until the middle of the eighteenth century that coffee gained widespread acceptance in European homes. Prices had plummeted as the international trade in coffee and tea had grown dramatically. In the second half of the eighteenth century coffee prices fell by 81% while those for tea by 95%. In 1800 each still cost much more than an equal quantity of beer, though.⁴⁸

The change in consumption toward tropical beverages went quickly in Holland. Commercial contact with both the East and West Indies made the drinks available sooner, in greater quantities and at lower prices than elsewhere in Europe. In Holland coffee was always more of a man's drink, tea more one for women. Chocolate remained largely a drink for fine ladies. Beginning in 1691, coffee, tea, and cocoa were taxed in Holland. Being taxed in the same way as beer, grains and meat was a sign that the tropical drinks had become a normal part of Dutch life. It also indicated that those drinks would be a serious threat to beer and to the brewing industry. The brewers realized the danger, it seems, and petitioned that the rate of tax on tropical drinks be raised. The method of assessment of the tax on coffee, tea, chocolate, and other drinks made with water was different from that with beer. The very well off, measured by their assessed wealth, paid a lump sum for such drinks. Those who farmed the tax had a monopoly of sale and distribution and the poor had to apply to buy any of the drinks. Registered retailers later got the right to sell the goods, always buying their supplies from the owner of the tax farm. The system remained in place for some time.⁴⁹ The system of sale probably skews the tax records, not giving a precise report of exactly how much by volume or value of the drinks were sold.

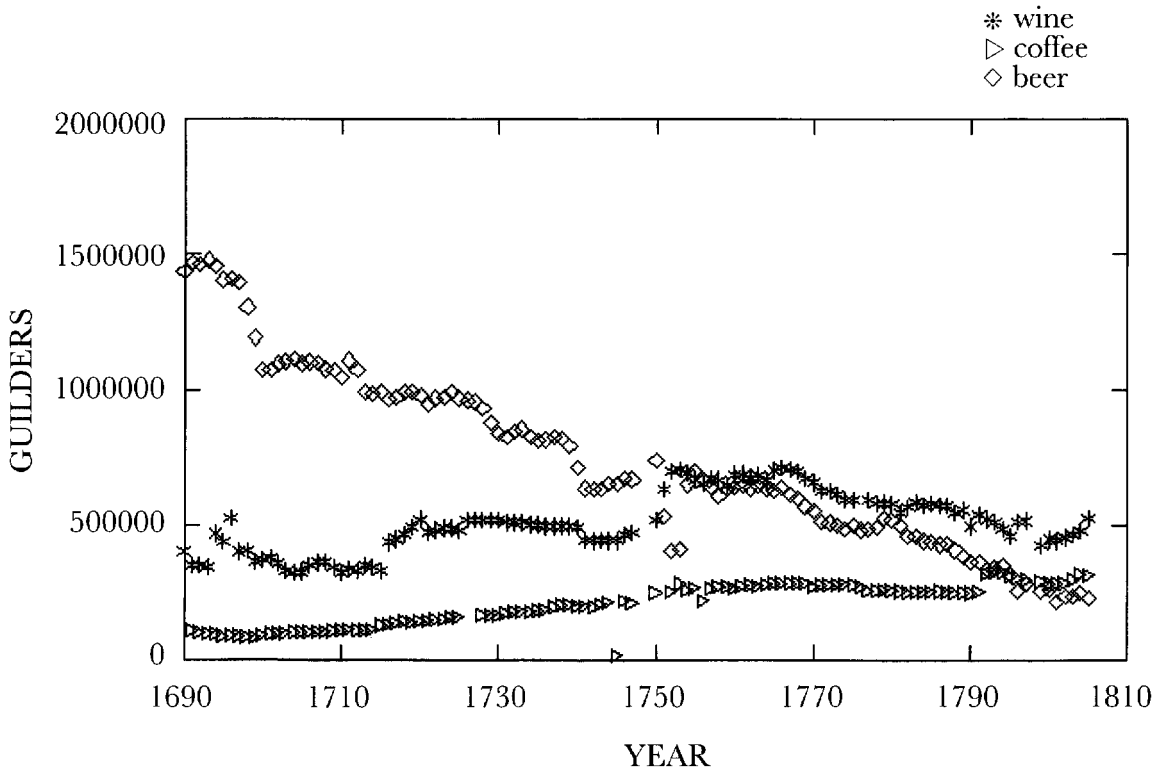
The income from the tax on coffee, tea, and cacao was small compared to the tax on beer but it grew, and the rate of increase rose over the course of the eighteenth century. By the tax year 1707-1708 at Amsterdam the tax on tea and coffee already brought the town more than twice what the tax on brewing brought.⁵⁰ By the end of the eighteenth century the tax on tea and coffee brought

⁴⁸ J. G. van Dillen, "De Achttiende Eeuw," *Tijdschrift voor Geschiedenis* 61 (1948), p. 27; Hunte-mann, *Das deutsche Braugewerbe*, pp. 114-115; Monckton, *A History of English Ale and Beer*, pp. 132-133.

⁴⁹ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 4, pp. 896-899 [1699], 5, pp. 1106-1109 [1715], 1298-1300 [1704], 1305-1307 [1707].

⁵⁰ Abel, *Stufen der Ernährung*, pp. 55-57; R. Beeldsnyder, *Verslag van een Onderzoek naar de Ontduiking van de Voornaamste Imposten te Amsterdam gedurende 1701 t/m 1710 (wijn, bier, brandewijn, gemaal, turf, zeep,*

Figure IX-5

Income from Provincial Taxes on Drinks, 1690-1806

Source: A. R. A. *Financien van Holland*, #826

in more than the tax on beer for the province of Holland. The income from the wine tax, however, caught up with the beer excise much earlier, already by the middle of the century. Wine apparently continued to be a threat to beer sales and wine sales held up, even increasing slightly it would seem, while beer consumption hurtled downward.

The total income from the tax on the tropical drinks was most highly correlated with the revenue from the tax at Rotterdam. Even Amsterdam lagged behind the Maas port in conforming to the general pattern of consumption of coffee, tea and cocoa. Haarlem followed the pattern least closely, suggesting that wine and especially beer held on longer there as common drinks than in the other towns.⁵¹

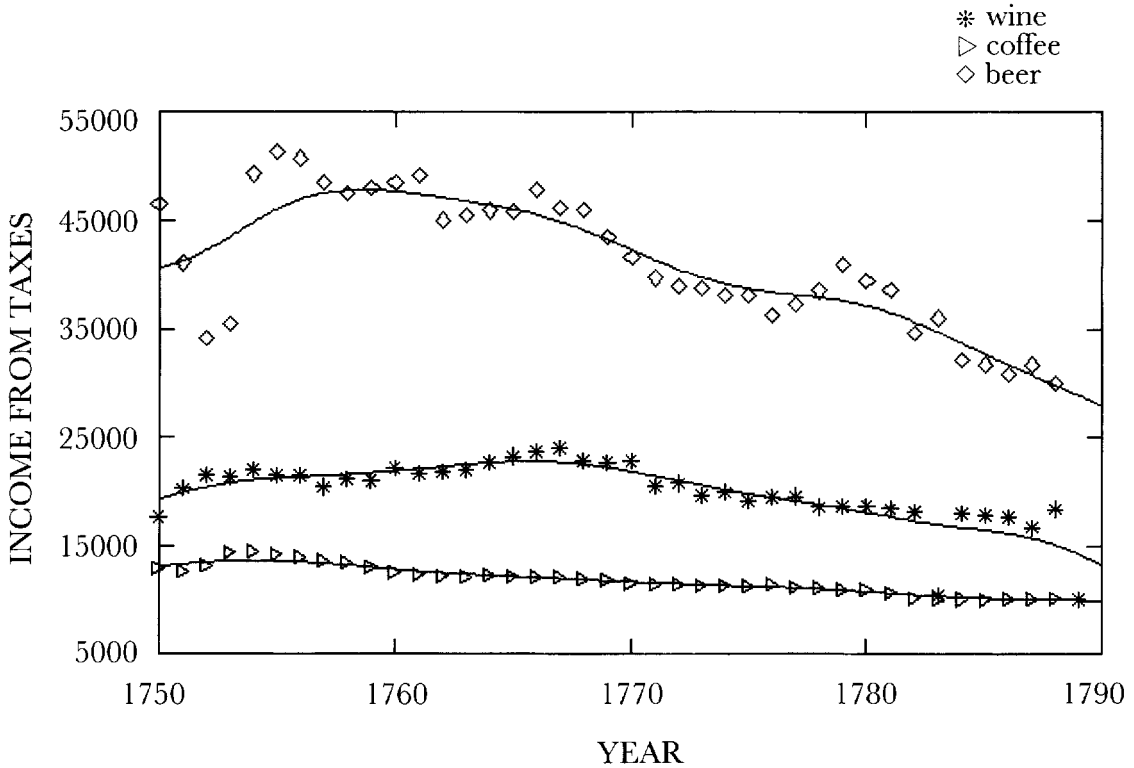
boter, zout) (n.d.), pp. 5-6; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 113, 159-162; Oldewelt, "De Hollandse Imposten en Ons Beeld van de Conjunctuur Tijdens de Republiek," p. 51.

⁵¹ A. R. A. *Financien van Holland*, #826.



24. Job Berckheyde, view of the Bakenessegracht at Haarlem, oil on canvas, c. 1670. On the left is the brewery '*De Passer(en de Valck)*'. Despite decline still in the late seventeenth century a brewing town like Haarlem had a number of breweries along the major waterways.
Source: Belasting & Douane Museum, Rotterdam, Nr. 1172, photograph by Robert J. Tiemann.

Figure IX-6

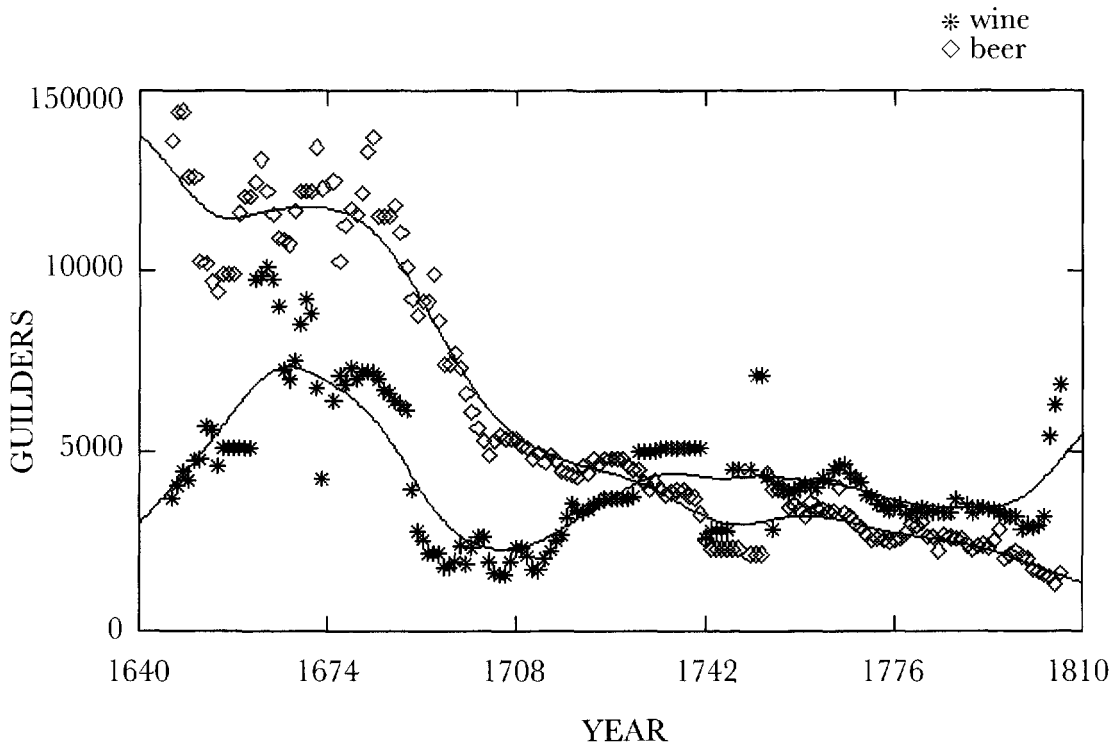
Income from Provincial Excise Taxes at Delft, 1750-1789

Source: A. R. A., Het Archief van de Financien van Holland, #850A-B

Delft ran somewhat against the general trend since the tax on beer brewed in Holland brought in much more than the tax on coffee or on wine. In fact it was only in the 1780s that income from the two taxes combined approached the income from the tax on beer alone. Since beer consumption was falling and that of coffee rising there may have been something to brewers' complaints that other drinks were treated more kindly by the tax system.

Over the long term the income from the town excise tax on beer fell dramatically. The tax on wine fell as well in the last quarter of the seventeenth century but then revived and remained relatively stable through much of the following 100 years. The wine tax brought in about the same amount as the beer tax by the first years of the eighteenth century and then exceeded it down to 1806. Wine consumption did not drop and perhaps even rose a little while beer consumers disappeared from the market.

Figure IX-7

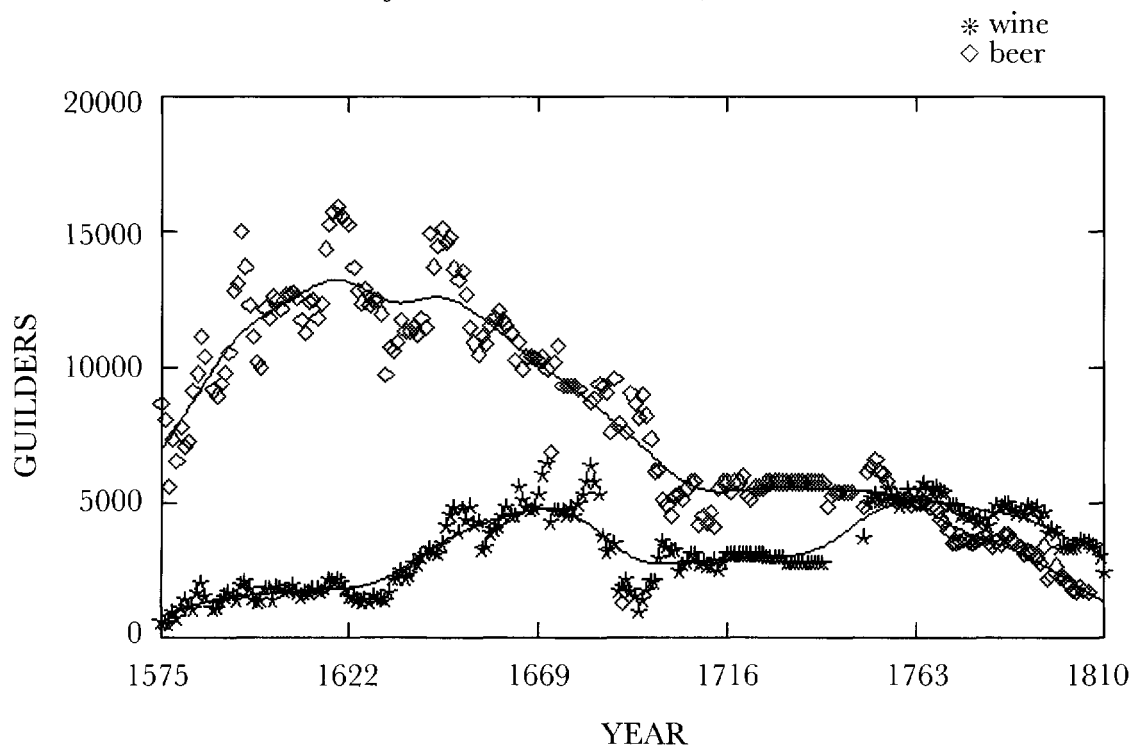
Income from Town Taxes at Delft, 1646-1806

Source: G. A. Delft, *Eerste Afdeling*, #678, *Rekeningen van der Thesaurier der Stad Delft*

Excise tax records for Gouda, available over a longer term, show exactly the same pattern. Overall income from the beer tax held up through the first half of the seventeenth century and despite a sharp slide downward even around 1700 could on occasion rise to high levels. The eighteenth century showed continuing decline, the pace of fall increasing down to and through 1800. The income from the tax on wine by the closing years of the century even exceeded that from the tax on beer, although after 1750 the category for wine was expanded to include the tax on vinegar and that may explain the wine tax finally surpassing the beer tax. The figures for the years from 1715 to 1748 for both wine and beer are somewhat misleading since the town farmed the taxes for the same amounts year after year with changes in the amounts only coming slowly if at all.

The records for the second half of the eighteenth century for The Hague for the provincial excise produce dissimilar results from those at Delft and Gouda.

Figure IX-8

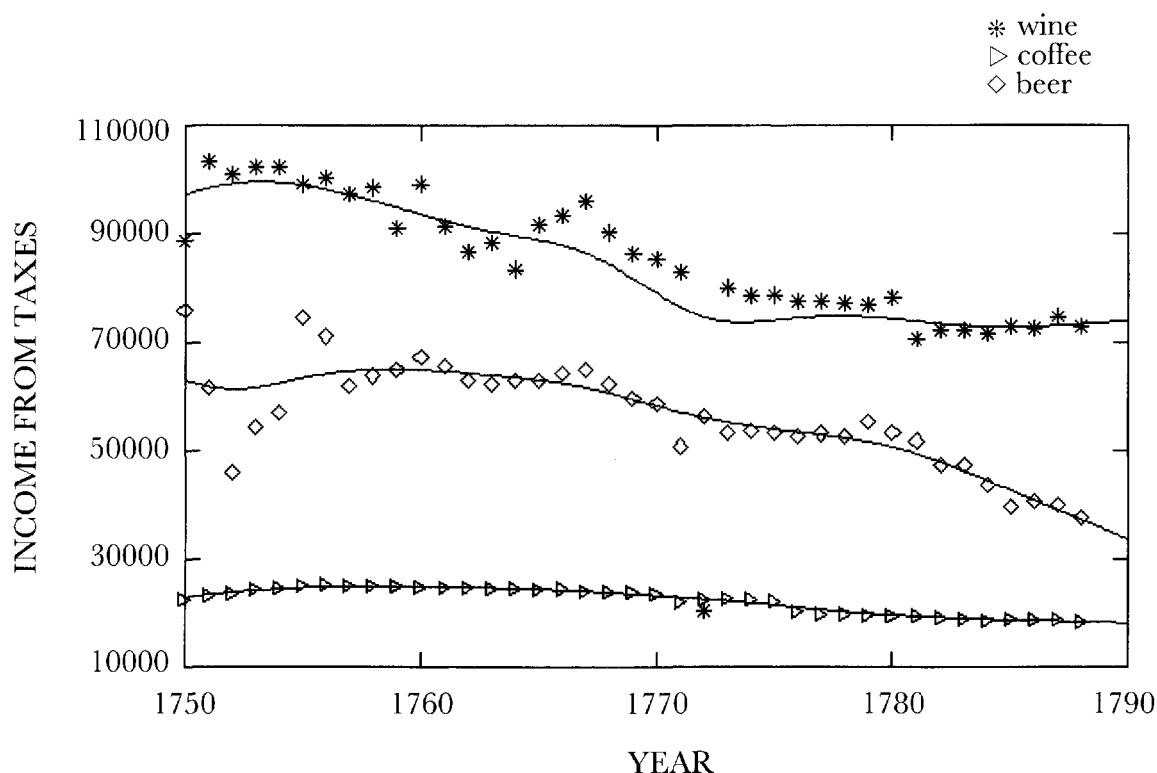
Income from Town Taxes at Gouda, 1575-1806

Source: G. A. Gouda, Oud Archief, #1222-1466

At The Hague the income from the tax on wine was more than beer and consistently so, reflecting the difference between a capital city and declining industrial towns. Though there might be exceptions and though over time the relative importance of beer tax income waned the government looked on beer as the major source of income on drink.

Hoorn had none of the mitigating factors of a town with many alien residents. It declined in the late seventeenth and eighteenth centuries, taking on something approaching the air of a ghost town. There were still trading connections to the Baltic and even the Far East but it was a shadow of the booming town of the first years of the golden century. Even at Hoorn the excise tax on brandy which presumably included the tax on wine consumption rose in value through the eighteenth century. While it had brought the city less than the beer excise tax in the 1690s a century later it was more than four times as lucrative. The Hoorn excises, like all excises, do not reflect accurately exactly how much of any beverage

Figure IX-9

Income from Taxes at The Hague, 1750-1789

Source: A. R. A., Het Archief van de Financien van Holland, 850A-B

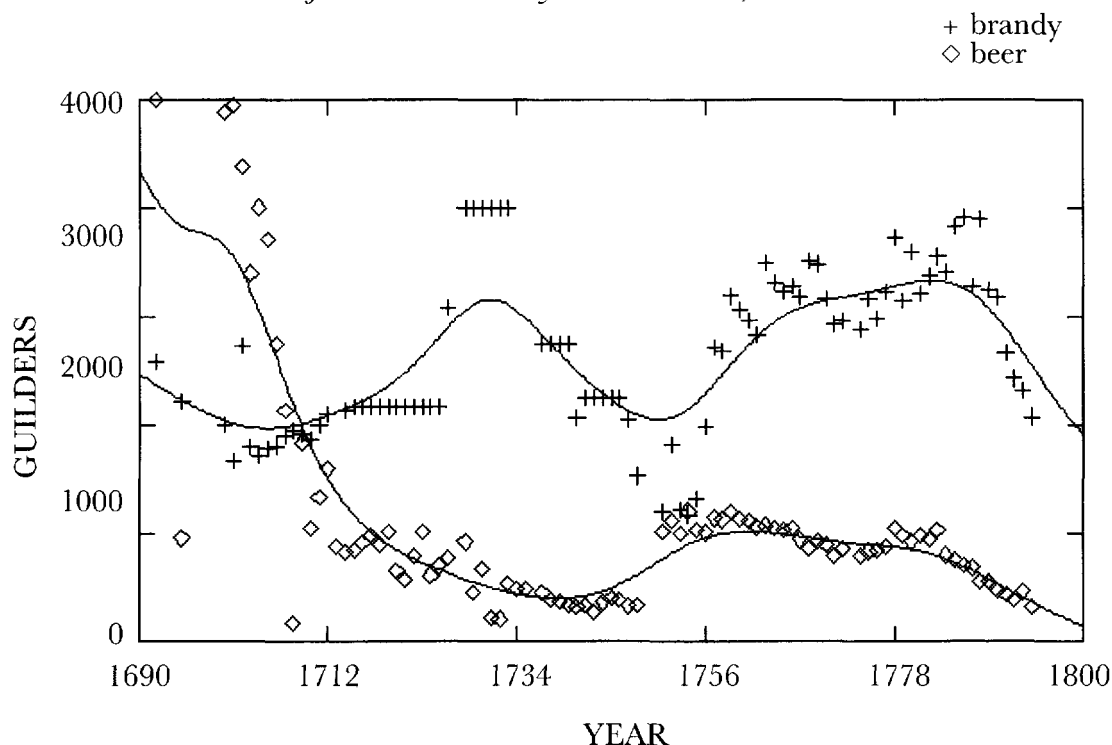
was drunk but the general trends in this case as in other Holland towns do indicate the displacement of beer by other drinks.

Brewers were hurt by the fall in the real incomes of poorer consumers in the eighteenth century who could not afford to drink as much beer. Brewers were hurt by the shift to coffee and tea, first among the well-to-do and later among a broader spectrum of the population as the prices for tropical drinks fell rapidly after 1750.⁵² The brewing industry was already crippled by rising costs and competition from spirits and the increasingly easy access to coffee and tea shut down another old market for the brewers.

Much less of a threat to Dutch brewers was competition from foreign beers. Specialty beers of high quality continued to be imported and could threaten a

⁵² Timmer, *De Generale Brouwers van Holland*, pp. 78-81; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 70.

Figure IX-10

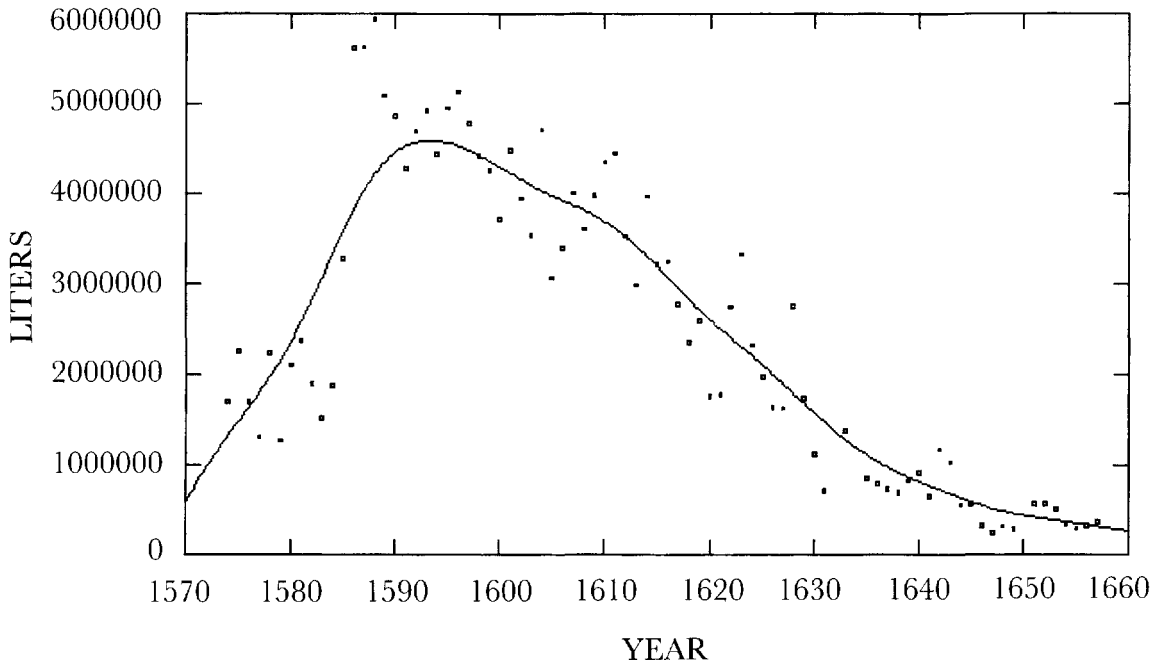
Income from Beer and Brandy Taxes at Hoorn, 1692-1794

Source: G. A. Hoorn, 336, *Thesauriersrekening* 1134-1286

potentially profitable market for Dutch brewers. The common English beers produced on a regular basis may well have been stronger, heavier and had more body than Dutch beers. Though the figures are not simple to interpret English brewers may have been getting just .26 litres of beer from each litre of grain on average.⁵³ Dutch brewers liked to get more than one litre of beer for each litre of grain and something slightly less for their best beers. In 1610, just after the Twelve Year Truce had brought a temporary halt to the Eighty Years War, Delft brewers complained that cheap imports of beer from the southern Netherlands also damaged their trade. By 1616 the economy of Delft had collapsed, in small part because of beer brought north from Brabant. Tariffs, protection and specific restrictions deterred imports. From 1673 no beer could be imported into Amsterdam unless in barrels of the ordinary size, which presented one more hur-

⁵³ Public Records Office, London, SP 16/341/124.

Figure IX-11

Exports of Beer Through the Sund, 1570-1654

Source: Nina Ellinger Bang and Kund Korst, eds., *Tabeller over Skibsfart og Varetransport gennem Øresund 1497-1783* (Copenhagen, 1906-1953)

dle for imports.⁵⁴ In Holland sales of high quality imported beer were never large. For example, between 1570 and 1654 beer exported from the Baltic averaged about 2,500,000 liters a year, the production of a small Dutch town. The share of that beer carried through the Sound in Dutch ships was on average 4%. In the 1560s carriers from the Netherlands took a significantly higher proportion out of the Baltic but the volume fluctuated widely. Ships from Gdansk carried most of the beer out of the Baltic through the first half of the seventeenth century. Presumably they carried high quality, high priced beers and took them to ports all around the North Sea. Exports of beer from the Baltic fell dramatically from the 1590s. In the first years of the seventeenth century exports reached more than 5,000,000 liters each year, a figure which compared with levels of production in some larger Dutch cities. The total carried out in Dutch ships after

⁵⁴ Israel, *The Dutch Republic and the Hispanic World*, p. 57; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, p. 1191.

1570 only twice flirted with a level of 300,000 liters in a year, an insignificant part of Dutch consumption. The sharp decline that would mark domestic sales of beer in Holland after mid century began for Baltic exports with the opening years of the seventeenth century. If beer from eastern Europe was unimportant in the Dutch market before the 1650s it was irrelevant after that decade.

Foreign beer was nothing like the threat to Dutch brewers created by spirits or coffee, tea and cocoa. It did draw off a few potential customers at home, but drew off many many more abroad. Dutch beer exports by the eighteenth century were of little consequence in sharp contrast to the circumstances two centuries before.

The explanation for the decline of brewing in Holland is not to be found in competition from foreign brewers and contemporary Dutch brewers understood that. Though explanations in the first half of the seventeenth century may have come from short term changes, such as interruptions in communications,⁵⁵ by the second half of the century the explanations recognized more serious and extensive changes. Brewers' claims that their troubles came from competition from alternative drinks, from higher costs of raw materials, and the tax burden were correct. Faced with a shrinking market and rising costs, Dutch brewers tried different tactics to meet the test placed before them. In the end none of them worked, as the statistics on taxes and the number of breweries show, but brewers did not give up without an effort.

⁵⁵ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #891 [1623].

CHAPTER TEN

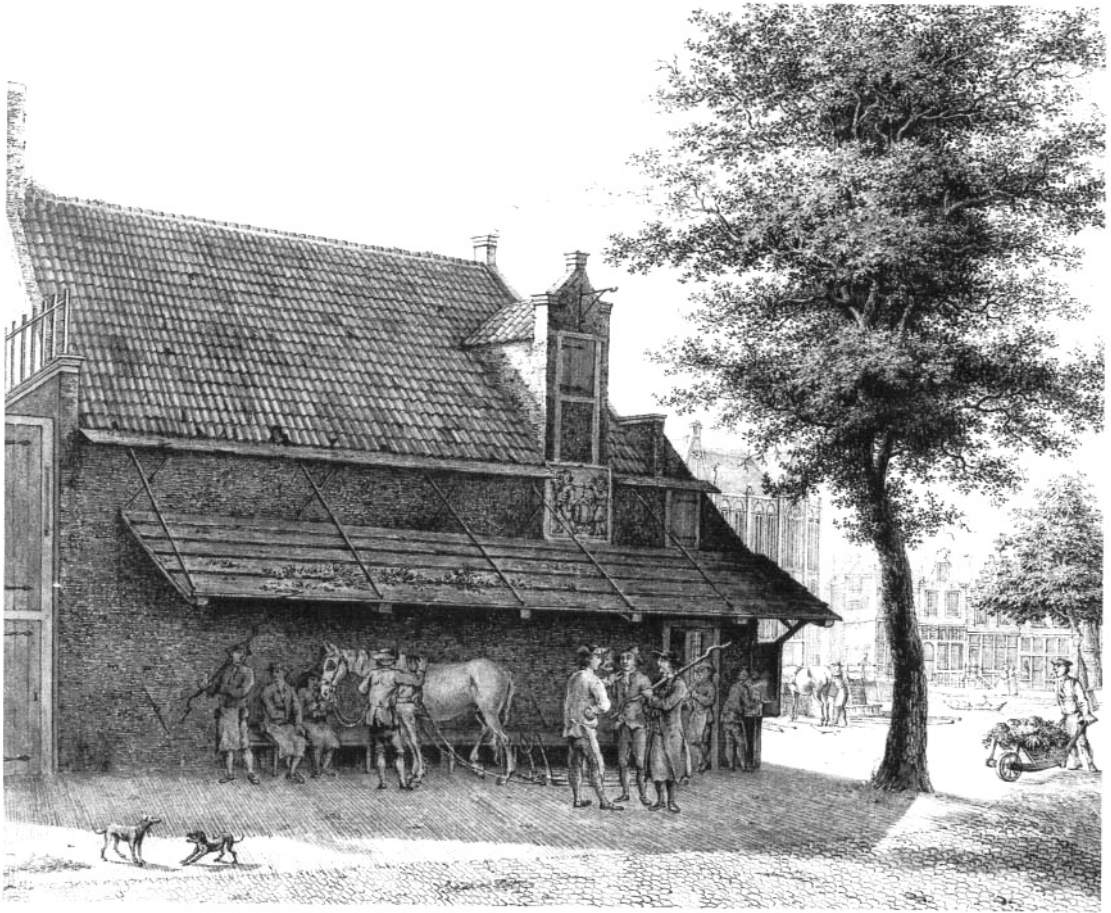
STRATEGIES FOR DEFENSE, 1620-1800: GUILDS AND COST CONTROL

Brewers did different things to defend themselves and combat the decline. The first line of defense was institutional. Guilds of brewers were the traditional institutions to protect as well as control practices in the industry. There were more guilds in the seventeenth century than earlier and their scope increased. Brewers and their guilds became more protective and closed in on themselves. Tighter regulation on many aspects of the trade, such as membership, became the norm and not just for brewers' guilds. Others connected to brewing such as porters' and coopers' guilds saw an increase in their level of regulation through the seventeenth and eighteenth centuries. Even with the increase in the number and scope of brewers' guilds brewing remained in many towns a free trade with no guild. Entrance to brewing or even beer selling was open to anyone.¹ Few documents, few regulations of brewers' guilds have survived. Compared to other trades, Dutch brewers' guilds had limited legislation. In the years after the Revolt the provincial and urban governments abandoned regulating a number of aspects of brewing such as rules on the composition of inputs or on levels of output. The guilds also dropped any religious connection. Sets of guild bylaws, guild letters continued to be rare. Delft got such a set of articles in 1680, Amsterdam in 1682 and Haarlem, Rotterdam, and Leiden in 1644, 1648, and 1682 respectively.² The lack of such documents as in previous centuries reflected the relative importance of legislation produced by the towns themselves for brewers.

In Holland even the beer porters got more complete rules and elaboration of earlier simple rules. Their role as agents of the excise tax collectors increased, especially in smaller towns. They retained and in some instances had to defend their monopoly, allowing brewers to move beer under special circumstances and at a lower rate of pay. The porters tried to get the right to charge for beer in transit, though with mixed success, since they often did not even have to touch

¹ Timmer, *De Generale Brouwers van Holland*, pp. 3-4; Visser, *Verkeersindustrieën te Rotterdam*, pp. 71-73.

² G. A. Haarlem, Archief van het Brouwersgilde, #1 [1644]; G. A. Rotterdam, Keuren, #175; G. A. Leiden, Bibliotheek, #59406 [1682]; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 1191-1193; Timmer, "Uit de nadagen der Delftsche brouwning," p. 742; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 245.



25. H. P. Schouten, the beer porters' house on the Spui, Amsterdam, drawing on paper, 1790. The house was behind the Beguinage. The old gable of the beer porters with a scene like that on the obverse of the guild penny is prominent above the protective roof where men and animals waited to be called to their next task.
 Source: G. A. Amsterdam, *Hist. Top. Atlas, Beschrijving van den Atlas van Amsterdam van Louis Splitgerber*, coll. Splitgerber cat. 1874, p. 106, no. 677, Spui, E3625

the casks. They also retained their responsibility to see that all transactions were carried out openly and were fully recorded. Porters' pay was apparently good, and included, at least in Amsterdam, freedom from tax on the beer they drank. The job was definitely sought after. Not only did the length of their ordinances increase but also their repetition increased.³ Brewers took an active interest in the rules of porters' guilds and that helped promote an increase in rules. There was a natural interest in having the rates of pay for porters under various circumstances fixed and known. Prohibitions of drunkenness and smoking on the job were common as were requirements of good behaviour and being available at fixed places at fixed times. In all cases, though, the rules were more numerous, more precise, and more detailed than before, and addressed potential, imagined, or incidental historical abuses.

Brewers' guilds regulations in Holland covered much the same ground in the seventeenth and eighteenth centuries as they had from the earliest days of the institutions. The underlying principles of regulation were stable and so, therefore, was the language of rules. The Haarlem bylaw of 1654 was virtually the same as that of 1592, for example, with minor additions to do with the tickets used to confirm beer sales and with protection for those responsible for enforcing the rules. Since towns made the final decision, tax collection was always the dominant theme of regulation. Matters to do with submission of receipts for payments of excise were commonplace. So too were rules dealing with surveillance of the use of casks of the proper size, and prohibitions of their being sent out empty from the brewery. At Amsterdam the town enlisted support of the officers of the brewing trade for new regulations on the sale of imported beer and for the inspection of beer to be sure it was of the right and the advertised quality.⁴

Only members of the guild could brew beer and that had to be stated clearly in any set of bylaws.⁵ Otherwise the guild had no purpose. Guild members had to pay annual dues which constituted both a license fee and a way to sustain the finances of the organization. At Leiden, Delft and Haarlem the fee was based on the number of times a member brewed each year. There could be an annual

³ e. g. G. A. Amersfoort, #74, #74a; G. A. Veere, #312, fol. 140v-142r; R. Z., *Versamling Handschriften*: #967, 6; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #130 [1634], #190 [1635], #543 [1641], #689 [1643], #1522 [1663].

⁴ G. A. Haarlem, *Archief van het Brouwersgilde*, #1, 16, 18, 20 [1644]; G. A. Haarlem, *Archieven van de Gilden*, #182, 3r [1627]; G. A. Leiden, *Archieven van de Gilden*, #182, 3r [1627], 8r [1637], 16r [1637], 4-5 [1642], 25-26 [1647], *Bibliotheek*, #59406, 4 [1682]; G. A. Rotterdam, *Keuren*: #175, 13-14 [1648]; Amsterdam, *Nederlandsch Economisch-Historisch Archief*, *International Institute of Social History*, #40; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 6-7; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 181-182.

⁵ Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 36; Timmer, "Uit de nadagen der Delftsche brouwning," p. 741.

fixed contribution in addition to the fee based on production. Since granting membership also meant granting a license to operate a brewery there was typically an entry-fine. It applied to all those buying, building or inheriting a brewery, with the exception of Haarlem from 1644 where the spouse or child of a deceased guild member could take up the brewery and brewing gratis. At Haarlem the entry-fine was some 40% higher for those coming from out of town. The guild kept only half of the charge, the rest going to the town orphanage. Amsterdam entrants paid only two-sevenths of what foreigners had to pay for entrance. Five-sevenths of the outsider's entry-fine went to the poor. At Delft natives paid only one-third of what was due from foreigners.⁶

Though guilds had a monopoly over granting the right to brew in those towns where there were guilds, the ease of entry into them was such that there was no effective restriction on the number of producers. That meant brewers could not force up prices to earn higher profits. By the later years of the eighteenth century guilds in some towns did press for and got limitations on competition. Dordrecht refused to allow the construction of new breweries and a set of rules from Haarlem of 1784, attached to the guild bylaws, fixed prices and in general restricted competition among brewers. Brewers were also prohibited from extending credit to publicans, a common but dangerous practice. The Haarlem rules and guild legislation in general of the late eighteenth century was to prevent competition and so preserve the few breweries that were left.⁷

Guilds by the seventeenth century, with the grant of power from the town, typically selected their own officers. The number varied but usually included one or two deans and two or four lesser officers. Half the administration often changed annually, giving two-year terms to the directors. The process of election was simpler than earlier and required town government approval of the members' choice.⁸ For the Amsterdam society there were four officers, the first ones named in January of 1674, three being replaced each year and one carrying over as the senior officer. The town government made the choice from a list of twice the number of posts. The officers' most important task was to resolve members' disputes over the beer trade and to render swift justice. Those summoned were

⁶ G. A. Haarlem, Archief van het Brouwersgilde, #1: 2-4 [1644]; G. A. Leiden, Archieven van de Gilden, #182, 3r [1627], Bibliotheek, #59406, 1 [1682]; G. A. Rotterdam, Keuren: #175, 2, 12 [1648]; Magré, "De Brouwning in Haarlem van 1700-1800," p. 4; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 1191-1193; Timmer, "Grepn uit de geschiedenis der Delftsche brouwning," p. 428; Timmer, "Uit de nadagen der Delftsche brouwning," p. 742.

⁷ Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," pp. 256-257, 259-260.

⁸ G. A. Haarlem, Archief van het Brouwersgilde, #1, 1 [1644]; G. A. Leiden, Archieven van de Gilden, #182, 27-28 [1646]; G. A. Rotterdam, Keuren, #175, 1 [1648].

fined if they did not appear on time. For violations of the rules the officers usually imposed arbitrary fines. The town, the guild and the poor, as at Rotterdam, shared equally in the proceeds.⁹ In the small town of Groenlo in the eastern Netherlands the treasurer of the guild in 1677-1678 covered the sizeable deficit which his colleagues had run up during his second year at the job. Compensation to him came from his fellow guildsmen in the form of cash and beer.¹⁰ Towns insisted on the right to examine guild records at will, all part of the continuing effort, through guilds or by any other means, to maintain careful oversight of the brewing trade.

The guild also, as at Leiden, administered the brewers' oath to follow the tax regulations laid down by the States of Holland. The oath included the now standard promises including one to use only containers of standard size. Brewers also swore not to attempt to defraud the tax authorities by passing off good beer as tax free beer or by selling beer outside the town without paying tax.¹¹ The guild more often than before had a servant, a salaried junior officer who might or might not have something to do with the trade. His income usually came from a levy on each member. He was responsible for collecting any fees due the guild, keeping members informed of changes in rules, summoning members to meetings or hearings, reporting violations of the rules, making sure the records were safe and maintaining any property owned by the guild including getting the hall ready for meetings. At Leiden from 1646 the servant also had to visit each miller each Monday morning to find out how much malt had been ground for brewing. That was part of an effort to insure that proper quantities of grain went into beer. Not all groups thought they needed a servant. Delft did not appoint their first man to the job until 1733.¹²

Customers who fell into debt with guild members were another common topic of regulation. When a publican switched from one brewer to another, the guild wanted to be sure the publican was not just trying to avoid paying outstanding debts to his former supplier. It was a problem for beer shippers and wholesalers as well. When a new brewer took over a brewery there was also the question of covering the credit extended by the old owner. The guild had regulations to be sure that the former owner got paid promptly. At Leiden, if a customer failed to

⁹ G. A. Leiden, Bibliotheek, #59406 [1682], 9-10; G. A. Rotterdam, Keuren, #175, 8, 10 [1648]; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 1191-1193.

¹⁰ Grolsche Bierbrouwerij B. V., Archive #5.

¹¹ G. A. Leiden, Archieven van de Gilden, 224 [1678], 225 [1679].

¹² G. A. Amsterdam, Archief van de Brouwerscollege, #1681 [19 Dec., 1792]; G. A. Leiden, Archieven van de Gilden, #182, 16-18 [1646], 28-29 [1650], 31 [1655, 1666]; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 1191-1193; Timmer, "Uit de nadagen der Delftsche brouwering," p. 745.

pay a brewer then the guild servant was to report that to each of the other members so that they would not supply the customer with any beer until the bill had been paid. In 1649 the guild even published on a regular basis the names of those customers with the biggest debts. In 1650 the Haarlem guild established a system for informing everyone of who still owed members.¹³ The Amsterdam organization in 1682 laid down strict rules to prevent default by publicans. Brewers had to have a regular and continuing arrangement with any beer retailer they supplied. If the retailer fell behind in his payments then no other brewer was allowed to supply him with beer until the publican made good his liability or found a beer wholesaler to take on the debt for him.¹⁴

Brewers had to contract with retailers because often they were prohibited by law from selling in small quantities. They could only supply publicans and innkeepers or beer wholesalers. The latter were equally forbidden to sell at retail, a prohibition reinforced, for example, in 1658 with the threat of a large penalty from the province. Brewers needed the wholesalers to carry on trade with the countryside and also to carry on business for them in other towns. Oddly, in 1606 in one part of rural Holland, the government set a maximum on the number of wholesalers but such a restriction seems to have been unique. The goal may have been the standard one of so much government legislation: prevention of fraud. That was the avowed reason of a 1669 rule which demanded proper documentation from the village before anyone started to sell beer in the settlement. In export centres like Haarlem a single brewer could supply from 10 to 20 wholesalers each supplying a network of retailers in the countryside.¹⁵

The guild often and more frequently regulated hours and days of work. At Haarlem, for example, brewers had to work by sunlight and not on Sundays or on days of commemoration without the explicit consent of the town government. The Haarlem guild was adamant that brewers operate in their own houses and that no more than two brewers operate from any single dwelling. An exception could be made temporarily for anyone with a contract to supply beer outside the town. The goal was to keep up the number of breweries, prevent concentration and so maintain the number of guild members.¹⁶ Guilds had rules about the hiring of brewery

¹³ G. A. Haarlem, Archief van het Brouwersgilde, #1, 10-14, Amplification [1650]; G. A. Leiden, Archieven van de Gilden, #182, 21-22 [1647], 27 [1649]; Bibliotheek, #59406, 3 [1682]; G. A. Rotterdam, Keuren, #175, 3-6 [1648]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #506 [1618], #1471 [1632]; Yntema, "Allerhande bieren...", p. 93.

¹⁴ van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 1191-1193.

¹⁵ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 2262-2263 [1655], 2, pp. 2255-2256 [1596], 2519-2522 [1658], 3, p. 941; Yntema, "Allerhande bieren...", p. 92.

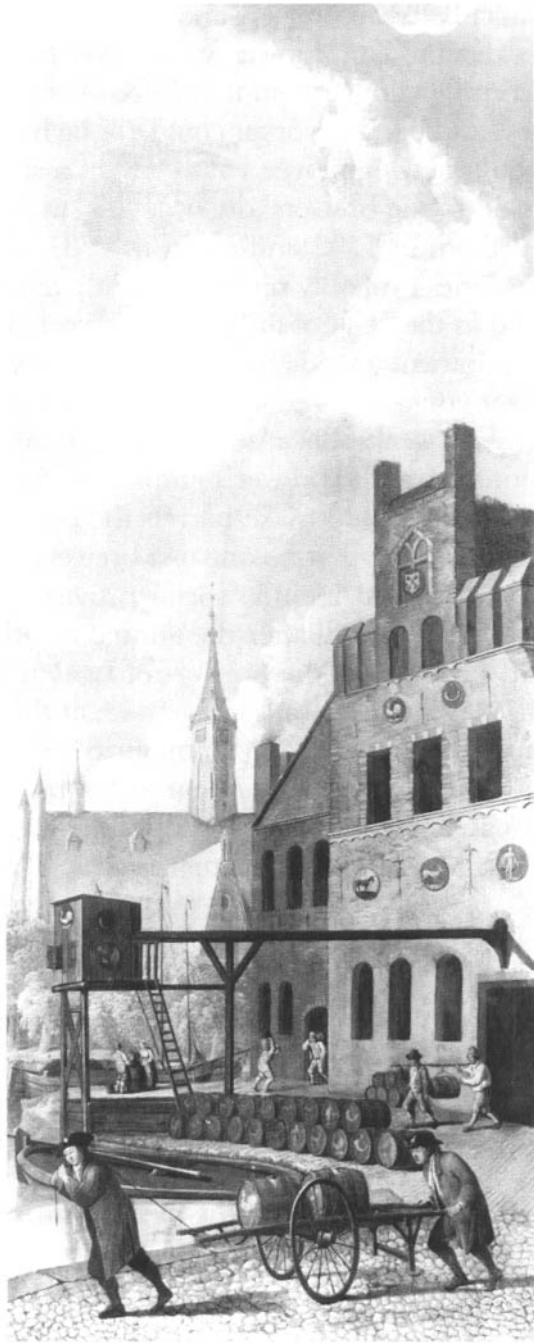
¹⁶ G. A. Haarlem, Archief van het Brouwersgilde, #1, 6-7 [1644]; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 35-36.

workers. To avoid conflict between brewers about the pirating of talented employees and to prevent workers bidding up wages, a worker had to get a statement of separation from his old employer. Without that piece of paper, acknowledging that he left with both parties satisfied, the worker could not be hired by any other brewer. Anyone who took on a new employee without such a statement was subjected to a heavy fine to be paid to the brewers' organization, as at Amsterdam in 1689. The rule was renewed there in 1702 and again in 1737. Brewery workers must then have changed breweries probably more frequently than in the sixteenth century. Not all workers did as the chief of the brewery directed and some acted with disregard toward the equipment or the horses at the brewery so were fired. At Leiden from 1638 no worker could be hired until he had been separated from the former employer for at least six weeks. Because of disputes between guilds there could also be provisions limiting what the brewer's employees could do. While in some places, like Delft, those people could make barrels the coopers' guild in Alkmaar, under a ruling of 1749, made sure that no one in a brewery made a barrel.¹⁷

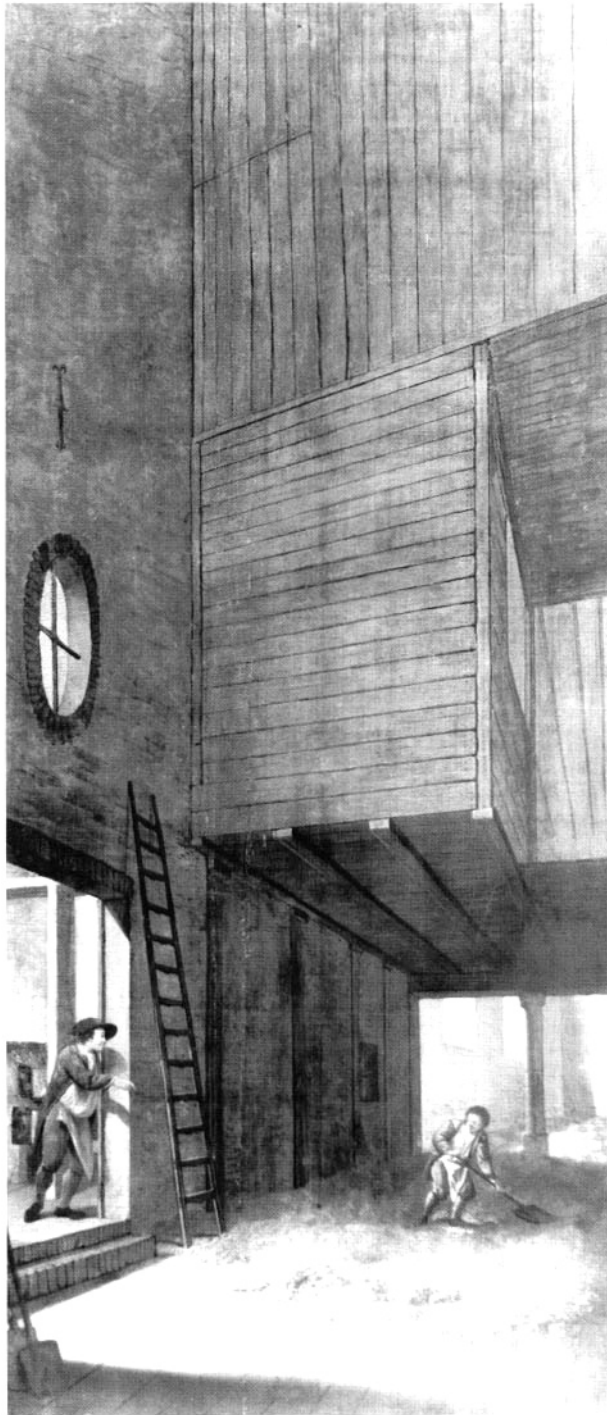
Guild regulations continued to include social provisions. There were meals with beer and even wine and brandy after the annual meeting and possibly even more than once a year. From 1627 the brewers of Leiden agreed to meet every month, the first Wednesday of the month from 1642, at the house of a guild officer where all decisions were to be taken by majority vote. 33 members of the guild signed in 1627 indicating their agreement to the provision but some questions still remained about financing those guild banquets. At such festive occasions wives and daughters and in one case a niece came. This almost doubled the company. A member's failure to attend led to a fine. Extraordinary meetings, called by the officers at their pleasure, lacked the festive air of the regular meetings. They fell outside the usual rotation and dealt with matters of conflict between brewers or between a brewer and a tax farmer. In 1657 Leiden brewers agreed to meet every Wednesday, except in December, January and February, at a designated place in the Corn Market for half an hour to compare notes. The guild was serious since there was a penalty for failing to come to the sessions. The officers of the Haarlem guild met each week, dealing with violations of the rules, and that seems to have been enough for their organization.¹⁸

¹⁷ G. A. Leiden, *Archieven van de Gilden*, #182, 1-3 [1638]; Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid, II Bierbrouwerijen," p. 75; Bruinvis, *De Alkemaarsche Bedrijfs- en ambachtsgilden*, p. 33; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1811 [1672].

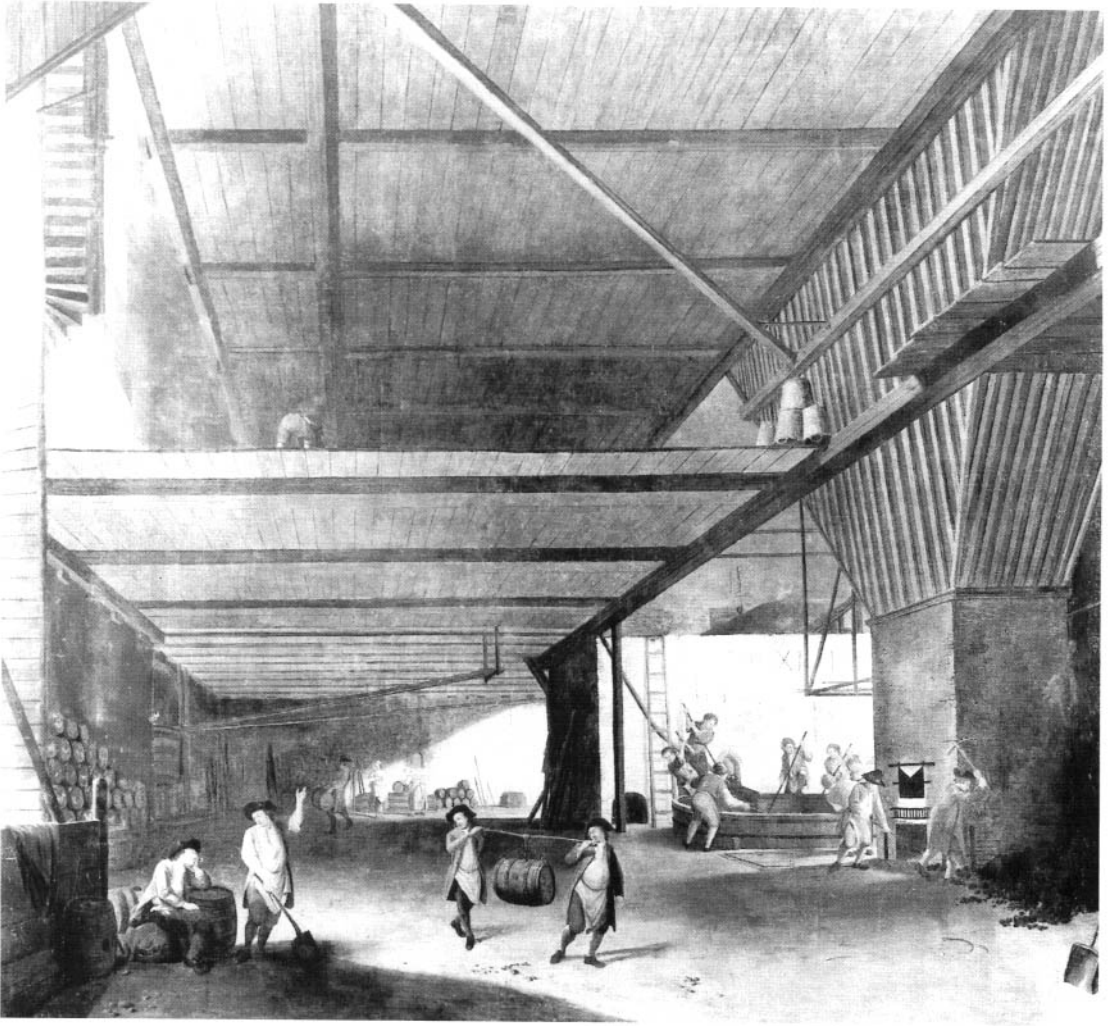
¹⁸ G. A. Haarlem, *Archief van het Brouwersgilde*, #1, 19 [1644]; G. A. Leiden, *Archieven van de Gilden*, #182, 1r-2r [1627], 7v, 12r-12v [1633], 8-9 [1642], between 30 and 31 [1657], *Bibliothek*, #59406, 7 [1682]; G. A. Rotterdam, *Keuren*, #175, 11 [1648]; Grolsche Bierbrouwerij B. V., *Archive* #5; Timmer, "Uit de nadagen der Delftsche brouwning," pp. 742-744.



26. Hendrik Meijer, exterior of a brewery, wall paintings, oil on linen, 1772. This painting and the following two were done for the guild room of the brewers' guild on the Oude Vest in Leiden. The first shows porters moving barrels and in the background workers taking peat into the brewery. The barrels on the quay are marked with brands of various breweries.
Source: Stedelijk Museum Lakenhal, Leiden.



27. Hendrik Meijer, loft of a brewery, wall paintings, oil on linen, 1772. In this scene from the decoration of the guild room a worker turns the malt on the malt floor using a shovel. Source: Stedelijk Museum Lakenhal, Leiden.



28. Hendrik Meijer, interior of a brewery, wall paintings, oil on linen, 1772. This portion of the wall shows the drying kiln for the malt on the right and in the back workers with rakes or paddles in hand standing over the brewing kettle. On the left are barrels in place and ready to be filled and carried away. Two men in the middle carry a barrel using the standard equipment of beer porters. Source: Stedelijk Museum Lakenhal, Leiden.

The Delft pattern of meeting four times a year was more typical. Brewers reported the number of times they had brewed and paid the levy due to the guild, the rate being based on the needs of the organization. That business did not take long but the meeting continued all day in a tavern owned by a member. The members enjoyed wine with dinner. By 1701, though, the guild had fallen on hard times and so dropped the grand meals and the games that went with them. By the middle of the eighteenth century the conviviality of a brotherhood of tradesmen had been replaced by an annual meal with the tax farmers. In 1760 the guild decided to have their wives join them. Single men brought women. Widows who had inherited breweries were also invited to attend. Within eight years the experiment was abandoned and the event returned to being an all-male affair. Staying on good terms with tax collectors was a common desire among brewers.

Brewers' guilds still commonly paid for the funeral of a member. Leiden brewers in 1627 agreed to contribute 12 stuivers each toward the funeral costs of a brewer or brewster. Members were to attend funerals of members and the guild servant had to make sure that everyone knew when the funeral was to take place. The Haarlem guild continued to maintain the home for women who had retired from the trade. Amsterdam brewers who worked paid an annual fee to a sickness fund and so long as a member could not practise his trade he could draw a weekly stipend from the fund. It dated from at least 1575 and by 1682 it was administered by the brewers' society. As early as 1684 there were complaints that individuals joined, did not practise the trade and then collected the benefits when they got sick or old. To cover the costs and deter fraud the guild increased the entry-fine. The weekly benefit was raised in 1620, in 1692 and again in 1701 so by that date it was in absolute terms seven times the original level set in 1575.¹⁹

The place of women members had clearly become a problem for guilds by the second half of the seventeenth century. Though among 17 brewers petitioning the Amsterdam town government in 1637 only two were women, there were complaints about female brewers like the half owner and operator of a brewery who as much as admitted her beer was of poor quality by saying that it was impossible to make good beer with brackish water. It appears that widows leased out breweries they had inherited to eager brewers rather than exploit the building and equipment themselves, so through the seventeenth century the small number of women brewers shrank to zero. In 1682 the Amsterdam brewers'

¹⁹ G. A. Haarlem, *Archief van het Brouwersgilde*, #1, 17 [1644]; G. A. Leiden, *Archieven van de Gilden*, #182, 3r-3v [1627]; G. A. Rotterdam, *Keuren*, #175, 9 [1648]; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 37; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 1191-1193, 1194, 1196, 1201, 1204.

organization declared that no woman could practise the trade and specific restrictions were laid down preventing a husband from acting for a woman or from sitting as a guild officer while acting for his wife. Women were explicitly restricted from holding guild office. Legislation also indicates an effort, at least at Amsterdam, to keep them from owning and operating breweries.²⁰ This was a change from earlier practice and Amsterdam rules may not have been the norm since women continued to operate breweries, for example, at Delft.

The accounts of the Leiden brewers' guild from 1627 to 1638 indicate the character and scope of guild activities. Expenditures varied. The outlay of 1637 was almost 30 times that of 1627. The peaks in payments were created by the purchase of French wines for the festivities. In 1633 a four day celebration in October with over 40 members and their wives and relatives present on each day drove up expenditure for the year to almost 1,200 guilders. In most years, however, the officers were more modest. The subscriptions of members paid for the banquets and presumably beer replaced wine. The standard expenses which changed little were legal fees to notaries for drawing up contracts, fees to representatives of the guild in Rotterdam, Delft and Amsterdam and postal charges to send letters to them, the annual salary to the guild servant, and the rental of house or hall where the business of the organization was carried out. Guilds could set aside funds, as did the organization at Haarlem. The brewers' guild put the capital into bonds on the province of Holland and sold them in bad years, but only with the permission of the town.²¹

Brewery workers had their own organizations, mutual assistance societies, which had religious and social purposes. Those did not prove highly durable. The Gouda brewery workers participated in an annual procession with other guildsmen in the first decade of the fifteenth century but faded away and left no trace. The groups devoted to maintaining funds to support sick and infirm workers, like the funds of the guilds, lasted much longer. At Delft in the sixteenth century the brewers who owned the breweries did not have a society but their employees had one before 1590. In that year the town agreed to an increase in the contributions to the fund made by those working to support impoverished members. The kind of work the individual did in the brewery dictated the level of payment. The guild was separated legally from the mutual assistance fund by 1659. Membership in the latter was not required of those in the former. The

²⁰ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #323 [1637], #408 [1638], #1114 [1650]; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 1191-1193.

²¹ G. A. Leiden, *Archieven van de Gilden*, #278; Magré, "Be Brouwning in Haarlem van 1700-1800," p. 6.

guild included not only brewery workers but also malt makers, coopers working for brewers and millers working for brewers among others. The principal function of the organization, though, remained seeing to less fortunate or retired members. The guild had many of the features of other guilds in other trades. Those who belonged also had to go to the funeral of a member, or the wife or the widow of a member if she had not remarried. The membership provided pallbearers, unmarried men for those unmarried and married for those married, for widows and widowers. Survivors of those who had contributed received a death benefit. Half of the four officers administering the fund were replaced every year, by election.

Failure to enter the guild and pay annual dues led to prohibition from working in the trade. Payments had to be made at a fixed place at 11:00 on Sunday morning. The Delft town government approved and validated the guild regulations and in 1681, for example, set aside the existing basic regulations. What replaced them is not clear. Distillery workers saw their fund merged with that of the brewery workers, in large part because of the falling number of employees in beer making. The Schiedam society, which dates from before 1718, included both brewery and distillery workers. It appears that the Delft organization was finally wound up in 1796.

Brewing was not the only industry to get such common benefit funds, but the organizations at Delft and Schiedam as well as the one in Leiden proved to be long lasting. The earliest document for the Leiden organization dates from 1664. The principal goal there as elsewhere was to offer continuing income to sick and retired members. Regular contributions to the funds came from those working. The group also owned a linen shroud for the burial of deceased contributors. The brewers' guild had been the original sponsor of the fund and the officers of that organization were to administer the money. If the treasury became depleted because too many workers were sick, the guild officers had to make up any shortfall. By 1691 the trust had established its independence but in 1740 it went back under the umbrella of the brewers' guild. Older workers — by the 1740 regulations anyone over 40 — could not be admitted as a new member. The 1740 regulations set out the system of selection of the five officers of the fund with provisions to prevent workers from any one guild or family from dominating the group. In 1747 a new rule, requiring two members to be Protestants, prevented Catholic domination. Payments to retired members remained steady until 1762 when they were reduced from 1 guilder per week to 15 stuivers. Those working saw their contributions drop as well, by 20% to 2 guilders per week. At those rates the number of men collecting benefits clearly exceeded the number working. On occasion, as in 1767 when there was a shortage of brewery workers, contributions could be raised to generate a surplus

against hard times.²² The workers' groups performed many of the same functions as guilds. It was brewery workers rather than the brewers who generated guilds more like the trade guilds common among other Dutch craftsmen of the period.

The guilds of brewers did take on other responsibilities, ones different from what was common among other industrial organizations. There may have been greater concentration on ecology, an interest dictated by the brewers' need for large quantities of good water. At Leiden, from 1669, brewers and brewsters could take water only from the place designated by the officers of the guild, a practice laid down in Haarlem guild legislation of 1644 as well. The guild had the responsibility for selecting the spot from among three and for enforcing the ruling.²³ At Alkmaar in 1635, the brewers' guild got approval from the town to pipe water from nearby. The arrangement continued until 1769 when the brewers had to change the source, presumably because of deterioration of the wood used to carry the water. The brewers' guild at Haarlem was in intermittent conflict with bleachers over pollution of streams but the organization also was the agent for lobbying the town government to make changes in streams and water sources, as they did after a particularly bad storm in 1621. The guild also had a common fund from 1622 to 1637 for the maintenance of certain sluices and to rent an icebreaker in the winter. Haarlem brewers in the eighteenth century got their water from wells and springs in the dunes to the west and small waterways were built to give them access to that water.²⁴ Haarlem was following a practice already established in Amsterdam.

As early as the reign of Charles V, Amsterdam water had a bad reputation. Water had long been brought from elsewhere so it was probably before 1624, the year when indisputable evidence begins, that brewers organized the shipment of water from some distance. Each brewery had a number of flat-bottomed small boats, *schuiten*, pulled by horses for carrying water. They carried the brewers' brands in prominent places. The vessels were to have proper equipment, including a saw to cut through ice in the winter.²⁵ The brewers united to get water from the Vecht, a stream in North Holland beyond the village of Weesp. It

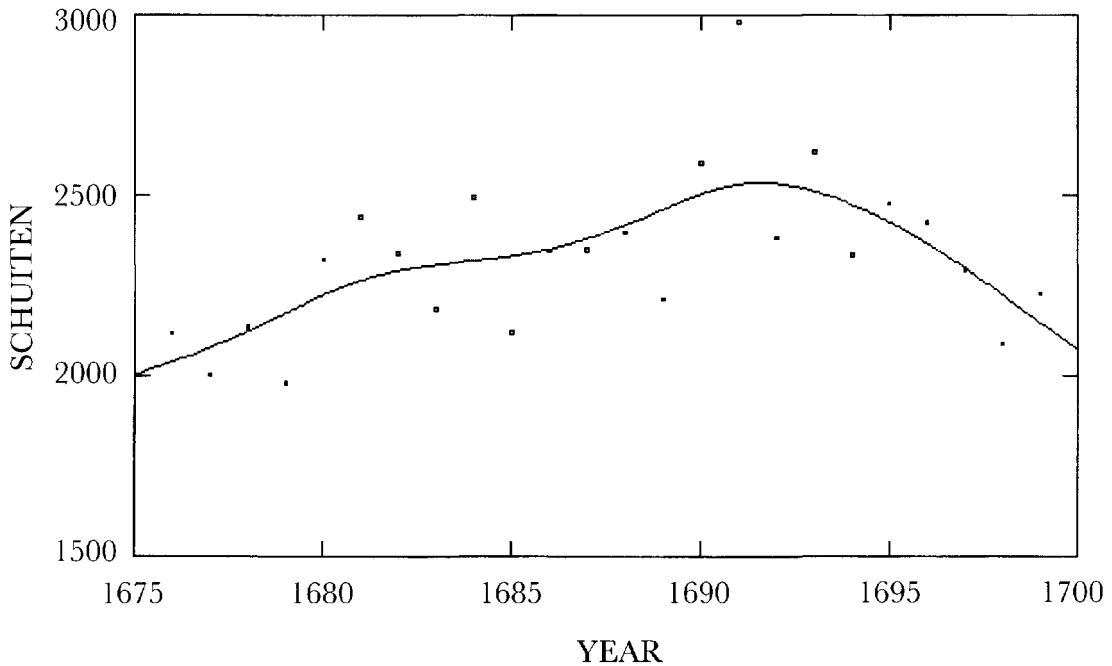
²² E. M. A. Timmer, *Knechtsbossen en Knechtsgilden in Nederland Arbeidsverzekering in Vroeger Tijden* (Haarlem, 1913), pp. 62-64, 77-79, 169-177.

²³ G. A. Haarlem, Archief van het Brouwersgilde, #1, 15 [1644]; G. A. Leiden, Archieven van de Gilden, #208 [1667, 1669]; Bibliotheek, #59406, 6 [1682].

²⁴ Bruinvis, *De Alkemaarsche Bedrijfs- en ambachtsgilden*, pp. 45, 93; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 19-21, 36-37; De Jongste, *Onrust aan het Spaarne*, p. 15,

²⁵ G. A. Amsterdam, Archief van de Brouwerscollege, #1668 [1745], Bibliotheek, M951.001; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 91-92; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 9, pp. 233-234.

Figure X-1

Number of Boats Carrying Water, Amsterdam 1676-1700

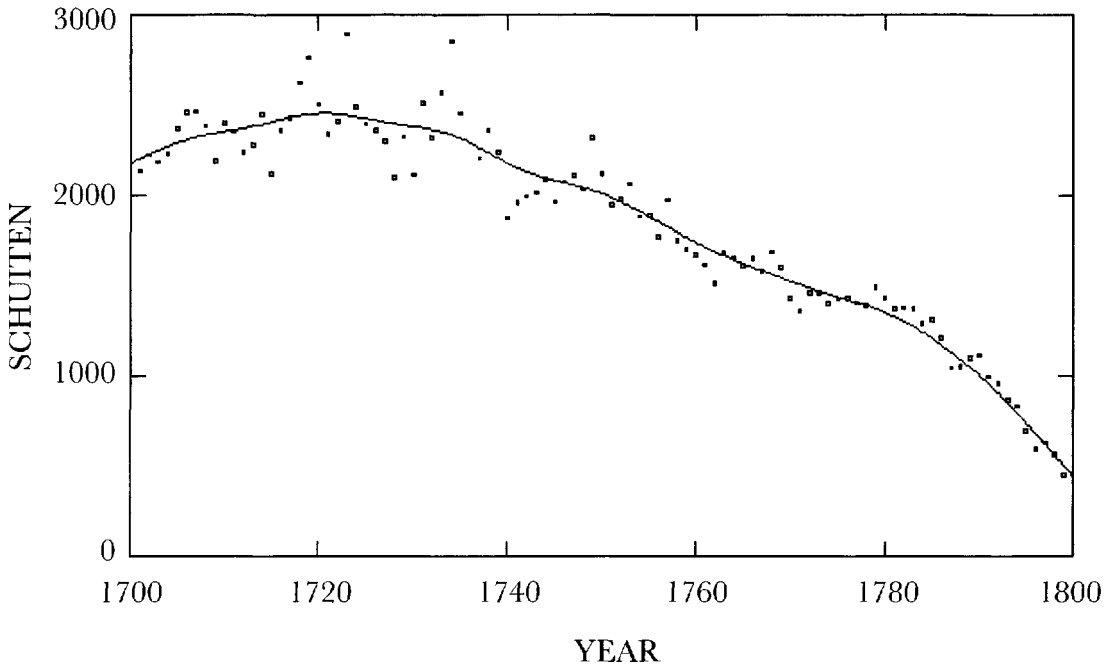
Source: J. A. Ten Cate, "Verslag van een onderzoek naar de geschiedenis van het Amsterdamse brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #118, (1940), p. 16

was one of the few things on which Amsterdam brewers cooperated, though with difficulty. The brewers' society organized and controlled the entire operation. From 1676 to 1700 there was an average of 2,315 trips each year by boat to haul water. The figure rose after the political troubles of the 1670s and then tended downward in the war years toward the end of the century.²⁶ Obviously it was hard to predict the number of trips in advance since the sum paid for the right to collect a charge on each boat was not highly correlated with the number of trips. The tax farm proved highly stable from year to year. From 1775 to 1784 the boats made an average of 1,384 trips per year, down sharply from the figures of a century before.

The guild kept a careful record of how much was shipped for each brewery. Some of the water did not reach the brew kettle, brewers selling to city con-

²⁶ Ten Cate, "Verslag van een onderzoek naar de geschiedenis van het Amsterdamse brouwersbedrijf in de 17e eeuw," p. 16.

Figure X-2

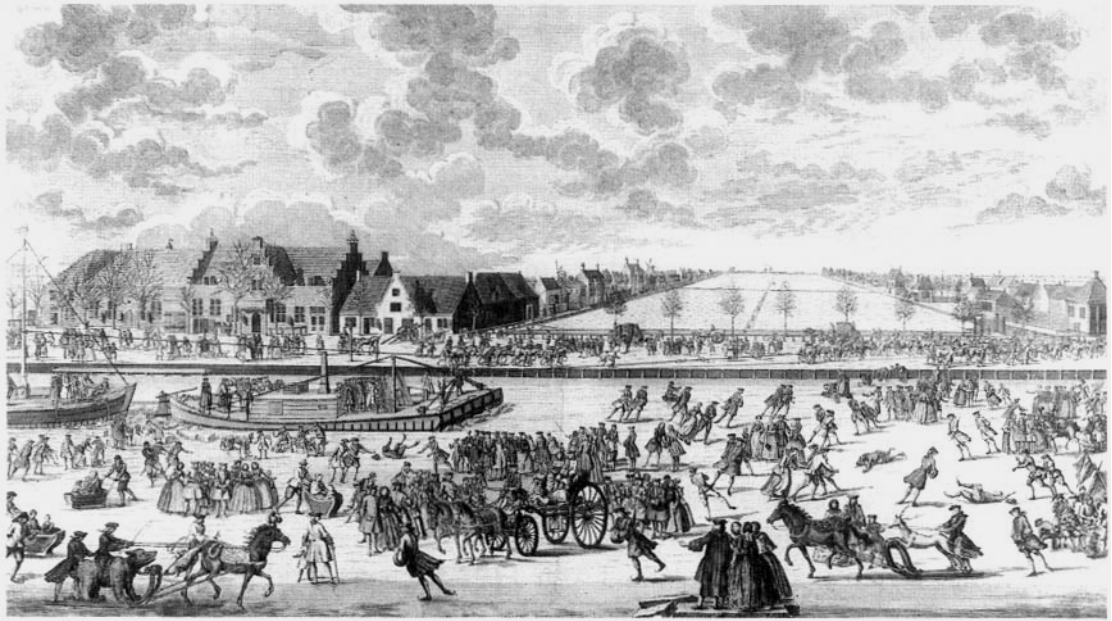
Number of Boats Carrying Water, Amsterdam 1701-1799

Source: C. C. J. Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #117 (1936), pp. 28-31

sumers and ships, especially those in the whale fishery. The brewers could undercut other importers and so in 1763 the town government fixed the price at which they could sell water. Members of the brewers' society took an interest in the organization of shipments and tried to make them as easy and as inexpensive as possible. The extensive records the organization kept on all aspects of water supply confirm the central importance of that function for the corporation.²⁷

To keep the waterways open to the Vecht, the organization in 1651 added an icebreaker to their assets to help in getting water to them late in the Fall and early in the Spring. The operation of that icebreaker became an obsession. The popularity of the icebreaker with artists and printmakers enhances that impression. Since water had to be brought into all towns of any size in the eighteenth

²⁷ G. A. Amsterdam, Archief van de Brouwerscollege, #1702; Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid, II Bierbrouwerijen," p. 75; Schwartz, "De Sociëteit der Brouwers in de XVIIIe Eeuw," p. 88.



29. Tieleman van der Horst, icebreaker leading the way along the Amstel for a *waterschuit*, print, between 1736 and 1763. The icebreaker was a popular topic for printmakers in the eighteenth century. Power for pushing through the ice came from the many teams of horses pulling ropes from along the bank of the river.
Source: Amsterdam Historisch Museum SA3015.

century, the cold winters presented particular problems. Taking water from a frozen canal that was a little deeper than the others was a last resort. At Amsterdam when it was impossible to get through along the waterways, brewers even brought water by sled, hauled by horses across the river IJ from the Zuider Zee. In truly bad winters the town even allowed churches to sell rainwater to the brewers, but truly severe winters were rare. In the town itself in 1667 a shipcarpenter and a partner built and operated an icebreaker, at the expense of the brewers so their small boats could get around the town's canals in winter.²⁸ More serious was keeping the waterway open to the distant supplies of water which generated greater costs and greater potential for conflict but also for cooperation. The first icebreaker dated from 1651 but the one most often depicted is that of 1696. The financing of the icebreaker may be what led Amsterdam brewers to form their college in the first place. The later icebreaker was pulled by seven horses and had a skipper with a crew of five. There were eight men on shore to lead the horses and when the ice was thicker more horses could be added. The maximum number was supposed to be 20 but in 1777 one effort used 36 and in 1784 another used 82. Presumably those large teams were intended to pull the *schuiten* which followed behind the icebreaker as well. The iron bow with protruding bars allowed it to cut through the ice or ride up on top of it so the weight of the vessel would break any jam. From 1704 brewers paid a fixed charge for each cargo of water their boats brought, the money going for the upkeep of the icebreaker. The college administered the funds and was responsible for giving a public accounting of those funds. The group also lobbied the town to deepen the passage and improve the towpath, that to make the task of the horses easier. By 1786 the brewing trade had deteriorated so much that the town itself had to take over the operation of the icebreaker and sell water to brewers for a fixed fee per boat load. The change made some sense in that common water suppliers took advantage of the brewers' icebreaker. In 1781 43 brewers' *schuiten* travelled behind the icebreaker but there were in addition 114 small boats of others. The shift to government operation had been mooted as early as the 1750s and when the change finally came in 1786 the brewers retained an interest in the icebreaker. Even that connection was abolished in 1805 and the long-established link between the brewers' organization and supplying water came to an end.²⁹

The guilds not only protected members but also tried to extend jurisdiction in

²⁸ Buijs, "De Bierbrouwer...", p. 28; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1601; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," pp. 14-15; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 9, pp. 234-235.

²⁹ van Eeghen, "De Ijsbreker," pp. 61-75; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 16; van Noordkerk, *Handvesten; ofte Privilegien ende Octroyen*, pp. 182-183; Yntema, "Tot welvaren der brouwers...", pp. 122-126.

an effort to defend the trade. One line of defence was in rules on dealings with bakers over yeast supplies. In general making beer produced surplus yeast, a potential source of income. Brewers cooperated in guaranteeing yeast supplies to themselves. At Leiden from 1657 brewers were required to deposit any surplus yeast with the guild officers who would then see that no member was short and then sell off any that would not be used. By 1682 the guild servant was allowed to visit members' breweries to collect yeast for any member who faced a shortage. After being petitioned by the bakers, a Leiden court ruled in 1664 that the brewers' guild could no longer sell yeast jointly at a single site and that the old practice of bakers buying from individual brewers should prevail. In the following year the town also fixed prices of yeast in response to bakers' complaints. The figure for November through March was two and a half times as much as from May to October. The bakers were still not satisfied and in 1669 they petitioned the town to regulate the sale of yeast more closely. They presented data on prices in other towns, documents showing the history of disputes and a draft set of regulations. The bakers seem to have accepted the brewers' supply monopoly but what they did not accept was price increases for the yeast. Their evidence of lower prices elsewhere and the request for tighter regulation seem to have fallen on deaf ears. The gross from yeast sales to bakers at Leiden from August, 1654, to May, 1655, was more than 13,500 guilders, a substantial sum even after deducting storage and administration charges, so the interest of the guilds in selling yeast was not surprising. At Amsterdam as at Leiden the brewers and the town had a hand in regulating the sale of yeast by brewers. The greatest question was always the price. There had to be at least two rates during the year because of the seasonality of beer making. At Amsterdam the 1755 set of nine articles on yeast allowed bakers to import yeast from 1 March to 15 May and again from 15 September to the end of the year, presumably to guarantee adequate supplies and keep prices from climbing.³⁰

The great battle over yeast began in 1762 when brewers lobbied the province for a tax on imports. They also wanted a prohibition on the use of cultured yeast which the bakers generated themselves using wheat, potato meal and hops. The call for an import ban on dry yeast was not new. Leiden brewers in 1744 had said it was one critical way to help their industry which was under pressure. In 1763 the States of Holland received a submission from bakers and grain dealers who said that the brewers could not produce enough yeast to supply them. At Amsterdam there were some 600 bakers but only 14 or 15 brewers, a telling

³⁰ G. A. Amsterdam, *Archief van de Brouwerscollege*, #1667, 19 [1755]; G. A. Leiden, *Archieven van de Gilden*, #182, 32-34 [1657], #202 [1655], #203 [1664], #204 [1665], #209 [1669], *Bibliotheek*, #59406, 11 [1682].

argument both economically and politically. Protection, the grain sellers and bakers said, would only yield higher prices since brewers already exploited shortages by raising their prices.³¹ Brewers replied that they threw away yeast and that the price of yeast over the previous 40 or 50 years had gone up less than other costs for bakers. The debate became more heated through 1763. The same arguments were repeated but in less temperate language. The bakers did point out that difficulties in brewing were the fault of the brewers and if they had made better beer in the past then their current financial problems would not exist. After long consultation brewers did finally in 1765 get a prohibition of bakers using cultured yeast but the States of Holland remained silent on a tax on imports.

The threat to brewers' yeast sales came from imports from Brabant and from distillers selling yeast. In 1784 the brewers claimed gin makers were putting cultured yeast on the market, that is not just offering a natural product of the distilling process. If it was manufactured that yeast fell under the 1765 prohibition, and the brewers wanted the rules enforced. This opened the old debate again. Bakers and grain dealers complained about the failure of brewers to meet demand, the high prices charged and the low quality of brewers' yeast. Brewers gave all kinds of reasons, including claims that distillers' yeast, unlike their own, went bad in the summer. Brewers also said they could supply yeast for less. The grain dealers and bakers too were worried that brewers could not produce enough yeast to meet the annual demand of over 130,000 kilograms. The distillers, in their defense, pointed to balance of payments savings since their yeast replaced imports from Brabant. The States of Holland simply did not make a decision, the effort died and the status quo remained. Another minor effort to get a ban on yeast imports in 1791 failed. Yeast from outside Holland continued to come in and some bakers bought yeast from distillers.³²

The records of individual guilds have many resolutions on the yeast question, especially in the second half of the eighteenth century. They also have many reports and letters about lobbying the provincial government to give them the protection they wanted. The continuing decline of brewing and the expansion of alternate sources of yeast along with a decrease in restrictive legislation led by the end of the century to the loss of any yeast monopoly by brewers' guilds.³³

³¹ G. A. Leiden, *Archieven van de Gilden*, #271; Timmer, *De Generale Brouwers van Holland*, pp. 130-136.

³² Timmer, *De Generale Brouwers van Holland*, pp. 134, 146-169.

³³ G. A. Delft, *Eerste Afdeling*, #1962; #1963; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 26; Hallema and Emmens, *Het bier en zijn brouwers*, p. 93; Magré, "Be Brouwering in Haarlem van 1700-1800," pp. 9-10; Schwartz, "De Sociteyt der Brouwers in de XVIIIe Eeuw," pp. 88-90.

Sales of yeast faded away like so many other aspects of the Dutch brewing industry.

Towns established the guilds of brewers as much to control brewers and regulate the industry as to promote the trade and the welfare of members. The guild might be the creature of the town but it also acted as the representative of the brewers' to the town, petitioning the government and striking agreements with the government and with third parties.³⁴ As the industry faced greater threats, the guilds found they could not defend brewing effectively. They had neither the power nor the tools in their bylaws. Since guilds proved an ineffective avenue for defense, the brewers asked governments directly for protection, as in the case of lobbying for the yeast monopoly. Local governments were, as always, the first and most frequent recipients of requests to keep foreign beer out. By the second half of the eighteenth century such requests went against the general trend in economic legislation. Regardless of that Dutch brewers still petitioned governments for protection from competition in a number of ways.

Beer from outside the Dutch Republic had always been subject to heavier tax burdens per barrel and, in the face of decline, the provincial government allowed new increases in taxes on foreign beer. In 1733 there was a restriction, repeated in 1748, that all beer from outside Holland had to conform to the same rules as local beers, even down to being of the same types. Brewers in each town set out to have the definition of foreign expanded to include any beer from other towns in the province. That was why Amsterdam threatened to retaliate against Hoorn beer in 1650. Long involved in measures to shelter its own brewers, Hoorn was allowed to charge a lower tax on its own locally brewed beer. That was also why beer shippers and importers in Amsterdam complained about the higher rate of tax due on the Rotterdam beer they were bringing into the town.³⁵ There was a reaction in Holland in 1764 when Schiedam put a tax on beer from outside the town. Delft responded quickly and pointed to the 1487 privilege and the 1536 decree of Charles V prohibiting such protection. Those pieces of legislation still had force, at least in the seventeenth century when, for example, Leiden applied higher rates of excise on all imported beer except that from Delft. Schiedam in 1765 responded that they had no intention of including Delft products among the more heavily taxed beer and so caved in to the pressure. When Delft made a similar request about differential charges on their beer in Amsterdam in 1781,

³⁴ Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," p. 228.

³⁵ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 5, pp. 1042-1043 [1701], 7, pp. 1298-1303 [1748]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1078 [1650], #1279 [1654].

nothing came of it. Amsterdam carried on as before. Rotterdam and Dordrecht brewers complained about Amsterdam's discrimination in tax policy against their beers between 1682 and 1687. They pointed to a promise made in 1579 by all not to tax others in the union, a promise forgotten in the face of the decline in the brewing industry. Public documents as well as sworn statements from beer sellers confirmed the tax differential and, therefore, the protection which prevailed in Amsterdam, but there seems to have been no change in policy even in the face of overwhelming evidence that Amsterdam was acting contrary to the spirit and letter of past agreements.³⁶

Brewers had mixed success when they tried to raise their incomes through higher protected prices or to supplement incomes through the sale of by-products. They also had mixed success in trying to cut down their capital requirements. They had little control over the cost of buildings and equipment and not much more over the cost of raw materials. They did try, at least in one case in Amsterdam, to cut down on the need for turnover capital. In 1637, the brewers asked consumers in future to purchase the ticket to prove excise had been paid from tax collectors rather than brewers. That was the practice, they said, in other towns and it saved them from having to advance the tax money and then wait, sometimes in vain, for reimbursement. The plan to cut accounts receivable addressed both a short and a long run problem of limited cash resources among brewers.³⁷ Much of their effort and what limited success the brewers enjoyed came from similar strategies aimed at cutting costs and in any way possible, no matter how small.

The great barrel issue consumed all regulators, guilds, town governments, and the province from the mid seventeenth century on. If maintaining the icebreaker was an obsession for the Amsterdam Brewers' College, then making sure that customers returned beer barrels after use was an obsession for all brewers throughout Holland. The theory was simple: if empty barrels came back, brewers would not have to make new ones and so would save money. Brewers could be required, under terms of a contract, to furnish beer to go on board ship only in barrels that had never been used before. Otherwise, they could and did reuse barrels. To get barrels back brewers, their guilds and their regulators followed two policies. They imposed a system of deposits, refundable on the return of the cask. They insisted that barrels be brought back to the breweries and then

³⁶ G. A. Delft, *Eerste Afdeling*, #1024 [1765]; G. A. Leiden, *Secretaire Archief* na 1574, #4335, 2; G. A. Rotterdam, *Oud Archief*, #2186, see also G. A. Rotterdam, *Oud Archief*, #2138; Timmer, "Delftsche bierconflicten," pp. 127-129.

³⁷ van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #323 [1637].



30. Frans Hals (Holland, about 1581-1666), man with a beer keg, oil on canvas, circa 1630-33. The Haarlem painter was a well known carouser so presumably knew that having a barrel of beer was the convenient way to keep drink handy. The keg carries the clear mark of the brewery, as required by town ordinance. It was in such kegs that beer was delivered to individual households. Source: Portland Museum of Art, Maine, Gift of Ilse Breuer Reichhold, 1983.158.

imposed a lengthy list of penalties for failure to do so as well as for misuse of barrels. Broad­sides, from the first half of the seventeenth century on, described all things that should not be done, undoubtedly planting ideas of new ways to use the barrels. The States of Holland used many methods to publicize the dire consequences for those who violated the rules.³⁸ Posters made in the latter part of the seventeenth century depicted, with great threats, the abuses and penalties.

Towns had long wanted casks to be of standard size to insure exact tax assessment. Back in 1627, Dordrecht complained about the use of English casks for beer. Substitution like that became virtually impossible as the century wore on and regulation became tighter. In the seventeenth century the effort to standardize on the Dordrecht keg appears to have been, at least by mid century, effective. Penalties such as donation of the beer to orphanages and after that the burning of vats which did not conform to provincial law must have helped to convince importers and everyone to abide by the rules.³⁹ The provincial government, once that was accomplished, established equivalences with other and foreign measures, all to make taxing easier. Brewers found that standardization could work to their advantage, for example by keeping out beer from the countryside. It could also allow fraud. Coopers attested that a brewster in Amsterdam took barrels from the brewery the *Red Hart*, altered and repainted the brand and used the casks for her own brewery, the *White Hart*. Falsifying brewers' marks had been against the law in Holland at least since 1580 and probably before. The States of Holland repeated the law against altering brands so often down through the 1670s that violation must have been a vexing problem.⁴⁰

The system of returning kegs could be used for other purposes, as with Amsterdam in 1649 and again in 1660 when Rotterdam beer shippers were forbidden to take anything back to their home town except empty casks. Carrying back

³⁸ G. A. Amsterdam, Archief van de Brouwerscollege, #1667, 15 [1673]; G. A. Leiden, Archieven van de Gilden, #182, xvi; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1594 [1667]; Staten Generaal of the United Provinces of the Netherlands, "Collection of Broad­sides and Proclamations on the Brewing Industry and Wine Making, 1621-1640," From the Library of the University of California, Berkeley, 1 [1621], 3 [1622], 4 [1633], 5 [1637], 7 [1640].

³⁹ G. A. Amsterdam, Archief van de Brouwerscollege, #1667, 13 [1707], Archief Burgermeester, Portefeuille Handel, #9, 3 [1768]; G. A. Dordrecht, Archief van de Gilden, #974, #981 [1646]; G. A. Gouda, Archief van het Stadsbestuur, #296, 77v-78r [1606]; G. A. Haarlem, Archief van het Brouwersgilde, #93, 2 [1658]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #906 [1646]; Balberghe, *De Mechelse Bierhandel-Geschiedenis-Folklore-Dialekt*, pp. 26-27; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1210-1213 [1622], 1724-1725 [1655]; Horks, "Enige Taken van Bedrijvigheid in Amersfoort in de Achttiende Eeuw," p. 18.

⁴⁰ G. A. Leiden, Archieven van de Gilden, #239 [c. 1690]; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1206-1211, 3, pp. 939-940, 7, pp. 1285-1298 [1749]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #621 [1642].

used cooperage was a common practice throughout the Low Countries for shippers but a cargo of empty barrels had little value. Without a back cargo it did not pay for Rotterdam shippers to bring beer to Amsterdam. Protection in that case was thinly veiled. At Leiden the guild servant was allowed to go around to breweries looking for kegs in the wrong places. He received a reward for each one that he made sure got back to its proper home. His counterpart in Amsterdam did the same thing at the end of the eighteenth century.⁴¹ The Amsterdam brewers' organization in 1730 established a group of agents authorized to search the town for unreturned barrels. The men descended on one part of town without warning and, in a sweep, would get as many as 350 to 400 brewers' barrels. Later in the century that changed to monthly visits to customers and then, despite objections about potential loss of sales, to a deposit system. A plan put forward in Haarlem in 1780 to have beer porters made responsible for all the kegs they handled and pay a punitive fine for all the kegs they did not bring back seems to have been both fruitless and a sign of desperation.⁴²

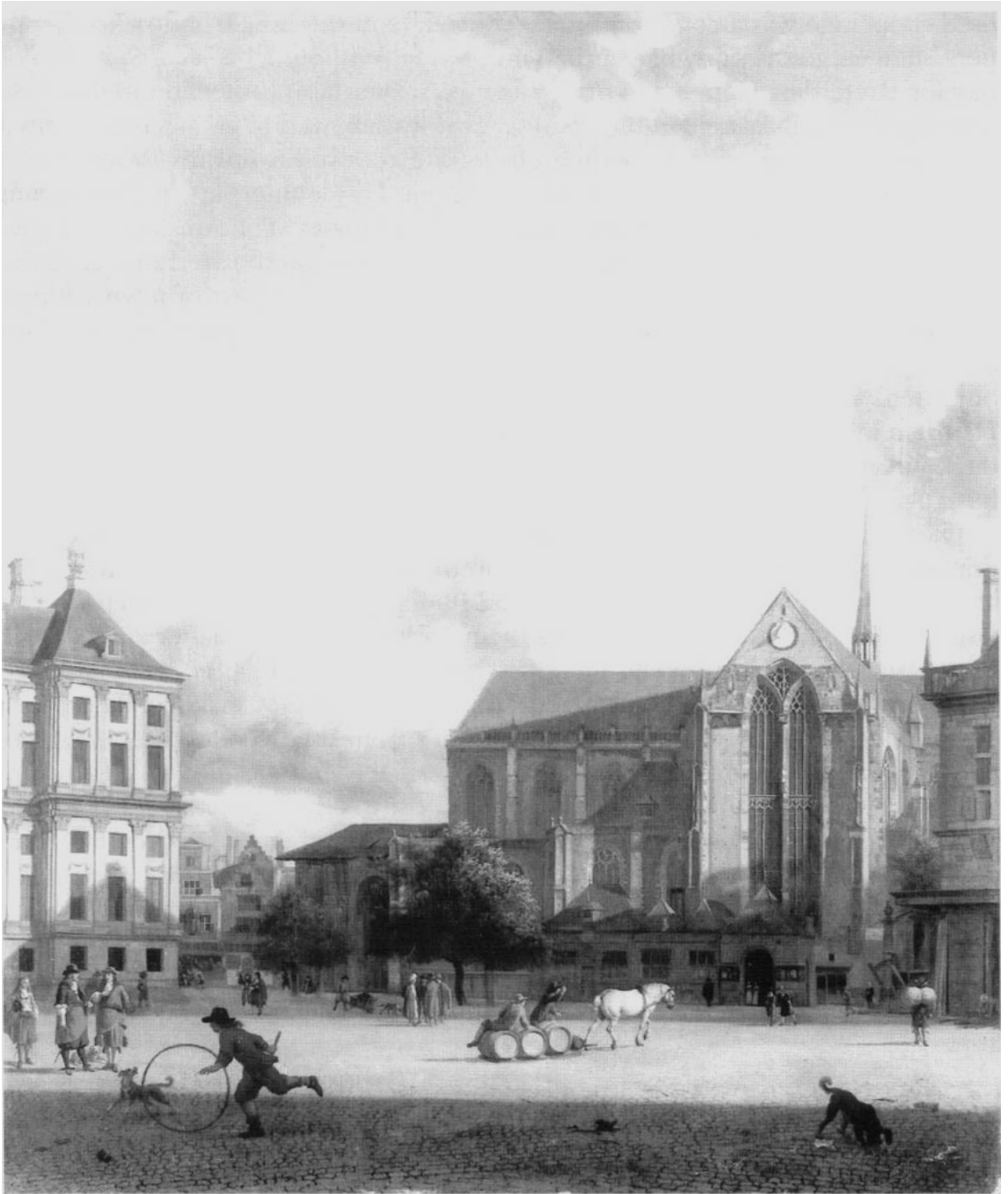
The quality of barrels improved, in part because of stricter government regulation on components and regular inspection. Magistrates or their sworn officers examined casks to see they were properly hooped and "branded." They even tested the capacity of casks by filling them with water. That better surveillance on the shape, size and quality increased the value of barrels for alternate uses. Publicans themselves were often at fault. The art of the seventeenth century shows many a pub with furniture put together from used products of a cooperage. The barrels could be used for other foods such as butter, milk, sauerkraut, as rain barrels and for storing coal. They could be sawed in half to make wash tubs, they could be filled with fish, and bricklayers could use them to mix cement. The regulators listed many options and penalties for such abuses and even included rules on reporting any misuse. In 1718 alone, Holland passed six orders on the theft of beer barrels, an indication of the value of the high quality kegs and of the scale of the problem.⁴³

In the second half of the eighteenth century, the rising price of wood increased

⁴¹ G. A. Amsterdam, Archief van de Brouwerscollege, #1681 [19 Dec., 1792]; G. A. Leiden, Bibliotheek, #59406, 5 [1682]; G. A. Rotterdam, Oud Archief, #2188; van Uytven, "De Leuvense Bierindustrie in de XVIIIe Eeuw," p. 220.

⁴² G. A. Amsterdam, Archief van de Brouwerscollege, #1667, 10 [1730]; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 29; Magré, "De Brouwering in Haarlem van 1700-1800," pp. 11-12; Schwartz, "De Sociteyt der Brouwers in de XVIIIe Eeuw," pp. 76-82.

⁴³ G. A. Amsterdam, Archief van de Brouwerscollege, #1667, 14, 15 [1668], Bibliotheek, N 39.28.002 [1668, 1673]; G. A. Leiden, Archieven van de Gilden, #265, 1 [1623], 2 [1693], 3 [1696]; Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1204-1207 [1652], pp. 1210-1215 [1622]; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 92, 141-142; Timmer, "Uit de nadagen der Delftsche brouwering," p. 761.



31. Jan van der Heyden, *Dam Square in Amsterdam*, oil on wood, c. 1668/1670. The New Church is on the right and City Hall on the left. In the centre of the painting is a beer sled with three barrels being hauled by a horse to its destination, Source: Amsterdam Historisch Museum SA7332.

the cost of barrels. Brewers grew even more vigilant about getting their casks back. This brought brewers into conflict with other workers, such as guilds of coopers, over regulation. The brewers' guilds often took a leading role in such disputes, and petitioned governments for the enforcement of rules on the quality of cooperage. The brewers' guilds often pressed their role in maintaining the size and proper use of kegs though coopers complained about brewers using casks of the wrong size. Brewers in some places could employ their own coopers to make or rebuild barrels in their breweries. Coopers' guilds, like that at Leiden, did not want the competition of brewers selling extra barrels on the open market. Coopers were also fearful of brewers who imported barrels from elsewhere. As brewing declined so did the number of coopers working in breweries, a change which eased tension between the trades.⁴⁴

In 1765 when the province forbade the use of pipes, heavier, stronger barrels made with iron hoops and useful for stronger beers, the brewers protested that they would lose beer already laid down and that they could reuse little of the wood if they broke up the pipes. It appears that the prohibition was lightly enforced, if at all, and brewers continued to use the traditional pipe alongside standard barrels, half barrels, quarters and eighths. The smaller barrels were of the same length. Only the circumference decreased. That made assembling and handling the casks simpler. The thickness of the staves for each type was also fixed. The various types of staves were distinctively marked when they were made so it was possible to reuse them. Even stave thickness was a subject of public debate. Different towns opted for thinner or thicker barrels which generated exchanges on the best choice.⁴⁵

Provincial law fixed a requirement by the 1640s that people be paid a sum for bringing back barrels to the brewery. The next step to require anyone buying beer to make a deposit for the barrel, returned only when the barrel came back, was a product of the late eighteenth century. A deposit system was suggested in 1750 at a meeting of brewers from throughout Holland but declared unworkable. The reaction was the same in 1767 when the matter came up again. By 1786, however, Amsterdam had instituted a system of deposits. Rotterdam followed by 1794 and Delft and Brielle by 1795.⁴⁶ Brewers' reluctance to take that

⁴⁴ G. A. Leiden, *Archieven van de Gilden*, #242 [after 1705], #243 [c. 1705], #253 [1739], #265, 5 [1745], #267 [1746], #268 [1750], #276 [c. 1750]; G. A. Vlissingen, *Archieven der Gilden*, #134 [9 Feb., 1755, 7 March, 1755]; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," pp. 19-20.

⁴⁵ G. A. Leiden, *Archieven van de Gilden*, #255 [1743], #260 [after 1743]; Timmer, "Uit de nadagen der Delftsche brouwering," pp. 759-760.

⁴⁶ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1204-1207 [1641, 1643, 1652]; Schwartz, "De Sociteyt der Brouwers in de XVIIIe Eeuw," pp. 83-84; Timmer, *De Generale Brouwers van Holland*, pp. 228, 231.

simple step arose from a fear that they would lose business with required deposits and a hope that the penalties for abuse of beer casks would solve the problem. Deteriorating sales and profits in the late eighteenth century combined with the rising cost of casks forced them to go over to deposits. For the four Enkhuizen breweries assessed in the period from 1774 to 1791 16% of capital tied up in movables was committed to cooperage. When land and buildings were included the share of total capital in barrels was only 2%. Investment in cooperage paled even in comparison to outstanding debts. It was less than 12% of that amount. In theory the brewers always owned the barrels but that had force only if they could get the barrels back,⁴⁷ so even a big drop in barrel costs meant little change in total costs for brewers. The concern about barrels in the late eighteenth century indicates the dire condition of the brewing industry.

Rising prices brought on efforts to control material costs. Brewers attacked the cost of grain repeatedly. Through the guild, as at Leiden, they tried to lower the wage paid to millers.⁴⁸ The rising price of peat in the eighteenth century continued to pressure brewers to shift to other fuels, most notably Sunderland coal, said by one experienced brewer to be superior to all fuels. Amsterdam brewers were, in principle, not allowed to use coal according to bylaws from before 1638 and 1663, in part to reduce air pollution although keeping up the income from the excise tax on fuel may have been a more important consideration. The use of Friesland peat, Amsterdam brewers said, raised their costs. In 1674 they claimed that ships from England and Scotland were turned away from the port and went to Rotterdam to unload since Rotterdam brewers could use coal. By the late seventeenth century Amsterdam was almost unique in not depending on coal for heating. The town, on occasion as in 1674, gave temporary permission to violate the prohibition on the use of coal. Because of excessive rains or cold weather brewers petitioned, for example in 1680 and 1692 and 1709 and 1740 and 1752 and 1754, for a concession to use coal. In 1752 they pointed out that in all of Holland only they and the brewers of Alkmaar and Haarlem did not use coal under their kettles. Rather than rescind the bylaw, the town government of Amsterdam from 1760 gave annual freedom from the prohibition of the use of coal. That changed to biannual concessions and finally in 1787 brewers could use coal until notified otherwise. Amsterdam brewers apparently still used peat from Friesland and Groningen but went over to the high energy coal that smiths used for a couple of months when the canals froze and when the government would allow them to do so.⁴⁹

⁴⁷ G. A. Enkhuizen, #444(1601), 9; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 68.

⁴⁸ G. A. Leiden, Archieven van de Gilden, #271 [1744].

Government resistance indicated real fears about the negative results of burning large quantities of coal in the town. Their final capitulation in the second half of the eighteenth century showed the deterioration of brewing and brewers, inability to survive if they used high-priced and often difficult to get peat. Coal did gain an ever increasing place as a source of heat and brewers were long among the leaders to moving to coal. Governments usually ignored brewers' requests to eliminate the tax on heating fuels but they often already enjoyed a reduction anyway. Moreover, the shift to coal might, as with some types of coal at Delft, allow brewers to avoid paying excise on fuel altogether. Whether peat, wood or coal, brewers continued to be aware of potential gains from efficient use of fuel. From 1634 to the end of the seventeenth century a total of 14 patents were taken out for brewing and 13 of them dealt with heating and fuel problems.⁵⁰

The efforts to control and regulate the trade with guilds and the effort to control costs through decreasing expenditures on fixed and working capital and on labour were only a part of the arsenal brewers used in the struggle to hold the line against the continuing deterioration of their industry. Other strategies might be more obvious and more direct but they proved just as futile, generating only some minor gains. The major changes needed in the industry, in reorganization, in the development of new products and in technical changes in production eluded brewers despite their varied efforts to improve their collapsing enterprise.

⁴⁹ G. A. Amsterdam, Archief Burgermeester, Portefeuille Handel, #9, 670 [1747], 672 [1752], Gilden Archief, #1717; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #349 [1638], #1339 [1655]; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 14; Wagenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen...*, 8, p. 237, 9, p. 237.

⁵⁰ Alberts and Jansen, *Welvaart in Wording*, pp. 95-96, 114-115, 134-137, 143-144; Doorman, *Octrooien voor Uitvindingen in de Nederlanden uit de 16e-18e Eeuw, passim*; Eykens, "De brouwindustrie te Antwerpen, 1585-1700," p. 95; Jansen, "Holland's Advance," p. 12; Timmer, "Uit de nadagen der Delftsche brouwning," p. 755; Unger, "Energy Sources for the Dutch Golden Age: Peat, Wind and Coal," pp. 224-226, 232-234; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...," pp. 66-7.

CHAPTER ELEVEN

STRATEGIES FOR DEFENSE, 1620-1800: TAXES, GOVERNMENTS AND TECHNICAL STAGNATION

The most common and, potentially, the most fruitful way for brewers to cut their costs was to get a reduction in taxes. Dutch brewers were subject to seven taxes. They paid not only on the production of beer, both to the province and their town, but also on the grain they used, on grinding the grain, on the fuel they burned, for weighing of raw materials, on their property and on the receipts which they had to buy to prove that the excise tax had already been paid before the beer left the brewery. If the beer went out of the jurisdiction brewers had to pay duty and fees for the boats and usually a higher rate of sales tax in the other town or county. At least for such exports the brewers got a rebate on the tax on ground grain.¹ In addition there were consumption taxes on the sale of beer. The number of taxes makes it difficult to assess the burden which brewers carried. Furthermore, as brewers liked to point out, the methods of enforcement of taxes increased their burden. In 1688 brewers in Rotterdam and Dordrecht complained that the provincial government now did not allow them to load beer at night. The legislation was to prevent fraud but brewers said the rule meant that they could not control the pace of fermentation, that it kept them from getting beer to their customers right away when it was fresh and that in the summer they could decrease the chance of spoilage if they moved the beer outside of the heat of the day. Boats made deliveries at their breweries at night and brewers wanted to use the same boats for shipping out beer. All they asked was to be treated like any others engaged in a trade,² but that was clearly not how government saw brewers.

Where brewers in Holland and elsewhere used composition, paying a lump sum in lieu of specific taxes, they simplified administration and reduced total liability, but they also made it more difficult to find out the exact tax burden born by beer. That was true even if there was no evasion involved. In 1654, for example, the States of Holland raised the rate of tax on beer by 1 st./tun. Haarlem, Rotterdam and other towns had brewers pay in lump sums and thereby kept the

¹ Bontemantel, *De Regeeringe van Amsterdam...*, 2, pp. 434-438; Hallema and Emmens, *Het bier en zijn brouwers*, p. 104; Timmer, *De Generale Brouwers van Holland*, pp. 21-22; Visser, *Verkeersindustrieën te Rotterdam in de Tweede Helft der Achttiende Eeuw*, pp. 60-62.

² G. A. Rotterdam, Oud Archief, #2187.

tax at the old level of 2 sts./tun. Similarly, though tax authorities might fix the price of beer, brewers were under pressure to offer discounts. They resisted, of course, but appear to have agreed to price reductions for sales to publicans and for volume sales, especially for export.³ Because of discounts and because of composition, the lump sum payment of tax liabilities by brewers may not accurately reflect the regime under which beer making operated. Many of the problems with interpreting the taxes on beer sales applied to direct taxes on brewers.

The tax system became more rather than less complex through the seventeenth and eighteenth centuries. The province of Holland repeated regulation on beer taxes annually with only slight variations. A revision in the excise tax law of the province in 1633 dropped the number of paragraphs in the legislation from 84 to 47, but there was little decrease in the detail in the regulations. Even the separation of rules on domestic and foreign beer into two sets of regulations in 1675 hardly changed the text.⁴ The tax rates were even slower to change than the text. Taxes on beer were still typically leased to tax farmers, though changing over to direct collection by town officials could be seen as one way to lower the tax burden and thus help a declining industry, as at Amersfoort in 1630.⁵ The Holland government dropped the farming of taxes in 1748 and so town officials took on the task. The officer responsible at Leiden said that each week his senior clerk took out a clean sheet of paper and divided it into five categories, the division based on the quality of the beer, whether it was a citizen or publican who bought it and whether it was produced in town or elsewhere. The clerk wrote the name of the person to whom the beer was sold and the quantity. On the following Monday those individuals were required to go to the town treasurer and pay according to a schedule, with a small fee for the transaction. The collector of the tax recorded only the quantity of beer in each category, not how much money he took in since that would involve greater administrative costs. The results of the change to direct collection of tax were far from what critics had expected. The income from all of the provincial *gemene middelen* was up about 10% but under the former regime the government had no costs associated with collection, the tax farmers taking on the burden.⁶ As practices at Leiden showed there were now costs which needed to be deducted from the gross receipts.

³ G. A. Leiden, Archieven van de Gilden, #270; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1137 [1650?]; Timmer, "De Impost op de Gijlbieren...", pp. 372-374.

⁴ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1702-1741, 3, pp. 906-913; Oldewelt, "De Hollandse Imposten en Ons Beeld van de Conjunctuur Tijdens de Republiek," p. 50.

⁵ Klop, "De Amersfoortse Brouwneringen tot de 19e eeuw," p. 13.

⁶ G. A. Leiden, Secretarie Archief na 1574, #4345, 5 [after 1750]; De Vries and van der Woude, *The First Modern Economy*, pp. 123-124.

The complex tax structure made confusion common. The variety of taxes and the changes in them over time made it difficult to tell which taxes applied. The surtax in Holland put on beer from other parts of the United Provinces in the mid seventeenth century expanded to include different surcharges for the products of different towns and villages by the mid eighteenth century. That worked counter to an effort being made then to simplify the tax system and also perhaps to ease the tax burden on the beer drinker. In 1749 the provincial tax on imported beer increased. Holland brewers liked this because of the protection it afforded them though it did generate protectionist retaliation in neighbouring Zeeland. Such retaliation was common, there being a case at Utrecht already in 1637.⁷

In addition an act of 1749 set a stamp tax on beer with a fee that depended on the type and quantity. For example, 2 sts. was due for the tickets for the smallest units, but the fee was 6 sts. for anywhere from two to four half barrels. That was in addition to the excise tax due. Rates from 50% to 100% more applied to foreign brewed beer. Taxes for publicans were often prorated, based on the price of the beer sold. In 1674 the province tried to tax consumption in taverns but the so-called *recreatiegeld* had to be dropped two years later because the varied rates, which depended on what was consumed and when during the day, were confusing while consumer resistance made the tax unenforceable.⁸

The brewers' guilds, where such organizations existed, were the logical institutions for asking for tax relief from their towns. Brewers in unorganized towns did not hesitate to petition for improvements, however. Their requests took many forms. They often pointed to the varied taxes they paid and then noted that competitors in other nearby jurisdictions paid less. Brewers in the Generality Lands, that part of Brabant administered directly by the States General, were the special target of complaint in Zeeland and southern Holland while in northern Holland it was brewers in Friesland who were said to have lower costs and lower taxes. Amersfoort brewers complained of the unfair advantage Holland brewers enjoyed since the latter paid less tax on the grain ground for their use and also paid a lower tax on each barrel of beer produced.⁹ Haarlem brewers did, in reply, point to the higher taxes Holland brewers had to pay on fuel, the cost advantage enjoyed by Amersfoort brewers in that they could use peat, and the absence of a certain grain tax which existed in Holland where there was also

⁷ G. A. Vlissingen, *Archieven der Gilden*, #134 [7 March, 1750]; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 30.

⁸ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 7, pp. 1222-1224; De Vries and van der Woude, *The First Modern Economy*, pp. 102-103.

⁹ G. A. Amersfoort, #157 [1633]; #159, 4, 5, 6 [c. 1640]; G. A. Vlissingen, *Archieven der Gilden*, #134 [c. 1751]; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," pp. 30-32; Timmer, *De Generale Brouwers van Holland*, p. 25.

Table XI-1

*Taxes on Beer in Holland, 1622-1795, in stuivers per tun**Provincial Taxes:*

Brewers

<i>Year</i>	
1622	2 (<i>gijlimpost</i>)
1654	3 (<i>gijlimpost</i>)
1671	4 (<i>gijlimpost</i>)
1675	4
1749	30
1751	15 + 10%
1754	30

Publicans

()=amount that each town could add to the tax

<i>Year</i>	<i>Type</i>	<i>Rate of Tax</i>	
		<i>Gross</i>	<i>% retail price</i>
1582	20sts/tun	4(0)	20
	30	10(4)	33
	40	16(8)	40
	above 40	42(24)	
	<i>Joopen</i>	360(60)	
	English, Lübeck, Hamburg	60(30)	
	Eastern	50(24)	
1605	20sts/tun	6(0)	30
	30	22(4)	73
	40	30(8)	75
	above 40	73(24)	
	<i>Joopen</i>	585(60)	
	English, Lübeck, Hamburg	110(30)	
	Eastern	93(50)	
1655	20sts/tun	11(11)	55
	30	22(4)	73
	40	30(8)	75
	above 40	73(24)	
	<i>Joopen</i>	645 sts.	
		(land=585, town=60)	
	English, Lübeck & other foreign*	140 sts.	
		(land=110, town=30)	

<i>Year</i>	<i>Type</i>	<i>Rate of Tax</i>	
		<i>Gross</i>	<i>% retail price</i>
1654	From outside Holland but in the United Provinces	5	
	From outside the United Provinces	8	
1675	20sts/tun	11(0)	55
	30	22(4)	73
	40	30(8)	75
	above 40	73(24)	
1749	All	70 + 10%	
	In foreign style	250	
	From outside Holland but in the United Provinces	82 + 10%	
	Nijmegen, Arnhem, Breda, Zeeland	38 + 10%	
	Foreign	250	
Towns			
Haarlem			
1714	From the town	10	
	From the United Provinces	20	
	Foreign	40	
	<i>Joopen</i>	60	
1750	From the town	10	
	From the United Provinces	20	
	Foreign	40	
	<i>Joopen</i>	60	
Leiden			
Post	Citizens' domestic*	12	
1750	Vaantjes' domestic	19	
	Publicans' domestic	21	
	Publicans' imported	31	
	Citizens' imported	22	

* Produced in the town

Sources: G. A. Leiden, *Secretarie Archief na 1574, #4345, 4* [after 1750]; R. Beeldsnyder, *Verslag van een Onderzoek naar de Ontduiking van de Voornaamste Imposten te Amsterdam gedurende 1701 t/m 1710*

(wijn, bier, brandewijn, gemaal, turf, zeep, boter, zout) (n.d.), pp. 23-5; Jakobus Buijs, "De Bierbrouwer of Volledige Beschrijving van het Brouwer der Bieren; Midsgaders van het Mouten der Graane, tot het Brouwen van Bier Gebruikt Wordende," in: *Volledige Beschrijving van Alle Konsten, Ambachten, Handwerken, Fabrieken, Trafieken, Derzelver Werkhuizen, Gereedschappen, enz. ten deele overgenomen uit de Beroemdste Buitenlandsche Werken... Zestiende Stuk* (Dordrecht, 1799), p. 2; Cornelis, Cau, Simon van Leeuwen, Jacobus, Paulus and Isaac Schultus, eds., *Groot Placaatboek vervattende de Placaaten, Ordonnantien en Edicten van den Hoog Mog. Heeren Staaten Generaal der Vereenigde Nederlanden...* (The Hague, 1658-1770), 1, pp. 1694-1759, 3, pp. 907, 920-938, 4, pp. 838-839, 848-855, 7, pp. 1285-1303, 8, p. 1043; P. Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium (1935), p. 34; Jacques C. van Loenen, "Structuur der accijnsen van de stad Haarlem over de 17e en 18e eeuw, vanaf 1575-1795," University of Amsterdam, Unpublished Doctoraal Scriptie, Economisch-Historisch Seminarium, #143 [n. d.], p. 8; E. M. A. Timmer, *De Generale Brouwers van Holland Een bijdrage tot de geschiedenis der brouwen in Holland in de 17de, 18de en 19de Eeuw* (Haarlem, 1918), p. 54.

a higher fee for recording all the taxation. The reply did little to clarify the relative tax burdens. All of them confirmed that brewers paid a lot and that it was difficult to establish how much in total. The requests for tax relief usually included a list of the disadvantages that brewers in any one place had relative to those in other places. Brewers could almost invariably find another town or province where rates were lower. They almost invariably pointed to the inevitable decline in quality of beer and with that in tax income unless they got some relief.¹⁰

The brewers of Holland once likened their industry to a sick old man whose illness would not go away so long as the causes for that illness - heavy taxes, high wages and expensive raw materials - remained. Without those impediments the industry would have remained young and beer would have remained the drink of the people, so brewers claimed. Like the petitioning guilds, writers on brewing pointed to the heavy investment, the costs of cooperage, the cost of lost barrels, the higher cost of making better beer, and rising raw material costs. They also cited the importance of brewing to towns in terms of employment and tax income as reasons for reducing the taxes brewers faced. In all cases petitioners stressed the many other trades and branches of commerce and shipping which depended on brewing. They stressed the employment generated by the industry, all reasons for both reducing taxes and protecting the industry. Amsterdam brewers claimed that in direct wages and in payments to beer porters their expenditures would have supported 700 families in 1746.¹¹ Taxes, and the differences in burden among different jurisdictions, were always a factor in the prof-

¹⁰ G. A. Haarlem, Archief van het Brouwersgilde, #85, 9, 10, 11 [c. 1640]; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," pp. 22, 24.

¹¹ Buijs, "De Bierbrouwer...", pp. 2-4; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," pp. 16-17; Timmer, *De Generale Brouwers van Holland*, pp. 57-58, 270-271.

itability and, by the late eighteenth century, even the survival of brewing. Since the usual form of request was petition there are many records of complaints on taxes but far fewer records of reductions in taxes.

Avoiding tax through fraud, another strategy used by brewers, has left few records other than signs of governments efforts to prevent it. The weakest of beer, that of 1 gld./tun or less at Haarlem in 1681, was free of tax or subject to a low rate with a single ticket or receipt needed for selling it.¹² Even though the cheapest beers were free of tax, buyers still had to obtain tickets and present them at the brewery to control sales and prevent fraud. The beer was to be delivered in open casks, fitting for a drink that would not improve and which would be consumed almost immediately. It also made impossible shipping barrels of high quality beer underneath barrels of tax free beer to avoid paying tax on the hidden barrels. Towns and the Holland government were always afraid, with cause, that brewers would try to pass off better beer as this thin, small *scharbier*. That was one reason for prohibiting the mixing of good and tax free beer. The well-to-do even had to promise if they bought beer free of duty that it would go only to the workers employed in their homes. Retailers who sold beer at prices of no more than 12 sts./tun were even prohibited after 1699 from selling any beer imported from outside Holland.¹³ Brewers' organizations unlike governments wanted to make it easier to sell the low quality beer. At Haarlem a proposal to replace the beer tax with an increase in the tax on grain used to make beer seems to have gained no support despite promises that it would decrease fraud and allow the price of beer to increase. At Amsterdam, on the other hand, the brewers changed the tax in 1650 from one of 2 sts./tun of beer brewed to 4 sts. for each *mudde* of brewing grain. A few months later they even offered to take over the farming of the tax and to administer it themselves, each member paying a lump sum of 20 guilders to capitalize the new arrangement. The provincial government, however, did not approve of the plan.¹⁴

Some brewers were willing to go to great lengths to defraud tax collectors and governments were willing to go to great lengths to make sure they did not succeed. To stop brewers from passing off beer as sour or gone bad, Amsterdam insisted that it be inspected before it could be sold or sent to vinegar makers. The inspector got a fee for each barrel he tested. In 1704 two workers at an Amsterdam brewery were found to have cut a hole in the back of the building to pass

¹² G. A. Leiden, *Archieven van de Gilden*, #233 [1681-1688].

¹³ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, p. 1734, xxix [1655], 3, p. 942 [1676], 4, pp. 848-855 [1699]; Yntema, "Allerhande bieren...", p. 92.

¹⁴ G. A. Haarlem, *Archief van het Brouwersgilde*, #90, 10-13 [1625-1628]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #1085 [1650], #1103 [1650], #1105 [1650].

beer into an empty house which opened on to the next street, avoiding the tax collector on the way. There was a case about the same time of switching barrels of beer for barrels of putrid water. There were cases of individuals buying beer brought in by boat from the countryside just to the north of Amsterdam which had not paid tax. From 1701 to 1710 at Amsterdam there were at least 18 cases of efforts to evade tax on beer. The guilty paid fines, lost the beer and in one case even faced exile from the town for a year.¹⁵ Given the number of people in the beer trade and the volume of beer handled, the number of cases that found their way to court is small. Though the elaborate system of surveillance to stop fraud may not have worked, more likely cheating on the beer tax was not a truly viable alternative for brewers in dealing with the financial problems of their industry.

The Amsterdam town government, when faced with a surplus in 1623, cut the retail tax on beer sales. Among all the taxes they could have lowered, they chose the one on beer so there was concern for the industry. But surpluses were rare and so were tax reductions. Even more rare were changes in the structure of taxation. Brewers especially disliked the charge of two sts./tun of beer produced, the so-called *gijlimpost*. It had started at that level in 1584 but was raised to three sts. in 1654 and then to four sts./tun in 1671. The fee was burdensome but there was also the inconvenience of having to have a sworn representative of the tax collectors present when the beer went from the trough into the cask. Finding someone and then having to pay that person a fee and giving him beer was always vexing. For a period of six months in 1625, brewers were allowed to pay fees on the grain they used in lieu of the charge of 2 sts./tun. Setting equitable rates and the enforcement of the tax apparently caused problems, so the scheme was never tried again. The brewers had the *gijlimpost* forgiven in 1676, but only because a doubling of the impost on fuel — peat or coal — gave them a telling argument for relief from the direct tax. The bribing of members of the States of Holland, an accusation made at the time, may have also helped brewers to gain relief. In 1751 the States of Holland dropped the total tax on domestically produced beer from 30 to 15 sts./tun, in order to stop the decline of the industry. That was done in the full knowledge that beer was better for the human body

¹⁵ Beeldsnyder, *Verslag van een Onderzoek naar de Ontduiking van de Voornaamste Imposten te Amsterdam...*, pp. 26-31; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #677 [1642].

¹⁶ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1750-1759, 1764-1769 [1625]), 3, pp. 935-937, 8, p. 1043 [1751]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #846 [1623], 3, #1137 [1650?]; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 103-105; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 34; Timmer, *De Generale Brouwers van Holland*, pp. 58-60; Timmer, "De Impost op de Gijlbieren...", pp. 361, 381-383.

than competing drinks.¹⁶ The government found that a 50% cut in the rate of tax led to a 50% cut in income with consumption remaining much the same. The failure of sales to rise, the realization that demand for beer was not at all elastic, was the principal reason for the return in 1754 to the old tax rate of 30 sts./tun. The interest of the government of Holland in the excise on beer declined with the fall in the income from the excise. In 1650 beer provided 29% of the revenue from excise taxes but that was down to 13% in 1700 and just 3% by 1790. Many of the increases in excise rates on other items were to compensate for that dramatic fall in income from the tax on beer.¹⁷ The fall reflected the troubles of the industry but also made it ever more difficult for brewers to get the attention of government in their struggle to survive.

One obvious strategy Dutch brewers tried was to organize across the province and create a body to lobby the government. The *Generale Brouwers van Holland* set up in about 1660 was a confederation of the brewers' organizations of a number of towns. As early as 1621 some brewers' guilds had lobbied the Holland government for tax relief, and the confederation was the logical outcome of those efforts. In 1631 guild members from Dordrecht, Haarlem, Delft, Leiden, Gouda, Rotterdam and Amsterdam made a second attempt to free brewers from the increase in the tax on peat. They argued for the same exemption that salt boilers enjoyed, pointing to the lower taxes paid in neighbouring jurisdictions by their competitors and the great loss in government income through the contraction of the brewing industry.¹⁸ They were concerned in the 1660s with tax advantages of brewers in nearby provinces as well as with wine sellers avoiding excise taxes but from 1671 they petitioned on a whole range of issues to do with brewing. In their annual meetings and in their petitions later in the century the *Generale Brouwers* pressed the government for changes in the law and help for the ailing industry. The Holland government was their target. The organization claimed, in 1674 for example, that a full 75% of the retail price of beer was paid to the state in various forms of taxation. The figure was almost certainly inflated but still plausible. The organization generated a mass of records of their meetings, their internal negotiations and their relations with the provincial government. The headquarters of the group was in Delft. Each town in turn appointed the chair. Membership changed as towns dropped in and out of the organization but declined as the eighteenth century wore on. At one point or another 26 towns were member. Expenses were covered by a levy on the income of each brewery

¹⁷ Buijs, "De Bierbrouwer...", p. 2; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 117-118; De Vries and van der Woude, *The First Modern Economy*, p. 105.

¹⁸ G. A. Haarlem, Archief van het Brouwersgilde, #93, 12 [1634]; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 2, #1338 [1631].

in member towns. The rate varied according to the estimate of the prosperity of the industry in each place. Dordrecht, Haarlem, Delft, Amsterdam and Rotterdam paid at the highest rate, Leiden about 35% less and Gouda even less. Smaller towns paid only some 14% of the maximum and some such as Monnikendam and Woudrichem were free of payment.¹⁹

The *Generale Brouwers* acted without official sanction and without real power. They could only make requests. Their meetings and resolutions had no legal force. Their lobbying efforts found mixed success. The stricter regulation of wine sellers from 1669 was a critical early victory and fed later efforts. In 1675 they won a change in the way beer from outside the province was taxed, part of an effort to decrease fraud but, more important, to protect Holland brewing. The *Brouwers* were instrumental in the abolition of the *gijlimpost* in 1676. The States of Holland passed an ordinance in 1677 that took away the general right to brew beer. That law reinforced earlier rules that only public brewers could produce beer in their own homes.²⁰ The Dutch were very late to lose the *braurecht* and although the *General Brouwers* may not have been directly involved, the limitation conformed precisely with their legislative program. They lobbied incessantly in the 1690s when the government tried to reintroduce the *gijlimpost* to pay for the wars against Louis XIV. The *Generale Brouwers* mustered a whole range of arguments about the how capital intensive their industry was and how they faced competition from wine and rising competition from coffee. They tried, in the 1690s, to get increases in taxes on coffee and tea. At the same time and again in the 1740s they tried to force tougher restrictions on imports of beer from other provinces in the Low Countries. There was after 1769 a prohibition on the import of foreign beer. In 1773 that prohibition was changed to a duty of 3 guilders per ton on imported beer. The duty brewers had to pay on heating fuel was not raised at one point and in 1773 it was lowered for three years, all because of the efforts of the *Generale Brouwers*. The tax on the sale of beer was forgiven for a short period. The *Brouwers* were vigilant about potential competition from rural brewers who might be avoiding tax, sometimes sinking to the specifics of the acts of individuals. They got renewals of the regulations on the returning of cooperage and were instrumental in setting up the deposit system. The group also helped in the struggle to keep the brewers' monopoly of selling yeast to bakers. They discussed the problem as early as 1722, but it was the lobbying on that issue in the 1760s which revived interest among brewers in the flagging organiza-

¹⁹ Timmer, *De Generale Brouwers van Holland*, pp. 24-27, 35-39, 48, 54-55.

²⁰ Cau, van Leeuwen, and Schultus, eds., *Groot Placaatboek*, 1, pp. 1715-1716, lv [1632], 1735, xxxiii [1655], 3, pp. 938-939 [1677]; Timmer, *De Generale Brouwers van Holland*, p. 271; Yntema, "Een kapitale nering...", p. 72.

tion.²¹ Their efforts, victories and defeats have been chronicled by the Dutch economic historian, E. M. A. Timmer, in great detail. She found a surprising degree of cooperation and common ground, consistent with the long history of the industry in Holland, between the government and the *Generale Brouwers*.²² They both were interested in increasing consumption of beer, one for the tax income and the other for the profits.

Despite some legislative gains the *Generale Brouwers* failed to stop the deterioration in the position of the industry. That failure may explain why enthusiasm and support for the organization waned in the eighteenth century, although the organization survived until 1816. The last meeting in November of that year was held in The Hague with representatives from eight towns. Another four asked for and received permission to be excused. The brewers acted in concert again in 1833 when there was a threat to change prevailing rules on cooperage. Apart from a suggestion for meeting in 1836 that was the end of the joint action before the transformation of brewing in the 1870s.²³

Another strategy, virtually forced on brewers, was consolidation. When no one could take on the operation of a brewery for personal or financial reasons the business was typically sold and often bought by other brewers and closed. The buildings and land could be turned over to another use. At Delft the rapidly growing production of Delftware in the seventeenth century created a need for industrial buildings so many of old breweries found new life as potteries.²⁴ Sales of breweries could be handled by the officers of the brewers' guild as they were on occasion. It was more common, though, to turn the matter over to an independent broker who would hold an auction at the site on a date and at a time advertised in a newspaper. There might even be a full inventory of the property. The frequency of such announcements increased over the eighteenth century.²⁵ Some brewers bought up other breweries to operate them. That was rare. The Haarlem brewers' guild did buy 50% of each of two breweries in 1675, bought other breweries outright in 1679 and 1697, and made a loan to another brewery in 1701, all to keep them in operation. Brewers' organizations developed rules

²¹ Hallema and Emmens, *Het bier en zijn brouwers*, p. 118; Timmer, *De Generale Brouwers van Holland*, pp. 39-40, 48-49, 55-61, 78-81, 96-98, 113-117, 126-130, 210-216, 226-231.

²² Timmer, *De Generale Brouwers van Holland*, p. 67.

²³ Timmer, *De Generale Brouwers van Holland*, pp. 42-45.

²⁴ van Bleyswijck, *Beschryvinge der Stadt Delft*, p. 736; Montias, *Artists and Artisans in Delft*, pp. 300-301; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 71.

²⁵ G. A. Amsterdam, Archief van de Brouwerscollege, #1697; Leonie van Nierop, "Gegevens over de Nijverheid van Amsterdam, 1667-1811," *Jaarboek van het Genootschap Amstelodamum* 28 (1931), pp. 102, 138, 165, 167-168 and (1933), p. 256; Visser, *Verkeersindustrieën te Rotterdam...*, pp. 77-80.

on how to go about buying breweries since there seem to have been problems with members who did not always pay their share of the purchase price on time. By 1746 the Amsterdam college had successfully bought up and closed nine breweries, three of them in 1698. Contributions for members were assessed on the basis of distance from the brewery purchased since those closest were the greatest beneficiaries from the disappearance of competition.²⁶

In the eighteenth century with hopes for revival fading when a brewery was sold it was commonly scrapped. If any brewery came on the market, even a larger and more modern one, it appears the brewers' organizations discussed joining together and buying the property. The goal was to lower the number of breweries. Amsterdam brewers tried to get a prohibition on the opening of new ones in the 1680s and 1690s, an effort which failed.²⁷ After three breweries were demolished in 1682 at Leiden the town government, fearing the trend to oligopoly, passed a bylaw that made it illegal to break up a brewery. In 1730 the brewers wanted the regulation to be overturned so they could shut down a firm they had just bought. They argued that with fewer breweries and slightly larger brews the quality of beer would go up. The chance of brews going off would be decreased. In 1684 the Delft brewers bought a brewery and broke it up. When they tried to do the same thing in 1700 the town allowed the purchase but refused to let the guild scrap the operation. The guild tried for a year to find a buyer and even offered to extend credit but there were no candidates. The brewers told the town that breaking up breweries was common in Haarlem, where two had been bought and broken up in the last 25 years, but the response of the town was to pass a bylaw that prohibited closing down any brewery and selling off the equipment. Violation led to heavy fines as well as the requirement that the brewery be restored. Though that law was renewed in 1746 it appears to have been ineffective since in 1736 and again in 1753 the brewers' organization bought breweries that had come on the market and then broke each up.²⁸ The Dordrecht brewers banded together in 1770 to buy out one of their competitors. In exchange for the payment of 1 guilder for each brew from the 8 remaining brewers for 10 years, the owner of the *Anchor* agreed to shut down and destroy his

²⁶ G. A. Amsterdam, Archief van de Brouwerscollege, #1660, 15 [1698]; #1667, 20 [1746]; van Eeghen, "De Brouwerij de Hooiberg," p. 57; Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 2; Schwartz, "De Sociteyt der Brouwers in de XVIIIe Eeuw," p. 70.

²⁷ G. A. Amsterdam, Archief van de Brouwerscollege, #1698; van Eeghen, "De Brouwerij de Hooiberg," pp. 64-65; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 8; Wageenaar, *Amsterdam in zyne opkomst, aanwas, Geschiedenissen*. 8, p. 229.

²⁸ G. A. Delft, Eerste Afdeling, #1941 [1700], #1945 [1700], #1952 [1736]; #1953 [1736]; G. A. Leiden, Archieven van de Gilden, #246 [1730?], Bibliotheek, #59406, 12 [1682]; Timmer, "Uit de nadagen der Delftsche brouwering," pp. 770-772.

kettles so that they could never be used again. He still got a reduced price on coal just as if he had still been brewing. The scheme apparently fell apart, however, since the *Anchor* was back in action before the ten years were up.

Dordrecht brewers, and indeed all Dutch brewers, had greater success when they simply bought a brewery, as they did in 1782 and again in 1785, took out all the equipment, used it themselves, gave the workers severance pay and then rented the house as a dwelling to someone who would not brew. Paying off the workers was not a major cost since it involved only two weeks' pay and numbers were small. Buyers got the land and buildings, the kettles and troughs, pumps, equipment for stirring and cleaning, grain and peat or coal on hand, cooperage, a maltery if there was one, a distillery if there was one, in some cases a boat, and in one case a carriage house with stalls for 10 horses.²⁹ Trying to estimate the value was difficult, given the variety of things being bought, that even without trying to assess the value of the business if it did or did not continue. The importance of land in the total value of breweries is clear from the difference in the selling prices of breweries in the cities and those in villages. In the countryside breweries could be just another asset held by a family, not the centrepiece of the family fortune as was often the case in Amsterdam. In the late eighteenth century, brew kettles - even the bigger ones - cost a few hundred guilders.³⁰ That was a small proportion of the value of an urban brewery, which could sell for 100 times the cost of the kettle. When brewers joined to buy out a brewery the benefits from getting additional equipment could be small. The ultimate goal of consolidation into fewer units was to create larger, more efficient and so possibly profitable breweries. In addition restrictions on building and the high cost of urban land made the purchase of existing breweries and malteries, even if they were not contiguous, a sensible investment. Brewers who bought other breweries might not get their money's worth from the equipment and goods on hand distributed among the purchasers, but they could expect a sizeable sum from the sale of the land and they would recoup part of their outlay in an increase in the capital value of their own breweries. It was that expectation which lay behind the way Amsterdam assessed contributions from members of the Brewers' Society when they bought another brewery. It might be years, though, before that capital gain could be realized so raising capital could not have been easy. One way was to sell shares. A Rotterdam brewer in 1750, for example, to find funds to

²⁹ G. A. Amsterdam, Archief van de Brouwerscollege, #1660, 15, #1697; G. A. Dordrecht, Archief van de Gilden, #1006; G. A. Leiden, Archieven van de Gilden, #297; van Dillen, *Van Rijkdom en Regenten*, p. 294; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 19; van Nierop, "Gegevens over de Nijverheid van Amsterdam, 1667-1811," 27 (1930), pp. 278, 303 and 28 (1931), pp. 126-127.

³⁰ Grolsch Bierbrouwerij B.V., Archive #33 [1734], #56 [1760, 1775]; 96 [1775].

operate the brewery he inherited from his mother, created a partnership of 32 shares and selling 24 of them but such selling of shares was rare.³¹ The lack of buyers for breweries indicates how difficult it was to find investors in what was clearly a declining industry.

Another strategy which brewers pursued was diversification. By integrating other tasks into brewing they could raise the productivity of their capital and so make it more appealing to investors. The easiest thing was to set up or buy a maltery and perhaps a mill, integrating vertically as they moved back along the production process. They could expand the range of goods produced on the site by making spirits in a distillery or vinegar in the same kettles and troughs or refining sugar using some of the same equipment. Diversification could prove so successful that beer brewing disappeared entirely. A number of breweries, especially in port towns like Rotterdam and Amsterdam, were converted to sugar refineries or malteries.³²

One of the advantages of going into making spirits was that the retail outlets for beer and genever were the same. In the Rhine Valley as in the Low Countries in the early seventeenth century brewers also operated distilleries. The practice appears to have increased and the two came to be associated so closely that when brewing declined in Haarlem, for example, so did distilling. Delft, a center of brewing, was a logical centre for distilling and though the town never rose to the status of Schiedam, distilleries grew up as parts of breweries or just replaced them. That continued throughout the eighteenth century.³³

Brewers could make a mistake and sell the mistake as vinegar, often of relatively high quality. The difficulties of maintaining purity in the brewing process and the excellent conditions for the growth of acetic acid bacteria during cooling made the accidental production of vinegar unavoidable. A writer on health in the mid seventeenth century claimed that the best thing for a drinker was a more sour beer, exactly, he continued, the thing from which brewers made vinegar. The narrow line between the two presumably helped brewers' diversification of sales. Though beer brewers could make vinegar, vinegar makers were not to make beer even though the equipment and the process was much the same.³⁴

³¹ Bijlsma, "De Brouwerij 'De Twee Witte Klimminde Leeuwen'," p. 136; van Eeghen, "De Brouwerij de Hooiberg," pp. 71-73; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden....," p. 76.

³² Visser, *Verkeersindustrieën te Rotterdam...*, p. 67.

³³ Dobbelaar, *De Branderijen in Holland...*, pp. 52-53, 74-75, 109-111, 117-119; Eycken, *Geschiedenis van Diest*, p. 200; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 119-120; De Jongste, *Onrust aan het Spaarne*, p. 14; Kampeter, *Die wirtschaftliche Entwicklung des Rheinisch-Westfälischen Brauerei-Gewerbes...*, p. 19.

³⁴ R. G. Ault and R. Newton., "Spoilage Organisms in Brewing," in: W. P. K. Findlay, ed., *Modern Brewing Technology*, (London, 1971), pp. 175, 177; van Beverwijck, *Schat der Gezontheyt*, p. 134; Grönloh, "De Brouwerij in Amsterdam van 1700 tot 1800," p. 23.

Brewers could also get involved in fattening cattle or pigs, using the spent grains from the brewing process. They could sell manure from those animals as well as the ashes from their fires.³⁵ The pressure on profits forced them to look for any way to increase income. Despite efforts to diversify, to produce new goods, to exploit different markets and to control costs, in the end brewers' efforts were to no avail, in part because they failed to take advantage of potential technical changes in producing beer.

Holland brewers did not find alternative markets as those at home shrank. They lost sales in other provinces in the Republic and did not establish a place for their products in other ports in Europe. It is true that as the eighteenth century wore on the general decline in Dutch trade meant fewer opportunities to ship beer cheaply. More damaging, though, were import duties which increased in places like the nearby provinces of Overijssel and Friesland from the second half of the seventeenth century. Around 1700 the Amsterdam beer wholesalers' guild which handled distribution to the countryside and towns to the north and east had about 40 members. By the end of the eighteenth century business was so bad that only one was left.³⁶

Even in the colonies of the Dutch Republic where the transport network and restrictions on trade worked to their advantage Holland brewers failed to expand sales. In the Indies, East and West, the climate made producing beer difficult and made imports a logical choice. The large port towns of Amsterdam and Rotterdam were the export centers for shipping beer to the colonies. Since heat and moving it around were both bad for beer, shipping it to the tropics created a great risk of spoilage. Higher alcohol content was the usual way to try to stave off trouble. Amsterdam had success in the early nineteenth century in the colonies, but was trying to gain a share of a market which English beer dominated.³⁷ It is difficult to say since statistics are incomplete but Dutch distillers may have had more success in the Indies than did brewers. Gin was more stable in tropical regions so even some of the genever sent to France and Spain was for re-export to their colonies. In 1792 Rotterdam alone sent 1,229,600 liters of distilled spirits to Spain and Portugal and to France 3,725,500. Every year, a mere 3,000 liters of beer, worth a great deal less per liter than gin, were shipped to Batavia on vessels of the East India Company. The numbers indicate the success of gin in com-

³⁵ Léon van Buyten, "Verlichting en traditie. De Leuvense stadsfinanciën en hun economische grondslagen onder het Oostenrijkse Regiem (1713-1794)," unpublished doctoral dissertation, Catholic University of Leuven (1969-70), 3, p. 76.

³⁶ Yntema, "Allerhande bieren...," p. 94.

³⁷ Gerrit Z. Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie* (Haarlem, 1933), p. 42; Mathias, *The Brewing Industry in England 1700-1830*, pp. 139-140; Visser, *Verkeersindustrieën te Rotterdam...*, p. 63.

peting with beer as well as the failure of beer in colonial markets. Meanwhile, brewers also lost the market for supplying shippers as distilled spirits became the standard drink for sailors. Brewers had in the past invested in ships, in part for the potential return on capital and in part to establish a market for their beer in supplying those ships. At Delft, for example, in the eighteenth century, such investment disappeared. If ships did not need beer then one of the reasons for brewers to invest in them disappeared.³⁸

Dutch brewers failed to find new drinks or types of beer to tap the taste of the public. If there was a change in Holland it was a drift toward making weaker beer, that is with smaller quantities of both malt and hops. That made beer a simpler drink. Quenching thirst was more and more its sole function. If Dutch brewers made any effort to shape taste, the efforts were feeble and ineffective. As in the fourteenth century neither brewers nor the government saw it as their function to decide or direct demand. For the government, considerations remained fiscal with some but lesser concern for employment. For brewers concern remained financial with some concern for the survival of the industry.

Not all European brewing industries declined in the eighteenth century. Other brewers in southern Germany, Austria and above all England found ways to overcome the problems facing them. Dutch brewers either could not or chose not to imitate their strategies. The decline in consumption in Holland had many reasons, chronicled often by petitioning brewers, but as the brewers themselves noted in 1802 it was consumption of native beer that declined while that of English held its own. Dutch brewers enjoyed the same advantages of geography and international trade connections which had made for the prosperity of the sixteenth century, but they now also faced handicaps. The lack of growth in the Dutch economy and tax levels in Holland certainly made business more difficult than in the past. From 1660 English brewers were subject to excise and collectors of the tax enjoyed extensive powers, just like their counterparts in Holland. So English brewers suffered with burdens as well, but they were able to overcome those burdens, positive examples which Dutch brewers failed to follow. Technical advances in England and in Bavaria made possible a growth of brewing on an impressive scale. New types of beer, in England porter and in Bavaria pilsner, came on the market and attracted a new and rapidly expanding clientele.³⁹

³⁸ Dobbelaar, *De Branderijen in Holland...*, pp. 233, 288; De Vries, *De economische achteruitgang der Republiek in de achttiende eeuw*, p. 91; Wijsenbeek-Olthuis, "Ondernemen in Mocilijke Tijden...", pp. 74, 76, 78.

³⁹ Hoffmann, *5000 Jahre Bier*, p. 126; Mathias, *The Brewing Industry in England 1700-1830*, pp. 351-354; Timmer, *De Generale Brouwers van Holland*, p. 197.

The high cost of transport made a large consuming public within a short distance, that is about 10 kilometers, a necessity for the prosperity of a big brewery. While London brewers had some success in export markets their growth depended heavily on the large numbers of Londoners. As other towns and cities in the British Isles grew, brewers followed their London counterparts but large operations and industrialist brewers were extremely rare outside of London. In Holland, despite large populations, a long established network of relatively inexpensive waterways and the opportunities those circumstances created, the reaction to the transformation of English brewing was slow or nonexistent. The example of success in London of larger firms did, however, have some impact. From the closing years of the eighteenth century it helped the efforts to strip away protection of small brewers, and so made brewing in other places in northern Europe including Holland more competitive.⁴⁰

Dutch brewing did not imitate English in, for example, the adoption of the use of the thermometer. It did not produce technical manuals on brewing nor, for that matter, did it generate anything remotely resembling the scientific interest in the brewing process that emerged in Germany in the early nineteenth century. In each case other brewers exploited advantages created by having started along a path of technical advance. Dutch brewers were at best distant followers. Knowledge of developments elsewhere was available but in Holland no participant in the industry appears to have been willing or able to exploit the potential for change.

At the outset, the new wave of English books on brewing, like their counterparts on the Continent, were more theoretical. Over time, though, they came to be overwhelmed by practical considerations. By the mid-eighteenth century they were how-to books and by the end of that century they were attempts to produce scientific treatises. Still, English writers never seem to have lost the empirical side of their approach to brewing. They were somewhat slower to embrace biochemistry and biotechnology than writers in the Low Countries or in Germany in the first half of the nineteenth century.⁴¹ Even so, the transition in written works, in the approach to brewing, is most clear in England if for no other reason than the great volume of material produced there.

The thermometer was invented in the first half of the seventeenth century. It arrived in England in 1661, after refinement and improvement in Italy. The Dutch scientist Christiaan Huygens became interested in it on a trip to London in 1663 and took knowledge of the new device back to Holland with him, but

⁴⁰ Kristof Glamann, *Jacobsen of Carlsberg Brewer and Philanthropist*, Geoffrey French, trans. (Copenhagen, 1991), p. 20; Mathias, *The Brewing Industry in England 1700-1830*, p. xxii.

⁴¹ Aerts and Put, "Jezuïetenbier....," pp. 102-103.

Dutch brewers appear to have ignored it. The thermometer was a powerful new weapon that changed brewing techniques. The thermometer indicated how long brewers should let grain germinate during malting, how long they should boil, how much hops to use at different times, how much yeast should be added for good fermentation. The device would eliminate brewing by accident.⁴² The thermometer helped to get the most beer possible from a given quantity of grain. That, along with decreasing the instances of spoilage, made the thermometer effective in raising brewers' profits.

The thermometer helped to curtail contamination. A new device, the saccharometer, in theory used for measuring sugar content but in fact a type of hydrometer for measuring the specific gravity of beer at any stage in the brewing process, changed the way brewers acted. It helped brewers extract more fermentable material from each liter of malt. There were hydrometers in classical times and various versions in England from the 1660s at least. Customs officers probably used a type of hydrometer before 1759 and excise authorities one around 1760. Distillers were more interested in the device but English brewers were not far behind. What all writers on the saccharometer needed was a way to standardize measurement and the measuring devices for consistent and comparable results.⁴³ Even more than the thermometer the saccharometer, because it could measure strength of beer and wort, was to revolutionize brewing, but not in Holland for a long time.

Dutch manuals on brewing could not compare to English manuals in number, quality, scope or exploitation of advances in other fields. In the seventeenth century beer consumption could be the topic of works on health. That led to discussion of how the beer was made, about what beers were most healthful but never to questions of measuring and experiment. In the Netherlands the first treatise on brewing was the *Liber de Cerevisia* of Martin Schookhuis, a professor of logic and physics at Groningen. It reached its twelfth edition by 1661. Only some 30 of the 400 pages were actually devoted to making beer. The rest of the book was taken up with citations of every classical author Schookhuis found who mentioned beer and what each said. Schookhuis searched through local archives to find a mention of beer production in his home town. The earliest he uncovered was from 1437. He also talked in general terms about production in Delft, Rotterdam and Hamburg and Hannover. Opinions on many topics, including the

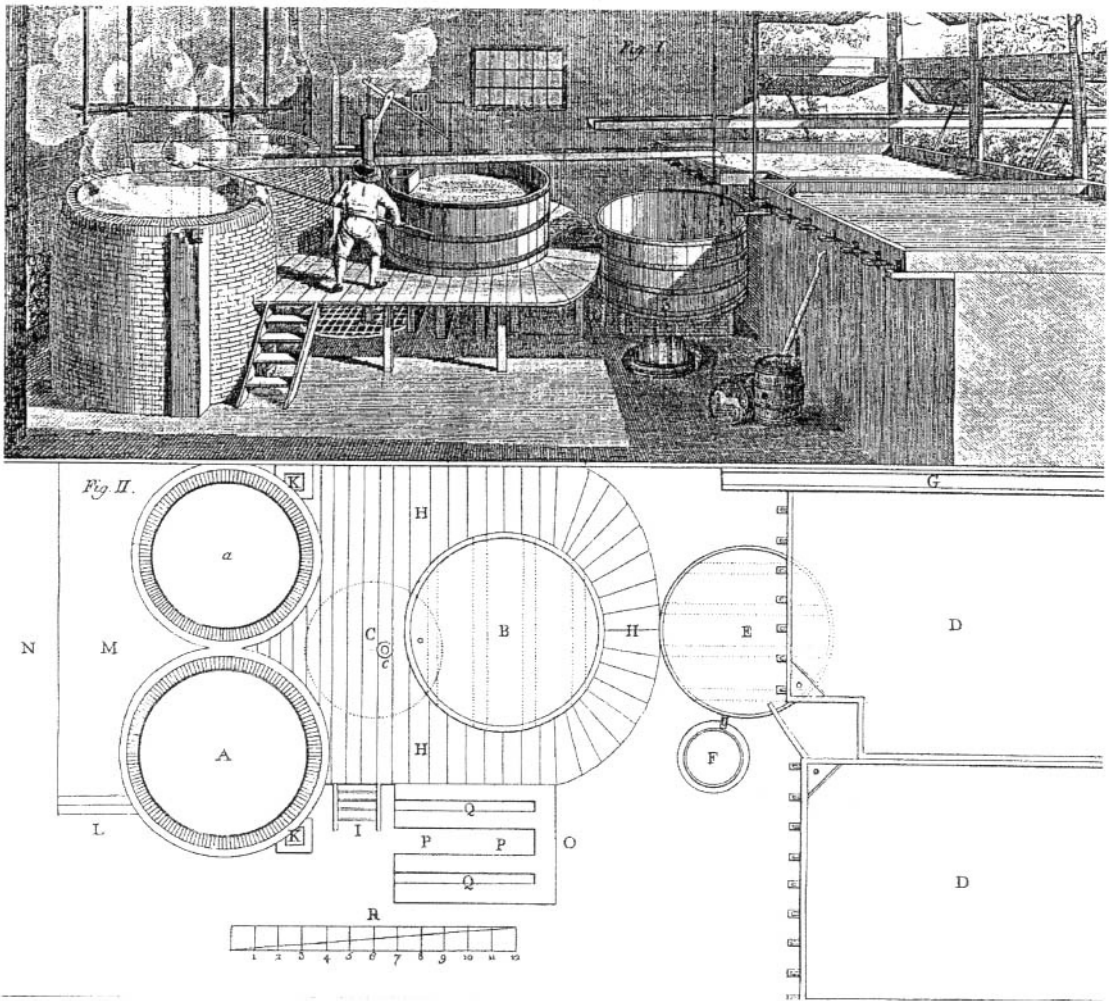
⁴² Michael Combrune, *An Essay on Brewing with a View of establishing the Principles of the Art* (London, 1758), pp. x-xii, 54-72; W. E. Knowles Middleton, *A History of the Thermometer* (Baltimore, 1966), pp. 5, 27-38, 50-51; Monckton, *A History of English Ale and Beer*, pp. 138, 142.

⁴³ J. H. Baverstock, *Treatises on Brewing* (London, 1824), pp. xiv-xv, xx, 6-8, 18; Mathias, *The Brewing Industry in England 1700-1830*, pp. 67-72; Siebel, *One Hundred Years of Brewing*, p. 48.

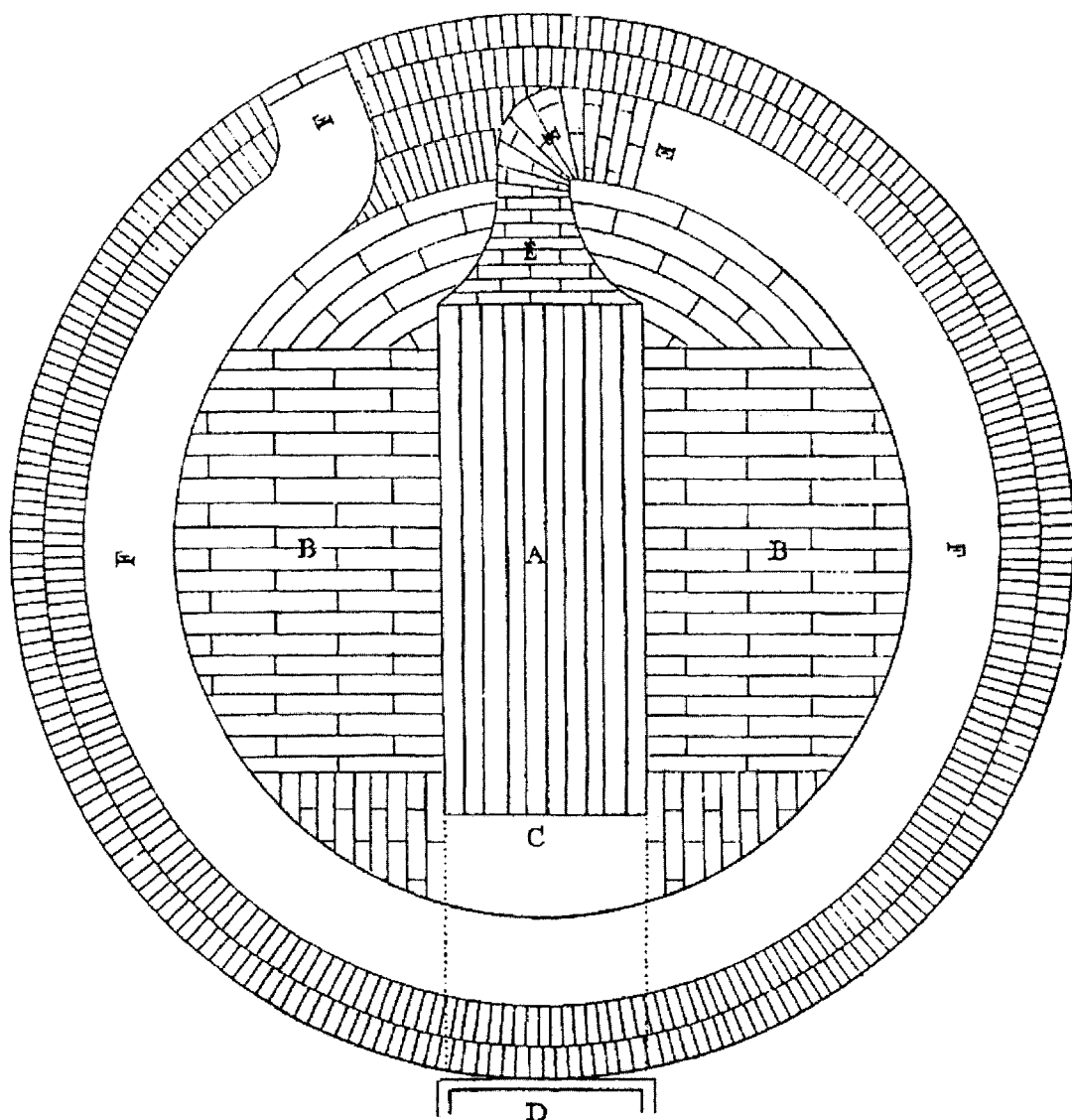
medical uses of beer, overshadowed the scant technical discussion of production. His may have been the first Dutch book on brewing but it certainly did not add to the technical literature. In 1667 a Delft writer claimed that a number of people had written about brewing but he named only Schookhuis and Hugo Grotius. Antonie van Leeuwenhoek, using his microscope, first identified yeast in 1680.⁴⁴ He reported the fact but it had no effect apparently on brewing or writing and thinking about brewing.

The few Dutch treatises on brewing were to come, by the standards of other parts of Europe, rather late. Only two of any note appeared in the eighteenth century. The two writers were Wouter van Lis and Jacob Buijs, both brewers by trade who had operated their own breweries. In 1745 the prominent Rotterdam brewer W. van Lis published his *Brouwkunde of Verhandeling van het voornaamste dat tot een Brouwery en Moutery en het Brouwen en Mouten behoort; alsmede een korte Beschryving van het Bier*. Apprenticed as an apothecary and having practised as an apothecary since 1733, he sold his earlier business in 1742 and bought the *Oranjeboom* brewery when the heirs of the deceased owners put it on the market. Later the same year he sold his apothecary's business to devote himself to the brewery and to studying for his doctorate in medicine. As a brewer he seems to have been better at theory than at practice. His book stands alone for its straightforward and matter-of-fact approach to brewing. He described with precision the equipment needed, the space requirements, the organization of work, the different types of beer produced, the different types of grain used for different beers, types of water to use and not to use, spices and plants to flavour beer, and additives to get rid of undesirable taste or appearance, among other practical things. He had useful small pieces of advice, clearly based on experience but apparently nowhere informed by anything else. He said that brewers were in the health business. His background in pharmacy and medicine lay behind such a claim. The statement also shows that he was still in a tradition of the seventeenth century, that he had not realized as writers in England were doing that brewing had more to learn from chemistry than from medicine. Though he had family connections with brewing it seems he was a failure. He sold the brewery at a loss at the end of 1748 and went on to practice medicine until his death in 1784.

⁴⁴ van Beverwijck, *Schat der Gezontheyt*, pp. 133-134; van Bleyswijck, *Beschryvinge der Stadt Delft*, p. 733; Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, p. 75; F. A. H. Peeters, "Introduction," in: W. van Lis, *Brouwkunde of Verhandeling van het voornaamste dat tot een Brouwery en Moutery en het Brouwen en Mouten behoort; alsmede een korte Beschryving van het Bier* and J. Buys, *De Bierbrouwer*, facsimile edition (Tilburg, 1986), forward; (Martinus Schookhuis) Martini Schoockii, *Liber de Cervisia quo Non modo omnia ad Cerealem potum pertinentia comprehenduntur, sed varia quoque Problemata, Philosophica & Philologica discutuntur; Simul incidentes quaedam Authorum antiquorum loca illustratur* (Groningen, 1661), pp. 2-15, *passim*.

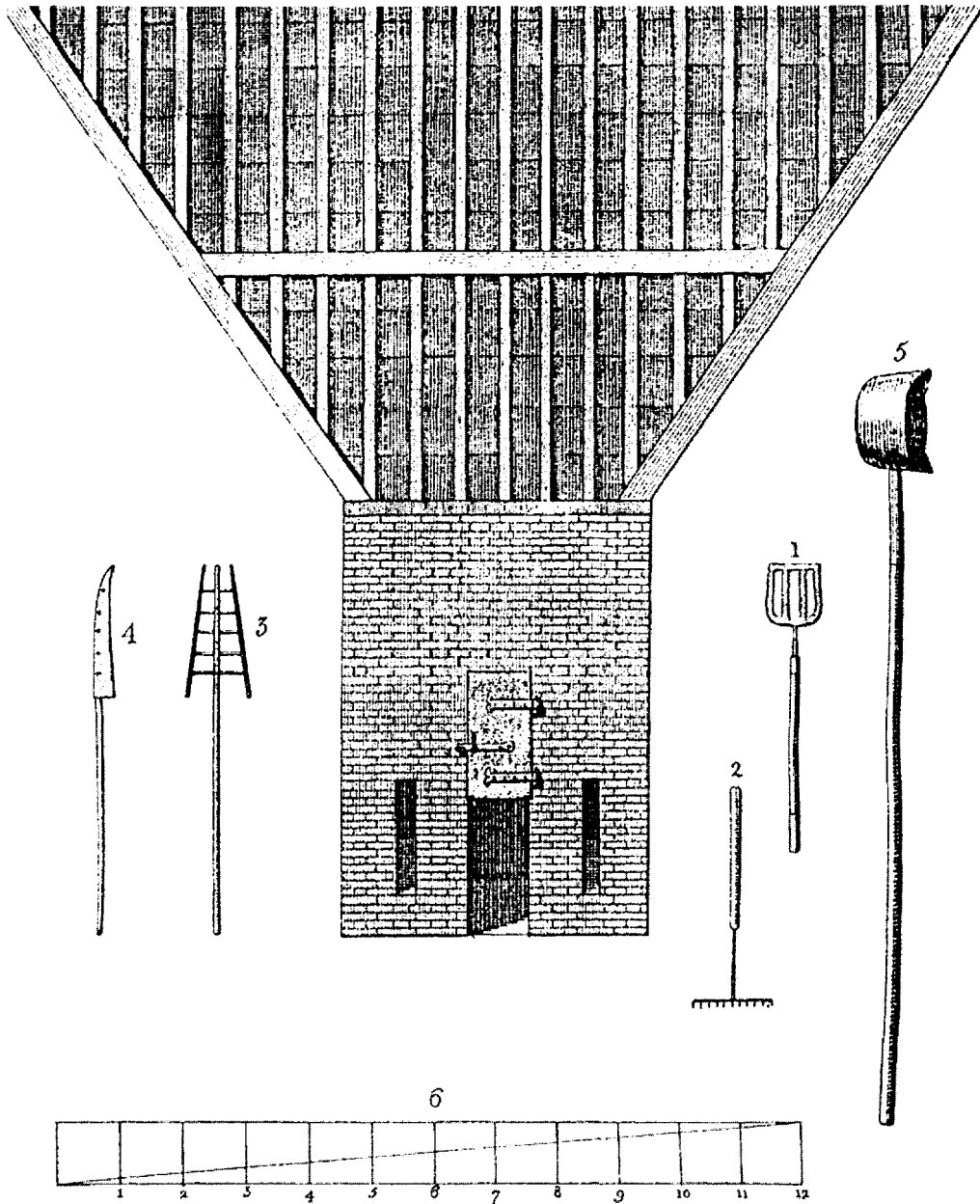


32. J. Buys, *De Bierbrouwer*, plate 1, drawing, 1799. He described the place as “A drawing of the principal parts of my brewery.” A is the large or brewing kettle, a the small or water kettle. B is the mash tun, c the pump, D and D the cooling vats. The scale, R, is in Rhineland feet. Source: F. A. H. Peeters, intro. and ed., facsimile edition (Tilburg, 1986).



33. J. Buys, *De Bierbrouwer*, plate 3, drawing, 1799. This sketch shows the inner workings of a brewing oven. A is an iron grate under which the fire is built, B & B the stone or brick supports on which the kettle rests, C the place for ashes under the grate, E and F the chimney which passes around the kettle so some of the exhaust heat is transferred to the contents of the kettle. Though on a grander scale the design is much the same as that of medieval examples of ovens, See illustration 2.

Source: F. A. H. Peeters, intro. and ed., facsimile edition (Tilburg, 1986).



34. J. Buys, *De Bierbrouwer*, plate 4, drawing, 1799. An accurate picture of his drying kiln. He thought no further explanation was needed but did describe each of the four tools shown — 4 is a side view of 3. The tools were used for manipulating grain at various stages in the brewing process, with the exception of the last, 5, which was a ladle for moving water in small breweries which did not have a spigot in the kettle.

Source: F. A. H. Peeters, intro. and ed., facsimile edition (Tilburg, 1986).

His book, however, enjoyed some recognition and had a second edition in 1793.⁴⁵

De Bierbrouwer of Volledige Beschrijving van het Brouwen der Bieren; Midsgaders van het Mouten der Graane, tot het Brouwen van Bier Gebruikt Wordende by Jacob Buijs appeared in 1799. It was the sixteenth volume of a twenty volume series published by the prominent Dordrecht publisher, Pieter Blussé, devoted to all types of trades, crafts, manufactures and different technologies. The Haarlem *Maatschaapji der Oeconomische Wetenschappen* sponsored publication. Modeled on the French *Description des Arts et Métiers*, the goal of the series was to bring Dutch industry up to the standards of other European countries and to make available the latest technical knowledge.⁴⁶ Buijs was a brewer, the owner of the *Witten Hengst* in the small town of Klundert in Brabant where he operated that brewery for much of his long life. He sold it in 1819, two years before he died well into his ninth decade. Among his goals was to pass on his 40 years of brewing experience to his children. He also wanted to decrease loss and so make brewing a paying profession which, he said, it had not been through the second half of the eighteenth century. He was an experienced brewer and above all a practical man. His book gave a complete description of exactly what brewers did.⁴⁷

When Buijs came to write his book the literature on brewing may have changed but the practice, from what he described, had not. One of the reasons Buijs gave for writing was that there was not much in Dutch on the topic. He noted how little even van Lis had to say about the quantities of grain, hops and water needed to make beer. It was that gap which he set out to fill. He had little use for comments in earlier works, and he cited two, on spices to be used in beer. He preferred a natural taste and saw no reason to raise costs through using unnecessary additives. He recommended only fresh air, fresh water, well-malted grain, and a strong hop to make beer of high quality. He also preferred stronger to weaker beers both for efficiency and health. He offered recommendations on the precise size, shape and thickness of kettles and the placing of kettles over fires. He worried about reducing fuel costs while maintaining quality. He offered a long list of recommendations on how to set up a brewery, how to deal with raw materials, how to use equipment, how to organize work in the brewery, how to make beer, which beer to make, and how to control costs. One certain way to lower costs, he knew, was to cut down on spoilage. His solution to that problem was not the use of new instruments of measurement or a knowledge of chemistry but rather getting the right quantities of inputs and working with care and

⁴⁵ Peeters, "Introduction," forward, pp. 1-6, 18-34, 37-43, 67-71.

⁴⁶ Buijs, "De Bierbrouwer....," p. vi.

⁴⁷ Buys, "De Bierbrouwer....," pp. vi, 2-5, 10; Peeters, "Introduction," forward.

order.⁴⁸ Even at the end of the eighteenth century, when readers in Holland finally got a definitive work in Dutch on how to brew beer, it was still the summary of the experience of a practitioner. Although Buijs' book was undoubtedly accurate, it just reflected long standing practice. He showed no interest in the advances in England, France and Germany.

English brewers used their new equipment, the thermometer and the saccharometer, to make better use of raw materials, to economize and so lower costs. This was combined with the development of a new and better product: porter. It proved so successful it was taken up by brewers in Ireland, Scotland, France, Denmark and Sweden, though hardly at all in Holland. Porter was dark strong beer first brewed in 1722. The popular tale is that customers in taverns would order mixtures of the three different types or strengths of beer then on the market. An East London brewer in that year decided to ship premixed beer, calling it entire or entire butt. Pub owners liked it because they needed to have only one cask rather than the three they had before. The new drink gained quick popularity in a pub frequented by porters and hence the name. Brewers used soft rather than hard water, and less but drier and darker malt that was scorched a little. They also used more hops. Given rising taxes on malt in England, that helped to control costs.⁴⁹ The price of porter was 25% less than ordinary ale, it kept longer and even got better if kept because the alcohol content rose over time. It was easy to adulterate, the dark color helping to mask impurities and greater hop content masking variations in taste. It was also relatively stable and so could be handled more roughly than its predecessors. Since it was stable at higher heat, brewers of porter could brew until mid June and start again at the beginning of September, adding almost a month to the brewing season at a time of the year when the potential for sales was high.

Leiden tax data from 1656 to 1748 showed consumption during the quarter beginning in the first week in February to be the highest during the year, 15% higher than the average for the entire twelve months. The fourth quarter, starting in the first week in August, showed the lowest average level of tax income and therefore of consumption. It was 10% less than the annual average and only 78% of the average for the quarter starting in February.⁵⁰ The fact that the sur-

⁴⁸ Buijs, "De Bierbrouwer...", pp. 7-9, 14-18, 35, *passim*.

⁴⁹ Glammann, *Jacobsen of Carlsberg*, p. 24; King, *Beer Has a History*, p. 91; Patrick Lynch and John Vaizey, *Guinness's Brewery in the Irish Economy 1759-1876* (Cambridge, 1960), pp. 38-39; Mathias, *The Brewing Industry in England 1700-1830*, pp. 14, 18; Monckton, *A History of English Ale and Beer*, p. 144; Clemens Wischermann, "Zur Industrialisierung des Deutschen Braugewerbes im 19. Jahrhundert Das Beispiel der Reichsgräfllich zu Stolbergischen Brauerei Westheim in Westfalen 1860-1913," *Zeitschrift für Unternehmensgeschichte* 30 (1985), p. 147.

⁵⁰ G. A. Leiden, *Secrtaire Archief na 1573, #4338-4341, Rekeningen van den bier-accijns, 1656-1748*.

rogate for consumption was almost exactly at the average for the year in the warm months of May, June and July, suggests strongly that Dutch brewers were still unable to produce in response to demand, that circumstances had not changed since the fifteenth century. Dutch brewers did not adopt porter brewing so could not make the small step toward overcoming weather that their English counterparts did. Dutch brewers would have to wait until the 1870s and 1880s for new beers and new equipment to help them conquer the seasons.

Porter might not represent a great technical breakthrough, but it was a beer well-suited to mass production at a quality acceptable to contemporaries. The shift to porter was a principal reason for the a sharp rise in the scale of production among London brewers. Where a large brewery making the old style of ale would expect to produce from 2,500,000 to 5,000,000 liters in a year, the larger porter brewers by the second half of the eighteenth century shipped over 30,000,000 litres and even up to 50,000,000 liters. To increase efficiency and to supply the growing market, they built ever bigger vats. After some experimentation brewers went over to using stone vessels from 1784 and capacity rose even more. In 1770 vats were of about 250,000 liters and more. In 1809 there was one of 1,145,550 liters but already in 1790 one some 18 metres in diameter, almost 8 meters high was rated at a capacity of 1,636,500 liters.⁵¹ In Holland nothing even on one-tenth that scale was ever attempted.

There is little evidence in fact of any efforts to imitate London porter brewers. The excuse of a small market which might make sense in Scotland could hardly apply to such a highly urbanized region with a network of canals that offered low cost transportation. The catchment area for Dutch brewers had always been larger geographically than the London counterpart since those canals and the boats owned by breweries offered relief from complete reliance on draymen. As early as the 1680s an Amsterdam brewery was being set up to produce beer of high quality that would compete with imports, including beer from London. One recommendation of 1768 for Holland brewers was to make stronger beers which would be tastier and offer better profit margins. In 1782 a fire destroyed a Rotterdam brewery. It was rebuilt using the latest techniques with ovens to direct, control and save heat from the fires. The maltery was built in such a way as to prevent fire from breaking out and in 1793 the town declared that in future all malteries would have to be built in the same English style. Dutch brewers, at least in the case of the best-run Rotterdam brewery, knew about the advances in England but imitation in the one case was remarkable because it was so rare. It appears that Dutch brewers took little interest in technical

⁵¹ Mathias, *The Brewing Industry in England 1700-1830*, pp. 12, 58-62; Monckton, *A History of the English Public House*, pp. 69-70.

advance.⁵² English beers, among them porter, were well known to Dutch producers. The option to shift to porter was clear but Dutch brewers, unlike their Irish and Scottish and even French counterparts, did not take it up.

The Dutch brewing industry faced the start of the nineteenth century in a miserable state. There were hardly any entrants to the industry and the few breweries that existed were typically struggling. As in the Dutch economy in general, there were signs of decline everywhere. Though fear was expressed as early as 1714 about the economic decline of the Dutch Republic, by the second half of the century there was an extensive literature on difficulties in trade, industry and the fishery. Whether the decline was absolute or relative has long been a topic of debate as has been the identification of the causes of decline. For brewing, the issues are clearer. Decline was absolute. Brewing in many parts of northern Europe declined in the eighteenth century so Holland was not alone. The difficulties for Dutch industry were often attributed to high domestic wages, restrictive practices by guilds, rising energy costs, the development of protected industries in traditional markets, and a failure to maintain the same pace of technical advance as competitors.⁵³ Wage costs were a small portion of total costs in brewing so that explanation has little force. Fuel costs rose dramatically in the eighteenth century, though switching from domestic peat to imported coal could lessen the pressure on profitability. The problems for Dutch brewers, then, turned on the general decline in the economy, the rising cost of fuel, a failure to invest, and the restrictions not so much from their guilds but from the extensive government regulation which typified brewing in Holland through its entire history. It seems above all, however, that problems arose from an inability to take up improvements in brewing methods and products. The few attempts to promote technical advance in Dutch brewing failed. Practice remained traditional. Inventions and innovations dated back to more prosperous times and little new had been introduced since the first half of the seventeenth century. That was true in the most complex and even in the most simple features of making beer. Wouter van Lis confirmed indications from other sources, that the contemporary trend was for brewers to leave the daily operation of the brewery to the chief worker, the captain of the crew, who was the most important man in the brewery.⁵⁴ The increasing scale of brewing with fewer and larger breweries increased the tendency, already present by 1600, of owners to turn over the day-to-day

⁵² G. A. Amsterdam, Archief van de Brouwerscollege, #1698; Timmer, *De Generale Brouwers van Holland*, pp. 113-114; Visser, *Verkeersindustrieën te Rotterdam...*, p. 76; Wijsenbeek-Olthuis, "Onderneemen in Moeilijke Tijden...", p. 77.

⁵³ De Vries and van der Woude, *The First Modern Economy*, pp. 681-683; De Vries, *De economische achteruitgang der Republiek in de achttiende eeuw*, pp. 1-11, 107-113.

⁵⁴ Peeters, "Introduction," p. 12.

operation of their firms to skilled employees and devote their time to sales, distribution and financing operations. The trend meant that the financial and commercial aspects of the business of brewing were separated from the technical ones. Such separation was a tendency noted in other Dutch industries of the eighteenth century. It appears that brewery owners in Holland preferred to concentrate on enhancing their incomes, on their comfort and the social status which grew out of their success rather than on the roots of that success.

The extensive government regulation inspired by the complex system of taxation remained virtually in tact at least until the Dutch Republic fell in 1795 and the new governments could attack the maze of economic regulation which they inherited. In 1795 brewing was not the thriving and massive industry of the fifteenth century. It was certainly not the developing and evolving industry of the sixteenth century. Brewers were not even the producers of a widely-sold good which was part of the popular imagination. Artists cared as little as consumers about beer and brewing. When the German writer Johann von Justi described the lands and regions where beer was the most popular drink or when he ranked the best beers in Europe in 1760, Holland and its beers did not even deserve mention.⁵⁵ By 1795 the Dutch brewing industry seemed hardly worthy of notice. That would change in the nineteenth century but the process of recovery would prove a slow one.

⁵⁵ Johann Heinrich Gottlobs von Justi, *Oeconomische Schriften über die wichtigsten Gegenstände der Stadt- und Landwirthschaft* (Berlin and Leipzig, 1760), 1, pp. 11-13.

CHAPTER TWELVE

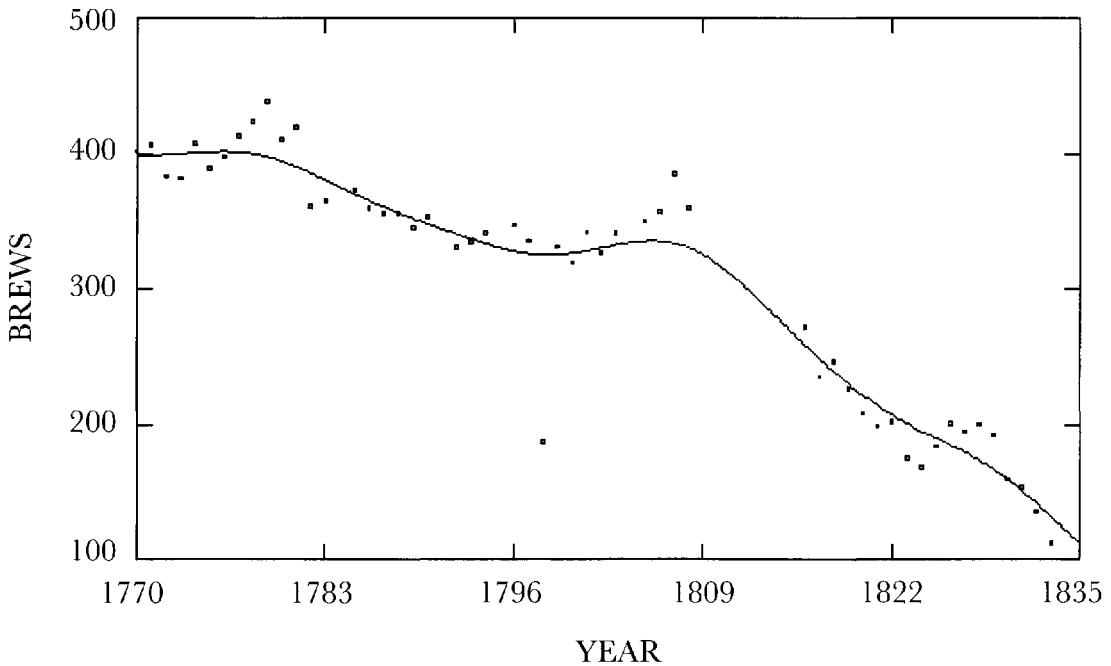
RENEWAL AND REVIVAL, 1800-1900

The fall of the Dutch Republic in 1795 ushered in a period of rapid political change which did not stop until a few years after the end of the Napoleonic Wars in 1815. Governments, republican, imperial and royal, all in turn carried out reforms. Despite decrees, local governments were often slow to comply with the dismantling of economic regulation and the opening of trade and industry to competition. There was, however, at least in Amsterdam, little effect on the regulatory environment in which brewers operated. In February, 1815, after all the changes, Amsterdam still charged a 33% surtax per barrel on foreign beer and prohibited entry into the trade. The brewers had to pay the excise taxes daily and report to an official whenever they were ready to put beer into barrels so he could come and inspect the work. A monthly report was due on all activities and on any spoilage. Rules on cooperage were equally reaffirmed as well as the right of town tax officials to visit the houses of brewers whenever they wanted. Only sworn beer porters could transport beer. Changes were mooted. In 1816, the new province of North Holland, created by splitting the most powerful province of the Republic in two, planned to hold a conference to discuss the form and level of beer taxes. The goal was to favor smaller brewers, to minimize administrative costs as well as to get rid of a number of restrictions, including those that controlled the time allowed for mashing.¹ Nothing substantial came out of the initiative. The regime remained much the same as before.

The wars themselves and the imposition of the protectionist Continental System by Napoleon, though it may have had adverse effects on much of Dutch industry including distilling, did benefit brewing. The decline in shipping hurt brewers in some major ports but the barriers to imports and higher prices of competing drinks led to a rise in beer consumption at home. Holland itself produced only 20,000,000 liters of beer in 1806. In the region which was Holland and Utrecht before political changes, production rose from about 35,000,000 liters in 1806 to 40,000,000 liters in 1811. Since there were just 57 breweries in the region that meant average output was around 700,000 liters. The turmoil to do with the latter phases of the wars and generally higher taxes did hurt beer

¹ G. A. Amsterdam, *Bibliotheek*, H 813 [1815]; G. A. Dordrecht, *Archief van de Gilden*, #1010, 4 [1816].

Figure XII-1

Production at Dordrecht, 1770-1833, in Brews

Source: G. A. Dordrecht, Archief van de Gilden. #934

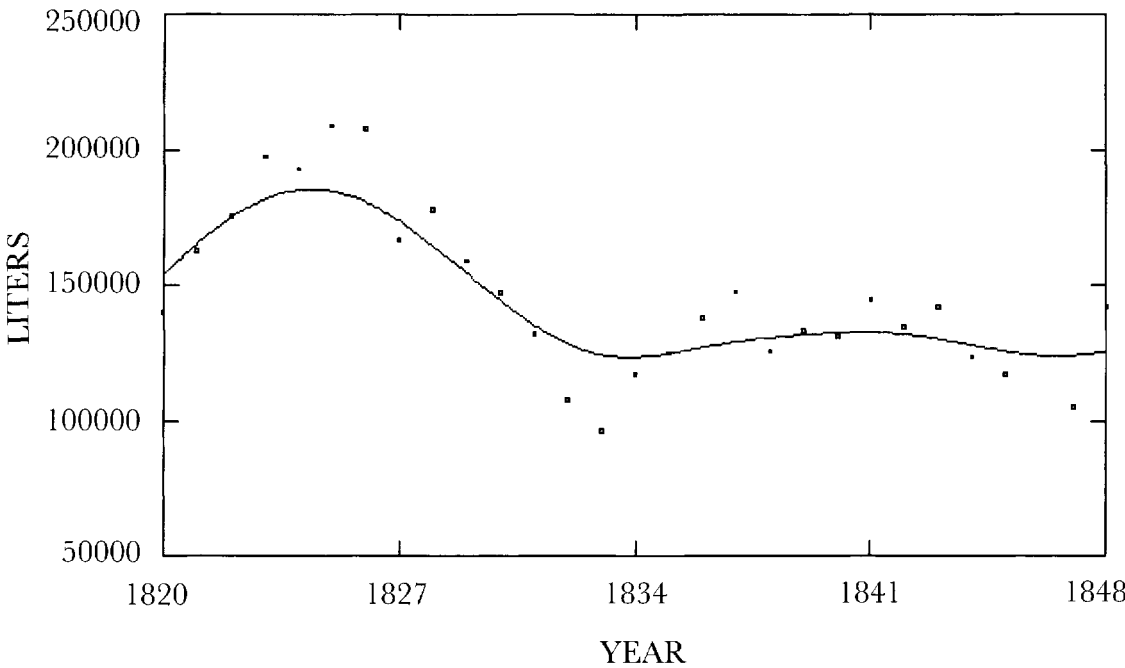
sales in 1812 and 1813. When asked in 1816 Amsterdam brewers said while they had done well during the period before French rule, things went badly once Holland was absorbed into the Empire and the town fell under direct rule from Paris in 1810.²

Production at Dordrecht while declining in the closing years of the eighteenth century held its own and saw some increase in the first decade of the nineteenth century. Political circumstances proved beneficial, but temporary. From the establishment of the Kingdom in 1814 the trend in production was down and precipitously down. The rate of tax on each brew fell in 1798 to a third of what it had been which may have contributed to the signs of life. There is no indication

² I. J. Brugmans, *Statistieken van de Nederlandse Nijverheid uit de Eerste Helft de 19e Eeuw* (The Hague, 1956), pp. 28-29, 174-175, 668-669; Dobbelaar, *De Branderijen in Holland*, pp. 253-258; Richard T. Griffiths, *Industrial Retardation in the Netherlands, 1830-1850* (The Hague, 1979), p. 96; Joel Mokyr, *Industrialization in the Low Countries, 1795-1850* (New Haven, 1976), pp. 86-87; Yntema, "Een kapitale nering...", p. 79.

Figure XII-2

Production at Dordrecht, 1820-1848



Source: G. A. Dordrecht, Archief van de Gilden, #939

of a change in the size of each brew to compensate for the decreasing number of brews.

The decline in output came largely from the disappearance of smaller breweries. The production of the largest brewery fluctuated in a relatively narrow range between 60 and 99 brews each year. In the 1770s that made up from 15-20% of total output in the town but by the 1820s and 1830s the largest brewery accounted for a third to two-fifths of total output. A separate report on production at Dordrecht shows that the decline from 1827 to 1833 did not continue but rather that there was a small revival from 1834. The problems of food supplies, a direct result of the potato famine, overtook the brewers in the 1840s. The absolute levels of production were low by any comparison. Assuming 155 liters for each barrel produced, Dordrecht output in the 1830s and 1840s never exceeded 150,000 liters. Two centuries before Dutch brewing towns counted output in the millions of liters.

The number of breweries fell from 9 to 3 in the same period. Dordrecht was never a major producing center but the pattern of production changes there was

similar to what happened in much of the rest of Holland. Total production in the Netherlands rose to 1817 and after some dramatic fluctuations through 1825 the trend was downward with little relief, reaching its lowest point at the time of the potato famine in the 1840s.³

Dordrecht brewers, like other brewers in Holland, still could not escape the tyranny of the seasons. Between 1820 and 1848 monthly production on average was higher in the spring but fell off in the warmest months of the summer, in July, August and September. Over the centuries the annual peak of production appears to have moved from March to May but otherwise the pattern of seasonal variation was largely consistent from the fifteenth to the late nineteenth century. The small Dordrecht industry was able to do nothing to attack the problem even though in the same years brewers in southern Germany were developing new methods to generate mini-environments in which to work and so defeat the seasons.

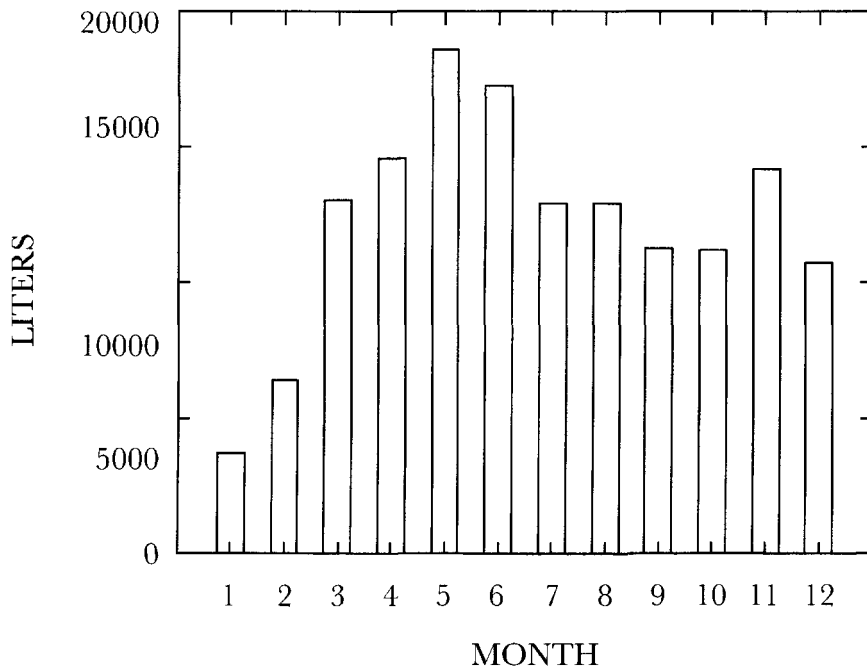
Tax reform in 1805 had removed finally the impost on beer. Brewers became subject to French tax law when the French Empire absorbed Holland. After the Revolution in 1791, French brewers had been freed from a complex and onerous tax regime but by 1804 a beer levy was restored and brewers had to pay a fixed amount for each 100 liters of beer produced. Dutch brewers, who specialized in lighter beers, were hurt by the French tax and so the brewers' organization, the *Generale Brouwers*, lobbied the government for relief. The argument was that a decline in beer consumption would be bad for the general health of the population. They did in 1812 get a lower charge on beer that was heated for more than 20 hours, so low quality thin beer carried the lesser rate.⁴

When the war ended and the Orange monarchy established itself, brewers lobbied again. This time they pointed to the disastrous effects of the French system of taxation and asked that tax not be based on the size of the mash tun. The addition of the southern Netherlands to the Kingdom meant that two systems of regulation to cover different brewing traditions had to be harmonized. In the South the tax was on capacity, on the size of the mash tun. Holland brewers did not want the system of the South to prevail in the new Kingdom of the Netherlands. They preferred the old one, based on consumption and on the quality of beer as measured by the price. The brewers' organization, now with a different name but still serving the same function, met in November, 1816. The topic was how to react to a determination made two months before that throughout the

³ Michael Jansen, *De industriële ontwikkeling in Nederland 1800-1850* (Amsterdam, 1999), p. 173.

⁴ Jehan Charlie, *L'Évolution Économique de la Brasseries Françaises* (Paris, 1909), p. 10; F. N. Sickenga, *Geschiedenis der Nederlandsche Belastingen Sedert het Jaar 1810* (Utrecht, 1883), 2, pp. 2-3; Timmer, *De Generale Brouwers van Holland*, pp. 258-263.

Figure XII-3

Average Monthly Beer Production: Dordrecht, 1820-1848

Source: G. A. Dordrecht, Archief van de Gilden, #939

Kingdom the beer tax would fall on the capacity of the mash tun with a fixed sum due each time the tun was used no matter what beer was made. That meeting was the last of the organization. It decided to pass the tax on to consumers, raising prices but giving 14 days notice before doing so.⁵

The greatest problem created by tax reform in the Netherlands and throughout Europe was the tendency to tax all alcoholic beverages on the basis of volume which gave spirits and even wine a significant price advantage over beer. In 1820 an Amsterdam doctor estimated per capita genever consumption at 57 liters a year, more than twice the figure for wine and close to the figure of 82 liters for beer. The tax regime promoted and even subsidized gin drinking, leading to the extreme result. There were some concessions to brewing. In 1830 the government, to compensate for a drop in the tax on grain, raised taxes on wine and imported spirits by 25% but on beer only from 13% to 21%. The shift to

⁵ Timmer, *De Generale Brouwers van Holland*, pp. 261-265.

genever consumption continued, however. In Dordrecht, where breweries fell from 10 in 1800 to four in 1816 two new distilleries opened. The new tax regime tended to lower government income from excise as a share of total income, down to under 12% for the Netherlands in 1814. The trend generated hope that brewers would be less a target of government interest. That hope was not realized. The new government considered restoring many features of pre-1795 economic legislation but in the end opted for greater freedom, more consistent with the principles of the French Revolution. That lessening of restriction did not apply to brewing. A law of 1819 required extensive reporting, in writing, from anyone who set up a brewery. Hours of work in breweries were even fixed as were the maximum time of brewing and the minimum size of the brew kettle.⁶ The revisions in the excise law of 1822 went even further in subjecting brewers to strict control from government tax officials. As well grain had to be ground outside the brewery which was a problem if the brewer malted grain on his premises. The system and regulations not only deterred change by constantly subjecting brewers to surveillance, but also by making larger kettles a greater tax liability. That rewarded brewers who pumped more water through the tun, getting as much from the grain as possible and so pushing thinner beer through their breweries more quickly. It made making thinner summer beer more profitable than heavier, thicker beer for the winter months. The tax remained onerous in that brewers still paid tax on their raw materials and also on the finished product. It was also onerous because the tax was due in advance, before the beer could be sold, and so the brewer financed sales as well.

The 1822 law remained in place, largely unchanged, until 1867. The law was designed to accommodate all the provinces of the Netherlands including the different type of brewing and type of market in Flanders and Brabant. Despite the separation of the southern portion of the Kingdom and the creation of Belgium after 1830, legislation changed little. In 1830 a revision increased the tax rate on beer by 5% and enforced closer control of the sale of equipment when a brewery shut down. In this as in many aspects of economic legislation after 1795, what had been civic became national and, if anything, became more stringent. The 1830 law was very precise about how to measure the vessels used in brewing. Tax continued to be levied on the basis of vessel size, a fact which, as brewers pointed out, kept kettles smaller than those in other countries.⁷ In 1859 the tax

⁶ G. J. van Oostveen, *De Economische Ontwikkeling van Dordrecht 1795-1945. Gedenkboek uitgegeven bij gelegenheid van het 150-jarig bestaan der kamer van koophandel en fabrieken te Dordrecht* (Dordrecht, 1946), pp. 50, 64; Sickenga, *Geschiedenis der Nederlandsche Belastingen*, 2, pp. 9-10, 19-20, 29; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," pp. 110.

⁷ Brugmans, *Statistieken van de Nederlandse Nijverheid...*, pp. 200-201; Engels, *De Geschiedenis der Belastingen in Nederland...*, pp. 307-310; Jansen, *De industriële ontwikkeling in Nederland 1800-1850*, pp.

changed to a fee for each barrel produced but much of the rest of the regulation stayed in place. When asked about their industry back in 1816 and in 1819, brewers complained about the tax system and about being hindered by the regulations and the way taxes were levied. They wanted more freedom of action.⁸ By the 1850s contemporaries pointed to the 1822 law as a deterrent to technical change, to following the successful practices of England and Bavaria. In those countries it was malt that was taxed. The brewer was free to do whatever he wanted with the malt in any way he liked.⁹ Taxing malt there, it was argued, also promoted efforts to find out how to get as much beer as possible from a given quantity of malt.

The result of the tax system and general consumption trends, already established in the eighteenth century, was a pattern of continuing decline for the brewing industry. Government income from the beer excise fell 18.5% from 1831 to 1840. From 1841 to 1850 it fell an additional 17.5%. The number of breweries in the entire Kingdom fell too, though there is confusion about the exact scale of change. There were as many as 989 in 1819 and as many as 658 in 1850. In 1845 there were 329 distilleries in the Netherlands and still 727 breweries. By 1859 the number distilleries was up to 375 while the number of breweries was down to as few as 466 in 1858 or to 582 in 1859, all that despite a sharply higher tax on distilled drink in the years from 1854 through 1859. In sharp contrast to the decline of sales of beer, genever production remained stable and, despite declining exports, stayed at much the same level through the first half of the nineteenth century. The ever smaller number of brewers survived the difficult conditions by selling related by-products: vinegar, yeast and the draff left over after brewing. At least with the spent grains the price tended to rise in line with rises in the price of the brewers' principal raw material, grain.¹⁰

The success of distilled spirits, in part thanks to a more favourable tax environment and in part thanks to stable or falling real incomes for labourers, generated a reaction to the consumption of alcohol. The temperance movement in North

169-171; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, pp. 136-138; J. A. De Jonge, *De Industrialisatie in Nederland tussen 1850 en 1914* (Amsterdam, 1968), p. 318; Schippers, "Bier," p. 189.

⁸ Brugmans, *Statistieken van de Nederlandse Nijverheid...*, pp. e. g. 722-727; D. Damsma, J. M. M. deMeere, L. Noordegraaf, *Statistieken van de Nederlandse Nijverheid uit de Eerste Helft der 19e Eeuw Supplement* (The Hague, 1979), pp. 80-81, 316-317; Engels, *De Belastingen en de Geldmiddelen*, p. 389.

⁹ A. M. Ballot, *Het Bier beschouwd als Volksdrank* (Rotterdam, 1856), pp. 15-17; Griffiths, *Industrial Retardation in the Netherlands, 1830-1850*, p. 97; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 171-176.

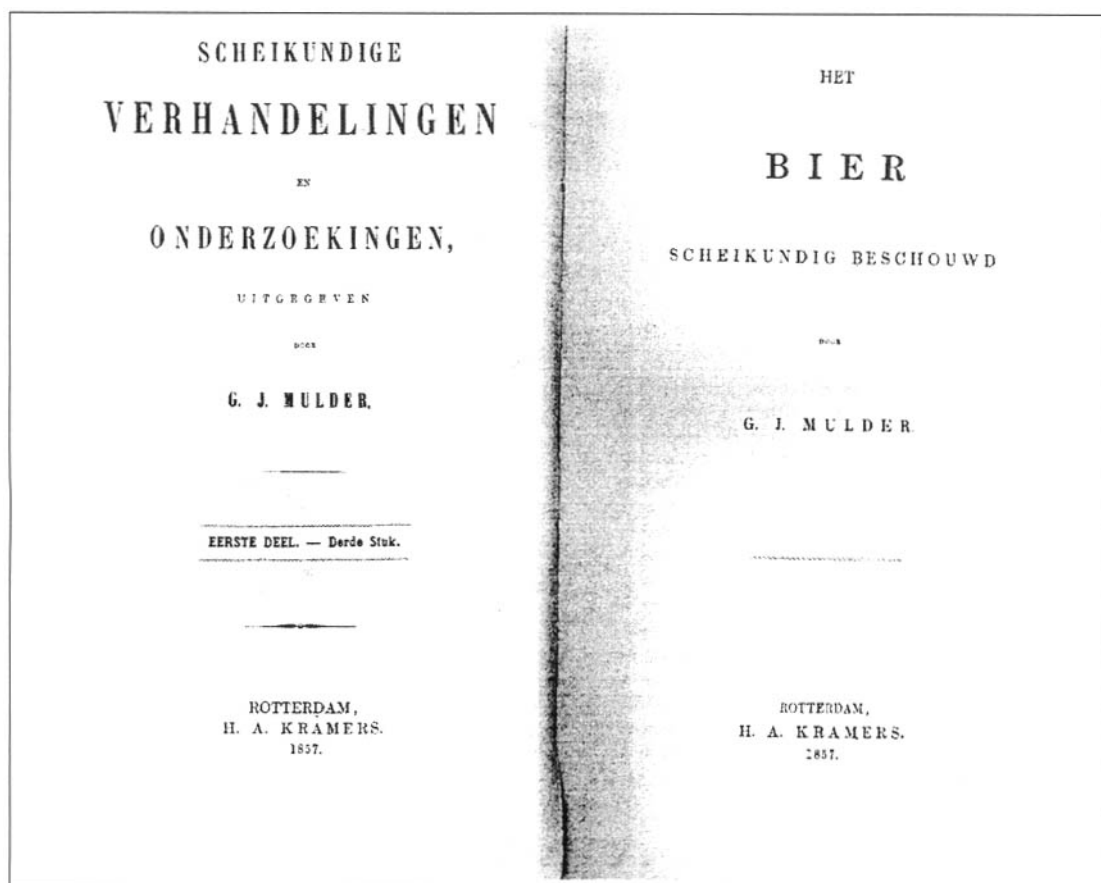
¹⁰ Engels, *De Belastingen en de Geldmiddelen...*, pp. 381-385; Jansen, *De industriële ontwikkeling in Nederland 1800-1850*, pp. 172, 176; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, p. 40; Schippers, "Bier," p. 180.

America and Europe first demanded moderation, then abstinence and finally prohibition of the sale of any drink with alcohol in it. In 1846 the state of Maine in the United States declared complete prohibition. Though the legislation could not be sustained in court, the years around 1850 marked great success for those trying to drive distillers and brewers out of business.¹¹ The movement had less success in Europe but there the proponents of the benefits of beer were under pressure to demonstrate why sales should be allowed. A certain J. Backer in 1839 called for the introduction of a standard beer of uniform quality and price to be available throughout the kingdom. Called *konings-bier* or royal beer it was to drive out genever and restore beer as the people's drink. He urged the house wives of the kingdom to give their servants *konings-bier* three days in the week and the other days they could drink water. It would cost a little more but the servants would remain healthy. He claimed genever was a pestilence worse than cholera since it never went away and so needed to be destroyed. In the 1850s in Holland calls for the restoration of beer as the people's drink and the restoration of the industry to its former status were even more common. The agitation in favour of beer was part of a general discussion about the state of workers, their poor living conditions and nutrition. Beer, the weapon in the struggle against genever, had all but disappeared from workers' families. In the national legislature there was a sustained attack on spirits. A lowering of import duties on beer led to a rise in imports, mostly from Bavaria and Brabant, which suggested that given the right circumstances, brewing could thrive again. In the Netherlands in 1856 the writer A. M. Ballot pointed out that in England and southern Germany where beer was the popular drink, men were stronger and in general healthier than in Holland. Beer as good as any other could be made in Holland, he was convinced, if only the industry were freed from the confinement of regulation.¹²

Others, most notably the prominent scientist, professor of medicine at the University of Utrecht and prolific writer, G. J. Mulder, pointed out that the shift from beer to genever implied a decline in the welfare of Hollanders since the food value of a given volume of beer is greater than that for the same volume of spirits. Drinkers typically consumed a smaller volume of genever which exaggerated the nutritional loss. He attributed the sickness and lack of intellectual and physical strength which he found in cities to poor nutrition. Beer, not strong drink, was the sensible and better alternative. The healthy body which would result would be home for a healthy soul. Mulder even went so far as to claim that the rise and fall of Dutch brewing coincided with the rise and fall of the Nether-

¹¹ Baron, *Brewed in America...*, pp. 196-198.

¹² J. Backer, *Het Konings-Bier Voorgesteld als Volks-Drank ter wering van de jenever-pest* (Arnhem, 1839); Ballot, *Het Bier beschouwd als Volksdrank*, pp. 3-7, 10-17, 21-22; Schippers, "Bier," p. 172.



35. The title page of “Het Bier” by G. J. Mulder. It was volume 1, part 3, in the series of works *Scheikundige Verhandelingen en Onderzoekingen*, edited by Mulder himself. He was a staunch advocate of beer drinking as a way to promote the health of working people and of people in general. This book was published at Rotterdam in 1857.

lands, an argument about the value of drink which other proponents of beer drinking took up later. He also wrote a book on how to make beer, a work incorporating recent scientific work. It was popular enough to warrant a French translation but none into English, surprisingly, even though Mulder enjoyed a good reputation in Britain for his promotion of the use of chemistry in brewing.¹³ He thought high levels of the consumption of spirits were the result of a lack of good beer, so he wrote to change the character of supply. He believed that Dutch beer was not clear enough and did not keep well if allowed to sit in the barrel. He also thought that there were problems with the quality of the water used. Since imports into the Netherlands in 1854 were seven times what they were in 1826 it was clear that others were able to produce good beer and Mulder was distressed that the Dutch could not.¹⁴

The fall in the number of breweries was general in the first half of the nineteenth century. In Dordrecht the four breweries of 1816, with an average of 10 workers, fell to three after a fire in 1820 and two more were abandoned in the course of the century. Only one survived beyond 1900. Alkmaar had gotten a second brewery before 1826, the year proposals were made for improving the water supply for brewers. The new brewery closed in 1834 and the town took over the last remaining one in 1877 to keep it open. At Delft already in 1772 only five breweries operated but one had shut down by 1787, the year a second closed. By 1816 only one remained. At least it was, by the standards of the much reduced Dutch industry, a large one with 16 workers and it exported beer not only to the countryside but as far away as the East and West Indies. By 1819 a second brewery had been added, also a relatively large one with 15 workers, so the new government did bring about some revival. In 1828 the partners in one of the surviving breweries gave up and closed down the operation and two years later the ownership group, formed in 1795, finally wound up the business selling off assets and paying debts. By far the biggest asset was the property worth more than ten times the beer sold off or the remaining casks. The lawyer who oversaw the liquidation made no mention of equipment or personnel in his reports but he did dwell at length on outstanding debt.¹⁵

¹³ Charles Henry Cook, *The Curiosities of Ale and Beer: An Entertaining History* by John Bickerdyke [pseudonym] (New York, 1886), p. 430; G. J. Mulder, *De Voeding in Nederland in Verband tot den Volksgeest* (Rotterdam, 1847), p. 77; G. J. Mulder, *Le Guide du Brasseur ou L'Art de Faire La Bière. Traité élémentaire théorique et pratique*, L.F. Dubiet, trans. (Paris, [n.d.]); E. M. Sigsworth, "Science and the Brewing Industry, 1850-1900," *Economic History Review*, second series, 8 (1965), p. 547.

¹⁴ Hallema and Emmens, *Het bier en zijn brouwers*, pp. 185-186; G. J. Mulder, "Het Bier," in: *Scheikundige Verhandelingen en Onderzoekingen*, 1, 3, G. J. Mulder, ed. (Rotterdam, 1857), pp. 9-10; G. J. Mulder, *Le Guide du Brasseur...*, p. 43; Schippers, "Bier," p. 192.

¹⁵ Amsterdam, Nederlandsch Economisch-Historisch Archief, International Institute for Social History, #41; Brugmans, *Statistieken van de Nederlandse Nijverheid...*, pp. 192-193, 196-197, 722-727;

In North Holland in 1816 there were just 12 breweries, including seven in Amsterdam. 130 of the 164 brewery workers were in Amsterdam. Only two of the seven breweries sold beer outside the province or to the colonies in the Indies. By 1819 the number in Amsterdam was down to six but with the same number of workers.¹⁶ In 1819 in the province of South Holland there were still 27 breweries and in North Holland just 12. The total for the two provinces remained stable at that low level up to the First World War. The pattern of a large number of small breweries in North Brabant and Limburg, provinces in the South and marching on Belgium, was already in place by 1819 and did not change during the century as production shifted in their direction. There was a cultural difference which only became more obvious over time. While North and South Holland might have 39 breweries in 1819, Limburg had 132 and North Brabant boasted 240.¹⁷ In 1843 Rotterdam still had five breweries though three also produced vinegar. In that year Amsterdam reported just three breweries with an average of 27 workers and average annual production of 1,240,000 liters of beer. The single Haarlem brewer in the same year produced only about 800,000 liters.¹⁸ The size of breweries had increased in Holland, especially in the big towns, but London porter brewers of a century before produced on a scale much greater than the largest of the Amsterdam breweries. The complexity and extent of equipment of all types in English breweries dwarfed the largest Dutch beer making operation.

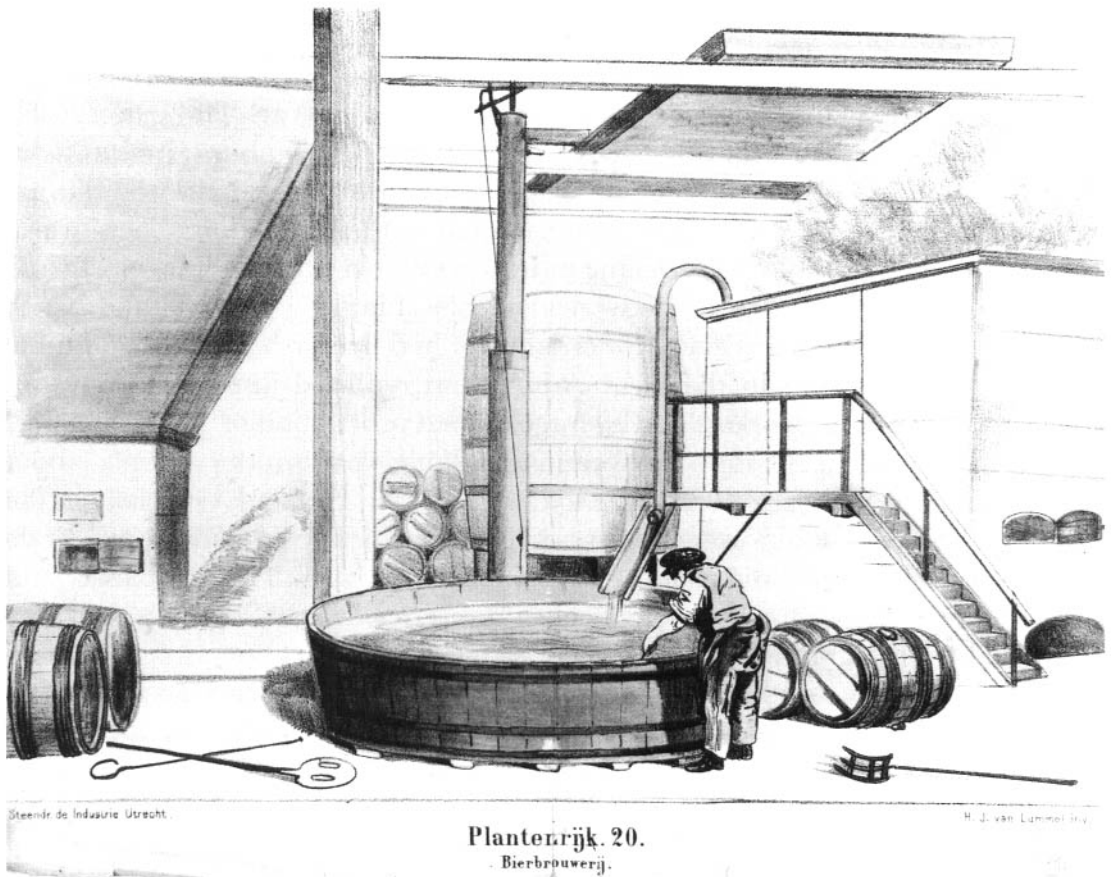
Taking advantage of developments in other industries and easy access to new machinery, English brewers turned to greater mechanization and the use of steam engines. The large London brewers early saw the potential of steam engines to replace horse driven mills which served to grind malt, lift and move grain and barrels, pump water and stir the mash tun. Already well advanced compared to other industries in commercial organization and marketing, brewing did not lag in exploring the possibilities created by the new steam engine. Stirring and pumping liquids in a humid atmosphere, sharp changes in temperature, long hours of work even through the night and when necessary on Sundays all combined with the seasonality of the industry to make working in a brewery

Bruinvis, *De Alkemaarsche Bedrijfs- en ambachtsgilden*, pp. 92-100; van Dalen, *Geschiedenis van Dordrecht*, p. 389; Timmer, "Uit de nadagen der Delftsche brouwning," pp. 772-773.

¹⁶ Damsma, deMeere, Noordegraaf, *Statistieken van de Nederlandse Nijverheid...*, pp. 80-103, 316-317.

¹⁷ Blink, "Geschiedenis en verbreiding van de bierproductie en van den bierhandel," p. 105; Brugmans, *Statistieken van de Nederlandse Nijverheid...*, pp. 16-17, 28-29, 52-64, 152-153; Griffiths, *Industrial Retardation in the Netherlands*, p. 97; Jansen, *De industriële ontwikkeling in Nederland 1800-1850*, p. 173.

¹⁸ Brugmans, *Statistieken van de Nederlandse Nijverheid...*, pp. 841, 855, 873.



36. H. J. van Lummel, drawing of a small brewery, print, possibly for use in schools, 1857. The illustration was to describe a small but typical brewery with the brewer, surrounded by barrels and hand tools, stirring in the fermenting vat.
Source: photograph, Nederlands Openluchtmuseum Arnhem, The Netherlands, AA139219.

unattractive. At least the steam engine eased some of the burden of shifting the weights of grain, malt, wort and beer. By 1795 only the cotton and coal industries were ahead of brewing in the installation of steam engines. Steam power could save money. The horses which steam replaced, it is true, were usually old and blind to keep down costs but the machines did eliminate the need for those animals and made possible uninterrupted work. They also provided a source of hot water to wash out kettles and troughs and barrels. In Holland it was 1841 before the brewery *Het Hert* in Haarlem got the first steam engine in the Kingdom of the Netherlands. The machine was a small two horsepower one but the brewery itself was small and produced only for regional needs.¹⁹ In the use of steam as in so many other things Dutch brewers lagged far behind their English counterparts.

It was not from the prosperous, well-established English industry that the greatest improvements in brewing came in the nineteenth century, but rather from Bavaria. Bavarian style or pilsner beer was produced in southern Germany and Bohemia perhaps even in the late Middle Ages. Bavarian prohibitions of brewing from 24 April to 29 September, which dated from 1539 and stayed in place to 1850, had forced producers there to develop ways to keep their beer, made in the spring, from going bad in warm weather. The solution was deep cold cellars. The lower temperatures meant Bavarian brewers could use bottom yeasting. It worked more slowly but also produced chemicals to inhibit acidification. The beer kept better and did not need as much hops or as high an alcohol content as other beers.²⁰ Pilsner was produced in other parts of Europe and even in Holland in the eighteenth century so it was known. The type of beer was different and its production required different conditions as well as different tastes among consumers.

While at some times of the year in some places natural conditions made it feasible to use bottom yeasting, most of the time the only solution was to use ice, about a kilogram for each 110 liters of beer according to Pasteur.²¹ The ice presented a problem not just because of cost but also because of the difficulty in getting it, storing it and handling it. To produce in the Bavarian style implied significant changes in plant, equipment and practice. It took more capital and more

¹⁹ Mathias, *The Brewing Industry in England 1700-1830*, pp. 82-95; Raymonde Monnier, *Un bourgeois sans-culotte Le général Santerre suivi de L'Art du brasseur* (Paris, 1989), pp. 127-128; Schippers, "Bier," pp. 179-181.

²⁰ Glamann, *Jacobsen of Carlsberg*, p. 44; Heinrich Huber, "Altbayerische Vorschriften über das Biersudwesen," *Brauwelt Zeitschrift Für Das Gesamte Brauwesen*, 99, 25 (27-31 March, 1959), p. 437; Siebel, *One Hundred Years of Brewing*, p. 30.

²¹ Pasteur, *Studies on Fermentation*, p. 24; Sigsworth, "Science and the Brewing Industry, 1850-1900," p. 542.

time which implied higher costs and higher prices. The generic term Bavarian beer served for almost all bottom-yeasted beers through the nineteenth century though they were also called pilsners and Bohemian beers as well as lagers, the last reflecting the longer storage period for the type. Johann Justi, writing in 1760, insisted on the need for deep and good cellars in order to make lager, that is, bottom-yeasted beer. He even said that towns with a high water table, something which applied to all Dutch towns, could not produce pilsner. The new method of brewing did not mean a beer of different strength but it did mean one that was lighter, brighter and less liable to deterioration. It lasted longer and could be stored until customers were ready to buy it.²²

Starting in the 1830s Munich, the largest beer producing town in Bavaria, became the center for technical change in brewing. The expansion of the borders of Bavaria combined with a reduction in regulation in 1811 gave brewers there a much less restrictive regulatory environment than that prevailing in northern Germany or the Netherlands. A codification of brewing regulations in 1822 established powerful strictures on the trade but appears to have covered few topics. There was a shift in the first half of the nineteenth century in relative prices of alcoholic drinks which led to rising beer consumption at the expense of wine. As sales went up the scale of brewing increased. In 1820 one Munich brewer built a storage cellar with a capacity of 4,000,000 liters. By equipping the cellar for the use of ice the brewer could almost eradicate the seasonal character of the enterprise. The Brainard system, where the ice was put over the cellars so cold air could circulate downward, decreased the quantities of ice required. When the frozen water melted it dripped down and contributed to rotting of the cooperage,²³ but lower expenditures on ice more than made up for the problems with barrels.

The last real barrier to large scale year-round production of Bavarian beer came down with the development of effective mechanical refrigeration equipment. Brewers in England tried circulating cold water through pipes in the fermentation troughs. The Admiralty in 1791 took up the invention of a John Long for what was called an attemperator. The water, cold but also possibly hot, went through copper pipes in the mash tun and in fermentation troughs to control the temperature with precise levels for different types of beer. Fermentation could then take place in covered vessels which cut down on the chance of contamination. A variation on the same idea was to pass the wort through copper piping,

²² Justi, *Oeconomische Schriften...*, 2, p. 36; Pasteur, *Studies on Fermentation*, pp. 11-13.

²³ Hallema and Emmens, *Het bier en zijn brouwers*, pp. 182-183; Huber, "Altbayerische Vorschriften über das Biersudwesen," pp. 437-439; Huntemann, *Das deutsche Braugewerbe*, p. 101; Schippers, "Bier," p. 198.

spraying the pipes with cold water to reduce the temperature.²⁴ Though attempters certainly helped, they could not generate consistent or uniform temperatures at which the whole brewing or fermenting processes could take place. They also depended on an abundant and reliable supply of cold water. Using ice in enclosures around the cellars was effective but presented problems both of cost and consistency of supply. In mild winters local canals could not provide what brewers needed, so they were at the mercy of importers who brought bulky frozen water from the North as part of a well-established trade. Machines freed brewers from dependence on Norwegian ice suppliers, merchants and shippers. Artificial refrigeration offered both consistency and, over time with improvements in the machinery, lower costs. In time machines could produce ice at one-fourth the cost of ice brought from Norway. A number of forms of machines based on ammonia for cooling emerged from the 1860s on. Brewers in Continental Europe came to prefer Dr. Carl Linde's system developed in the 1870s.²⁵ One reason for Linde's success over his competitors was funding for prototypes and then orders from 1873 to 1879 from major brewers in Munich, Vienna and Copenhagen. Other breweries copied their examples as the informal international network established among the bigger and more prominent brewers in the 1830s continued to disseminate information about potential technical improvements.²⁶

Mechanical refrigeration not only saved brewers from buying ice at what they thought were prices especially inflated for them but also freed them from the need for large cellars dug in the ground and in the sides of hills. Breweries could be built anywhere and completely above ground so there was no longer a concern about the water table. The 1890s saw the development of efficient smaller cooling machines, better for middle-sized breweries, but by the turn of the century still only 8% of breweries in the Netherlands had cooling machines. Beginning in the late 1880s, the introduction of electricity to power the increasingly efficient refrigerators contributed to greater productivity. Those changes coincided with falling grain prices in the closing years of the century to give both greater profits to brewers and a greater chance to invest in new machinery. Refrigeration gave a great advantage to producers of Bavarian beer since it allowed them to lower prices. In Amsterdam in the 1880s Bavarian style beer cost four cents more per

²⁴ Mathias, *The Brewing Industry in England 1700-1830*, pp. 74-76; Pasteur, *Studies on Fermentation*, pp. 7-9.

²⁵ Baron, *Brewed in America*, pp. 234-236; Hallema and Emmens, *Het bier en zijn brouwers*, p. 194; H. Holter and K. Max Møller, eds., *The Carlsberg Laboratory 1876/1976* (Rhodos, 1976), p. 22; Monckton, *A History of English Ale and Beer*, p. 161.

²⁶ Glamann, *Jacobsen of Carlsberg*, pp. 58, 202; Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij*, pp. 83-93; Siebel, *One Hundred Years of Brewing*, p. 678.



37. The photograph of the personnel of the brewery the Sleutel was taken in Dordrecht c. 1907. Distribution of barrels was now by horse drawn drays. The large condenser, part of the machinery for cooling in the brewery, above the vats is the principal indication of the technical changes which had taken place. The Sleutel was set up in 1433 and survived into the 1950s when it was bought by *Heineken*.

Source: G. A. Dordrecht.

liter than beer made with top yeast. A decade later the difference was down to one cent.²⁷ The narrowing of the price differential meant rising sales for bigger breweries since they had the capital and management skills to exploit.

Even before brewers used electricity they had made massive strides in their effort to place brewing on a scientific basis. The drive started in the mid eighteenth century with the first transfer of knowledge from chemistry. The successful research of Louis Pasteur on yeast in the 1870s continued the pattern, yielded major improvements for brewing, and created a precedent for the future. "*An appropriate yeast is of paramount importance for the production of good beer*".²⁸ After Pasteur's work it was possible to identify and select the right yeast. Yeasts, he insisted, should be pure and he offered a lengthy description of how to purify them. He urged brewers to keep down potential contamination by careful control over the yeast used. He laid out a number of methods to improve brewing, for example a way to measure the amount of oxygen in wort using titration. Since some English brewers told him that 20% of beer produced was lost through spoilage he expected that the use of his methods would sharply reduce the price of beer.²⁹

Refrigeration equipment combined with Pasteur's work freed brewers from the tyranny of the seasons. They could make beer at almost any time of the year and keep it long enough for consumers to buy it. The knowledge and equipment released brewers from many of their earlier constraints and opened a whole new range of possibilities. The mechanization of brewing had made the brewmaster by the 1870s into something of an engineer but the successes with yeasts in the laboratory turned him into a biologist and a chemist too.³⁰ The great advances coincided with continuing decline in Dutch brewing. The work of Pasteur may have marked another step in the expanding knowledge of the biochemistry of brewing but for Holland it marked more a beginning of a period when finally, after more than two centuries of contraction, the industry would grow again.

The Dutch brewing industry before the 1860s was slow to develop or even to accept new techniques. The adoption of mechanization and the invasion of measurement had left little mark. The small and declining industry continued the pattern of the previous century, failing to find or seize opportunities and possibly even resisting change. From 1813 to 1869 4,538 patents were registered in the Netherlands and of that number only 29 had anything to do with beer and brew-

²⁷ William L. Downard, *The Cincinnati Brewing Industry a social and economic history* (Athens, Ohio, 1973), p. 39; Schippers, "Bier," pp. 193, 198-203; Wischermann, "Zur Industrialisierung des Deutschen Braugewerbes im 19. Jahrhundert...", pp. 170-173, 176.

²⁸ De Clerck, *A Textbook of Brewing*, 1, p. 407.

²⁹ Baron, *Brewed in America*, p. 239; Pasteur, *Studies on Fermentation*, pp. 17-19, 23-26, 183, 223-232, 353-364, 390.

³⁰ Baron, *Brewed in America*, pp. 236-237; Buijs, "De Bierbrouwer...", p. 40.

ing. For some of those the connection was tangential, like the Amsterdamer who in 1839 patented a new way of making pasta, which he called Italian dough, claiming that the method would help in the production of beer, wine and brandy as well. Even more striking than the small number of patents is the number of those granted to foreigners. Though virtually all recipients claimed domiciles in the Netherlands, the patent records showed country of origin, and in some cases the address in The Hague or Amsterdam was a legal fiction. Of the 29 patents, 10 went to Belgians, seven to Frenchmen, three to Germans, two to Englishmen and one to a Swede.³¹ In the period of greatest decline in Dutch brewing only six individuals from the country had an idea about brewing worthy of a patent.

In the 1850s Amsterdam brewers finally made some progress in competing with English porter. They did find markets in the East and West Indies. The increased sales translated into some growth in brewing in the town, perhaps in part at the expense of the other large port, Rotterdam. Three Amsterdam breweries employed between 50 and 60 workers in 1855 and one of them, counting the vinegar plant, cooperage and maltery reached as many as 100 to 125 workers. Such figures were very high compared to the rest of the country. Only in Rotterdam where there were three breweries with about 35 workers each was there anything on the scale of the Amsterdam operations.³²

The East India beer Amsterdam brewers exported was not much different, it was said, in alcohol content and composition from beer made in the Bavarian style. In 1856 critics urged Dutch brewers to take up making Bavarian beer since tastes were already accustomed to something like that type. The high import duty, which was about 50%, it was said was the only thing keeping down sales of pilsner. Supporters of beer urged Dutch brewers to go to other countries to learn how to brew in the Bavarian style so beer could be restored to its proper place as the people's drink.³³ Bottom fermenting yeasts and the temperatures required to brew in the Bavarian style were known in the Netherlands, discussed in some detail by that strong propagandist for beer, Dr. G. J. Mulder, but even his exhortations did not impress Dutch brewers. Whatever the veracity of the claims the lethargy of Dutch brewers continued.

As in the thirteenth century the new technology, which revolutionized the Dutch brewing industry and which converted it from a group of small units satisfying local demand to a major export industry using the latest methods, came from Ger-

³¹ G. Doorman, *Het Nederlandsch Octrooiwezen en De Techniek der 19e Eeuw* (The Hague, 1947), #756 and *passim*.

³² Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, pp. 41-42; Schippers, "Bier," pp. 178-179.

³³ Ballot, *Het Bier beschouwd als Volksdrank*, pp. 18-19, 21; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, p. 44; Mulder, "Het Bier," p. 372.

many. It was not the north German port towns in the nineteenth century but rather the cities of Bavaria which were the source of technical change. Improvements in transportation, most notably the development of railroads, opened a number of markets to distant suppliers. The opportunities were especially great for producers of bulky goods like beer. The Low Countries had an internal system of canals which in the sixteenth century had already opened regional markets to local brewers. The growth in coastal shipping services but more than that the railway connection with other parts of Europe, especially Germany, suddenly made Holland part of a larger region. The spread of the railway net meant wider distribution for pilsner beer and, in reaction, the adoption throughout northern Germany of brewing in the Bavarian style. Exports of beer from Bavaria rose drastically from 675,500 liters in 1860 to 19,590,300 liters in 1870 and 102,466,500 liters in 1886. Faced with the flood of Bavarian beer, local brewers throughout central Europe had to do something. The railway network reached into Holland, the direct connection to Munich being opened in 1856.³⁴ The reaction, though muted and slower, was the same in Holland as everywhere else. Brewers tried to produce pilsner.

In 1847 two men got permission to set up a brewery in Groningen to brew in the Bavarian way. Apparently nothing came of the effort. In Asten in North Brabant there was a Bavarian brewery in 1850 but it was a small one. A brewer in The Hague, B. M. Perk, claimed in 1856 that he had tried to make beer in the Bavarian style but that the cost was too high. He blamed the tax system which, because rates were based on the size of the mash tun, made it virtually impossible for him to match the quality of what was made in Munich.³⁵ The depression of the 1840s decreased consumption in general, and so it was not an auspicious time to make a new and more expensive product. Freer trade in the 1860s yielded an increase in average incomes and so better opportunities for the sale of beer. It also brought in Bavarian beer at lower prices. That confirmed the need for Dutch brewers to produce in the new way in order to survive. Dutch investors in the novel brewing technique, as it turned out, picked a good time to launch their operations. The 1870s, at least in Britain, proved the high point for beer consumption between 1840 and 1920. The economic changes in the Netherlands in the 1870s were not as dramatic as in Britain, nor were changes in beer drinking, but certainly if there was one time in the nineteenth century that investment in Dutch brewing was likely to pay off, it was around 1870.³⁶

³⁴ Hallema and Emmens, *Het bier en zijn brouwers*, pp. 183-184, 191.

³⁵ Hallema and Emmens, *Het bier en zijn brouwers*, pp. 175, 190-191; A. C. M. Jansen, *Bier in Nederland en België een geografie van de smaak*, Nederlandse Geografische Studies, 39 (Amsterdam, 1987), p. 33; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, pp. 45-46; Schippers, "Bier," pp. 189-190.

³⁶ Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, pp. 43-45, 48-49.

A change in the method of assessing taxes created a very different environment for Dutch brewers and investors. Under the 1822 system, excise made up 10-15% of costs for brewers so government decisions, as always, were critical to profitability. After government studies in 1855 and 1863 a new excise law came into force in 1867. It gave brewers the choice of being charged on the size of the mash tun, that is in the old way, or paying a tax on each pound of malt that they used. Though the dual system had disadvantages it did make economically feasible the production of pilsner beer. Many brewers opted for the old method and even as late as 1878 about half of the income from the taxes on beer came from the levy on the mash tun. The old system deterred the introduction of new and larger equipment so the brewers who opted for the tax on the mash tun, typically the operators of smaller firms, did not innovate. The 1867 law also increased the tax on spirits by 59%. The government was more interested in the tax on spirits since already in 1842 it took in almost ten times the amount from taxing spirits as from taxing beer, wine and vinegar together. As late as 1881 the ratio was almost 25 to one. An 1871 law fixed the dual character of taxation on beer brewing, that until 1917. From 1867, then, brewers who changed over to making Bavarian beer did not have to face, as they had under the old regime, a 50% increase in the effective tax rate³⁷. Holland brewers also benefitted from the dismantling of the entire excise tax system in the Netherlands, a process of the 1850s and 1860s. From 1856 they did not have to pay tax on the grinding of malt. In 1855 the tax on vinegar was dropped. Much more important, from 1864 brewers no longer had to pay excise tax on heating fuel.³⁸ By 1871 most of the tax reforms for which the *Generale Brouwers* had vainly lobbied for a century or more were finally in place.

Gerard Adriaan Heineken in 1863 at the age of 22 decided to enter the brewing industry. It was his way of making effective use of his energies and his inherited fortune. In 1864 he bought the *Hooiberg* brewery in Amsterdam. It was an old one, started in the 1580s, and mentioned by name as early as 1620. The various owners turn up in documents to do with the brewing trade through the seventeenth and eighteenth centuries. In 1784 it produced 18% of all the beer brewed in Holland but the prosperity did not last and the firm declined in the first half of the nineteenth century. The brewery passed through the hands of a number of proprietors and lessees. By 1821 it was held by many partners from different

³⁷ Jansen, *Bier in Nederland en België een geografie van de smaak*, p. 53; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, pp. 45-47, 52, 135-139; Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij*, pp. 48-50; Sickenga, *Geschiedenis der Nederlandsche Belastingen*, 2, pp. 66-67.

³⁸ De Jonge, *De Industrialisatie in Nederland tussen 1850 en 1914*, p. 319; Sickenga, *Geschiedenis der Nederlandsche Belastingen*, pp. 39, 49-51.



38. An advertising poster from the Sleutel Brewery of Dordrecht, lithography by Faddegon & Co., Amsterdam, between 1886 and 1908. The Sleutel is called a steam brewery. The changes in beer production and distribution of the second half of the nineteenth century led to new ways of marketing beer and reaching customers. Among them was posters. Source: Stedelijk Museum, Amsterdam.



39. The new construction, shown in this photograph taken about 1867, at the *Heineken* brewery in Amsterdam was part of expansion of the firm on a new site. It would be another three years before the brewery would be producing beer in the Bavarian style.
Source: photograph, Nederlands Openluchtmuseum Arnhem, The Netherlands, AA 128553

social and economic groups who owned, in some cases, only small portions. That was presumably why in 1855 the structure was changed to a limited joint-stock company. Though relatively small, employing just 20 workers in 1855, still it was the only Amsterdam brewery in 1852 that used steam power at all. With the fall in the cost of steam engines from 1856 to 1860 a number of Amsterdam and Rotterdam breweries installed machines. Even so in 1860 the *Hooiberg* was the only brewery in the Netherlands where everything possible was done with steam. Heineken paid 2,000 guilders less than the assessed value for the brewery, presumably because the board were pleased to let the operation go. He first thought he would produce beer in the English style and so increase exports but when faced with the high costs of developing overseas markets he turned to the Dutch one. In 1867 he moved the brewery, along with all the equipment, to a new site. In the same year he travelled to Germany where he met and hired Wilhelm Feltmann, Jr., a young and difficult man with extensive experience in a number of German breweries, who was a strong advocate of the Bavarian brewing method.³⁹ At an international exhibition in Amsterdam in 1869 Heineken was impressed with the reaction to Bavarian beer from the Dreher brewery in Vienna and so decided to change over to producing that type of beer. He then, in conscious imitation of other successful brewers of his day, sent his brewmaster on a long study trip abroad, to Germany and Austria. In 1870 Heineken started to make Bavarian beer, that with the help of workers imported from Germany. In the same year he also started to ship beer by rail. Before that he had used only boats.⁴⁰

Heineken was not the first Amsterdam brewer to try to brew and sell Bavarian beer. In 1866 some Amsterdam investors along with the owner of a Nuremberg brewery opened the *Netherlands Bavarian Beer Brewery*. The first modern brewery in the country, it became the *Royal Netherlands Bavarian Beer Brewery* the following year. The shares, totalling 375,000 guilders in value, sold quickly and to the most prominent citizens of Amsterdam. Investors hoped to capitalize on the market for the new kind of beer as others had done in Germany, England and Belgium but also to gain from import substitution since from 1846 to 1863 beer imports into the Kingdom of the Netherlands had increased 20-fold. Capacity was to be

³⁹ Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid...", p. 75; van Dillen, *Bronnen tot de Geschiedenis van het Bedrijfsleven en het Gildewezen van Amsterdam*, 3, #323 [1637], #1510 [1663]; van Eeghen, "De Brouwerij de Hooiberg," pp. 46-53, 70-71, 86-88; Schippers, "Bier," pp. 178, 182, 195-196.

⁴⁰ Kristof Glamann, "The scientific brewer: founders and successors during the rise of the modern brewing industry," in: D. C. Coleman and Peter Mathias, eds., *Enterprise and History: Essays in honour of Charles Wilson* (Cambridge, 1984), p. 191; Jansen, *Bier in Nederland en België een geografie van de smaak*, p. 33; Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij*, pp. 13-14, 26-36.



40. The advertising poster from what had become the Royal Netherlands Bavarian Beer Brewery showed the site of brewery at Weesperzijde 55-58 in Amsterdam but also interior scenes of the brewery and the arms and motto of the royal house to leave no doubt about the status of the firm and the beer. It was the first brewery to produce Bavarian style beer on a large scale in the Kingdom of the Netherlands.

Source: G. A. Amsterdam, Hist. Top. Atlas, 29 — Q0495

3,000,000 liters. That would have only a small impression on a market that consumed 40,000,000 liters per year, but the scale was large enough to make the operation profitable. The new brewery stood next to a rail line and included cellars for ice as well as for fermentation. There was steam to carry out a number of tasks, the engine being a large one rated at 20 horsepower. There was a cooperage as well. It was so novel that before going into production the brewery was opened to the public, the fee for a tour going to a local charity. Bonds were offered to the public, with shareholders getting first chance to buy, and there was discussion in the local press about whether it was a good investment. In fact the newspapers covered the project in great detail. Though the long term results were far from good, in the first year of operation the brewery paid a dividend of 13%.⁴¹ No matter the financial return, the effect on German beer imports was immediate. They dropped in 1868 to just 20% of what they had been in 1866. Another effect, felt immediately, was the rise in the import of hops from Germany, up more than 200 times between 1860 and 1870. The *Royal Netherlands* proved able to sell Bavarian beer that was fresher, had not been jostled by a long train journey, and at a price 50% lower than imports.⁴²

The *Royal Netherlands* and the *Heineken* breweries were followed in 1871 by the *Bavarian Brewery De Amstel*. The owners invested in steam power and in the know-how of Bavarian workers. They imported their brewers since no Dutchman knew how to make Bavarian beer but that meant special diets had to be supplied to the experts while they were housed at the brewery. Those foreign brewmasters, incidentally, tended to prefer grains from Bavaria and Bohemia because they were more familiar with those types of barley. The same was true of hops and so farmers in the Netherlands did not benefit immediately from the growth in brewing.⁴³ In Amersfoort in the province of Utrecht investors set up a new brewery in 1872 and 1873, calling it the *Phoenix* since it was to embody the resurrection of the medieval brewing industry there. It produced pilsner like the new Amsterdam breweries. The *Amstel*, like the other breweries making Bavarian beer, proved successful. They sold the higher-priced type as a beer for gentlemen, typifying the older top-yeasted beer as a workman's drink. The implication was that with some extra expenditure anyone could improve his or her social status. A German writer in 1872 said that Dutch beer did not enjoy the same demand that it had in the past but he thought that the Princess beer now pro-

⁴¹ G. A. Amsterdam, Bibliotheek, N001.25, N41.082, N.40.02.001/.003; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, p. 47; Schippers, "Bier," p. 195.

⁴² G. A. Amsterdam, Bibliotheek, N40.02.001/.003; Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid...," pp. 75-76.

⁴³ Hallema and Emmens, *Het bier en zijn brouwers*, pp. 196-197; Jo. Spier, *Aan D'Amstel en het Y' 100 Jaar Bouwen en Brouwen Uit de Geschiedenis van de Amstelbrouwerij 1870-1970* (Haarlem, 1970).

duced, something more like Bavarian beer, would promote sales. Falling imports into the Netherlands confirmed his opinion. In any case he was more interested in Belgian beers because he and consumers thought them better. He underestimated the ability of Dutch brewers to produce pilsner of high quality and to sell it in ever wider markets, whether that beer was produced in new establishments or in existing ones which through the 1870s converted to making Bavarian beer. The success of Amsterdam beer exporters, already established by the 1850s and especially in markets in the East and West Indies, continued now that there was a new and better product to sell. In 1870 exports reached 93,700,000 liters and in 1890 that figure was up to 314,200,000 liters.⁴⁴

Like his two competitors Heineken enjoyed great and rapid success. Just a year after he started making Bavarian beer he had to replace some of the major vessels which had already proven too small. In 1872, a year later, he added a steam engine of five horsepower. In 1872 *Heineken and Company* embarked on a project to open a new and larger brewery in Rotterdam devoted completely to making beer in the Bavarian style. The move expanded capacity and eliminated a potential rival. The firm brought in partners to finance the new Rotterdam operation and in 1873 reorganized as a limited liability company. The enterprise prospered with dividends of 4% in 1875 that rose by one percent in each of the next two years. In 1873 Heineken stopped making traditional Dutch beer and concentrated exclusively on the new type. By 1876 sales levelled off, having replaced imports from Germany. That did not stop the company from continuing to make profits. The falling costs of raw materials made it possible to increase dividends and when in 1886 the board of directors wanted to declare a dividend of 19% Heineken, the largest shareholder, fired them and kept the dividend at 10%. He, like some other owners, feared that big returns would draw speculative investors who had neither knowledge of nor interest in the art and trade of brewing.⁴⁵ The three Amsterdam breweries that set out between 1860 and 1871 to emulate Bavarian producers transformed the Dutch brewing industry. Instead of a shrinking number of small declining firms there were beer makers expanding, increasing the scale of operations, investing in new plant and equipment and, above all, making profits.

It was not only the conversion to making pilsner which made Heineken and his fellow Dutch brewers successful. They took advantage of existing technical knowledge and converted as quickly as possible to the latest methods and equipment.

⁴⁴ Breen, "Aanteekeningen uit de Geschiedenis der Amsterdamsche Nijverheid...", p. 75; Grässe, *Bierstudien*, p. 96; Schippers, "Bier," p. 192.

⁴⁵ van Eeghen, "De Brouwerij de Hooiberg," pp. 88-89; Glamann, "The scientific brewer...", p. 195; Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij*, pp. 47-67.

By joining the process of change rather late they could eliminate many of the tentative and experimental stages and reap the benefits from investment almost immediately. The introduction of steam power was a first step. The largest brewery in the country, an Amsterdam firm which employed 100 workers in the 1860s, did not install a steam engine until 1872. The resistance of the owner, on the basis of cost, was exceptional. While only five Dutch breweries had steam engines in 1858 the figure was 15 by 1867, 48 in 1875, and 65 in 1880. The average horsepower climbed from 4.4 in 1858 to 8.3 in 1867. It would fall after that as not only big but also small breweries in the South went over to steam.⁴⁶

The second technical innovation which Dutch brewers were late to adopt was artificial cooling. There as well they took advantage of being followers. Though Heineken's Rotterdam brewery used the relatively new Brainard system, Feltmann was not satisfied with it. On a trip to Copenhagen in 1879 he was so impressed with a Linde machine he saw at work that, in cooperation with the inventors he developed a more efficient method of cooling. Feltmann passed water cooled by Linde machines through pipes in the fermenting troughs, exploiting the techniques of the earlier attemperators. In 1881 Heineken installed the first Linde machine, helping to pay for the high cost unit by selling ice to margarine makers and fish dealers. Ice prices in Holland fell sharply. The *Amstel* brewery got a Linde machine in 1882 and *Heineken* an improved one for the Rotterdam brewery in 1883. Even though it was to produce traditional beer with top yeast the new *Oranjeboom* brewery set up in Rotterdam in 1885 with an annual capacity of 7,000,000 liters also got cooling equipment. The pattern was the same as that throughout northern Europe.

Another step in the progression of Dutch brewing was, finally, the adoption of the measuring devices advocated and commonly used in England a century and more before. Though the thermometer was known among Dutch brewers by the 1830s, the saccharometer did not join the equipment of Holland breweries until after mid century and then only in the largest of them. The first number of the Dutch journal *De Bierbrouwer*, directed to small and middle-sized breweries, appeared in 1895. It included a long article that explained the proper use of the saccharometer so the instrument was probably not widely known in the Netherlands even at that late date.⁴⁷ The combination of the two instruments, the thermometer and saccharometer, along with published tables did make possible more efficient extraction of vegetable matter in the mashing process and by the end of the nineteenth century many Dutch brewers had realized that.

⁴⁶ Schippers, "Bier," pp. 183-184.

⁴⁷ Glamann, *Jacobsen of Carlsberg*, p. 37; Siebel, *One Hundred Years of Brewing*, p. 49; Schippers, "Bier," p. 186.

Since Dutch brewers were slower to adopt the saccharometer, their government was slower to adopt its use for tax purposes, something not done until the new beer law of 1917. By 1859 Dutch distillers paid tax based on the strength of the drink measured with a hydrometer.⁴⁸ The 1871 reform of the Dutch tax on beer showed that brewers in the Netherlands were not ready for so dramatic a change in assessment.

Another long standing problem Dutch brewers attacked and solved in the 1860s and 1870s was the one of water supplies. Using new scientific information and engineering techniques they finally got reliable supplies of the quality of water needed to make superior beer. The use of steam power and of mechanical refrigeration increased the already great demand for water in brewing. Heineken recognized the obstacle when he entered the beer making trade and in 1867 discussed bringing water from the district outside town not by boat but by pipeline. In 1869 a test well was sunk near his Amsterdam brewery to see if that might work but the water proved to have the wrong combination of metals and salts. Heineken and other Amsterdam brewers solved the problem of the water supply in the end by contracting with new companies that piped in water from wells in the dunes to the west of Haarlem. Heineken agreed in 1869, for example, with the Dunes Water Company to supply him with water, eliminating the need for barrels, boats and an icebreaker. Dordrecht in 1884 established a system of piped water for the whole town and so breweries there could turn to using that purified water rather than water from the traditional sources, canals and the harbor.⁴⁹

The invasion of brewing by chemists, a process started in the eighteenth century, resulted in final victory for the scientists in the closing years of the nineteenth. Emil C. Hansen, an employee of J. C. Jacobsen's *Carlsberg* brewery in Copenhagen from 1879, did research on the alcoholic yeasts, advancing on the work of Pasteur, in an effort to eliminate contamination. To do that research, which yielded a book on fermentation in 1884, he worked in the laboratory set up in the brewery back in 1871. Jacobsen, who had trained at the technical university in Copenhagen, in 1875 created a truly scientific laboratory and hired the chemist Hansen to use it effectively. Hansen, following Pasteur's warning of the need for pure yeasts, developed a way of isolating a single yeast cell. He could propagate that cell and so make a pure culture of a single yeast. He called other yeasts, the source of contamination, wild yeasts, and took no interest in them. In

⁴⁸ Engels, *De Belastingen en de Geldmiddelen*, p. 386; Hallema and Emmens, *Het bier en zijn brouwers*, pp. 176-177.

⁴⁹ Alleblas, "Nieuw Leven in een Oud Brouwerij...", p. 10; Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij*, p. 34.

1883 Hansen produced a pure yeast on a scale to satisfy the needs of the brewery. Rather than profit from the knowledge, Jacobsen insisted that the results be published in scientific journals and that Hansen hold courses in the *Carlsberg* laboratory to show how his new method worked. In 1876 Jacobsen had turned ownership of the laboratory over to a foundation, stating that the function of the institution was to study the processes of brewing, malting and fermentation. No work was to be kept secret and there were to be no students. The inspiration in part was Pasteur and his work but the organization encompassed Jacobsen's philanthropic streak, the typical practice of the late nineteenth century in freely disseminating technical information and the tradition of sharing knowledge among an elite of European brewers.⁵⁰

Other brewers seized Hansen's discovery since it became clear that with the apparatus to produce such pure yeast strains, apparatus which Hansen soon developed, it would be possible to end brewing failures. The ability to select the exact yeast for fermentation increased interest in the use of yeasts that sank to the bottom and so in the making of beer in the Bavarian style.⁵¹ Heineken had from the start of his enterprise taken an interest in gaining information from outside the country about new brewing methods. In 1885 Feltmann returned from a meeting in Munich where he had heard of Hansen's work with yeast and urged the establishment of a laboratory in the brewery. The board agreed and soon two Heineken brewery scientists went to Copenhagen to learn how to make pure yeasts in Hansen's laboratory. Early in 1886 *Heineken* became the second brewery to produce cultured yeast. *Heineken* developed a substantial business in selling yeast to brewers in Austria, Belgium, France and Germany and to bakers at home. Even Jacobsen's *Carlsberg* brewery in Copenhagen bought yeast from Feltmann's laboratory. *Heineken* was the only Dutch brewery to breed its own yeast and as late as 1910 *Amstel* was buying yeast from Germany. A resistance to pure yeasts in France and Germany, a conservatism in England and the prohibitive costs to smaller brewers of setting up their own laboratories all contributed to the lucrative sale of cultured yeast by *Heineken*. Making a profit from knowledge of how to make pure yeasts was something that Jacobsen had consciously not done and indeed had blocked Hansen from doing. After discussions, Heineken agreed to pay a royalty to the *Carlsberg* brewery on the sale of the yeast developed by Hansen. Production at the *Heineken* breweries was already rising rapidly, 25% per year on average from 1873 to 1883. New more efficient and more durable

⁵⁰ Ault and Newton, "Spoilage Organisms in Brewing," pp. 164, 189; Glamann, *Jacobsen of Carlsberg*, pp. 14, 186-190, 220-221; Glamann, "The scientific brewer...", pp. 192-194; Holter and Møller, *The Carlsberg Laboratory 1876/1976*, pp. 16, 20-23.

⁵¹ Hough, *The Biotechnology of Malting and Brewing*, pp. 120-121.

equipment made it possible to produce beer for less but also to experiment with new possibilities such as cultured yeasts. The scientists of the *Heineken* laboratory produced books on brewing, new strains of yeast and machinery to produce pure yeasts.⁵² The model for the operation of the laboratory had been imported as indeed were models for so many other aspects of Dutch brewing in the late nineteenth century.

The beer of the 1890s was more reliable, of higher quality than any beer ever produced. It was also wholesome, or so brewers argued against attacks from the temperance movement. In the Netherlands the leading temperance organization in the second half of the nineteenth century still saw beer as a valuable ally in the struggle against brandy and gin. It agitated consistently for lower taxes on beer. In 1878 the executive went so far as to discuss setting up a brewery in Amsterdam. The prosperity of the brewing industry and with it the prosperity of the owners catapulted brewers back into public life. Those men, after an absence of a century or more, returned to the top levels of the economic and social hierarchy of towns and cities in Europe and North America and even into national politics.⁵³ They did not want their newly enhanced status damaged by a moral condemnation of their trade. That created another incentive to publicize the beneficial effects of beer. The argument was made more powerful by the shift starting even in mid century, first away from porters and something in Holland called *Kitzinger* of around 5% alcohol by weight, to lagers or *Dortmund* of around 4% alcohol, and then after about 1900 to milder beers more heavily hopped, called pilsners, which were from 3-4% alcohol, though these did reach 4.5-5% in Holland.⁵⁴

As early as 1842 Dutch temperance advocates had formed a society to decrease the consumption of spirits and promote the consumption of beer. In 1881 temperance supporters promoted a new law that regulated hard drinks but did nothing about beer and wine. Beer gardens became popular in the years just before the First World War, thanks in part to the tacit approval of temperance organizations or, as in Holland, their active support.⁵⁵ The suc-

⁵² Glamann, "The scientific brewer...", pp. 192-194; Jansen, *Bier in Nederland en België een geografie van de smaak*, pp. 41-42; Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij*, pp. 107-113; Schippers, "Bier," pp. 207-209, 212.

⁵³ Downard, *The Cincinnati Brewing Industry*, pp. 73-74; Terence R. Gourvish and Richard G. Wilson, *The British Brewing Industry 1830-1980* (Cambridge, 1994), pp. 221-222; Jansen, *Bier in Nederland en België een geografie van de smaak*, p. 75; Thunæus, *Ölets historia i Sverige*, 2, pp. 49-53; Schippers, "Bier," p. 173.

⁵⁴ Schippers, "Bier," p. 192.

⁵⁵ Gourvish and Wilson, *The British Brewing Industry 1830-1980*, pp. 43, 46; Max Henius, *Danish Beer and Continental Beer Gardens* (New York, 1914), pp. 15, 21; Siebel, *One Hundred Years of Brewing*, p. 699.

cess of brewers in selling their product and its falling price from the 1880s, however, shook the alliance between brewers and temperance groups. As beer consumption went up and the threat of spirits receded, beer became a target for those opposed to the selling of alcohol and Holland did not escape temperance agitation. The alliance of government and brewer dated back to the Middle Ages but the relatively low level of tax income from beer in the nineteenth century made the alliance more vulnerable in a political battle. Taxes on spirits produced no less than 22% of all government income in 1881. The great and growing difference between revenue from spirits and from beer reflected the new tax regime which favoured beer by lowering taxes on it and also reflected the large exports of gin.⁵⁶ But the difference also showed that, despite improvements and early success, brewers still had a long way to go to restore beer to the position it held in Dutch life in the sixteenth century. That might protect them from temperance agitation but there were few if any other benefits.

Despite the adoption of new techniques and equipment in the 1860s and 1870s, brewing in the Netherlands lagged behind brewing in England, Germany, Sweden and even Denmark. In 1880 Dutch production ranked tenth in the world, even lower than that of Baden-Wurtemberg, and eighth in per capita terms. Bavaria with 6,240 breweries produced 1,232,227,200 liters of beer or about 230 liters per head of population. Belgium was third in per capita consumption, well ahead of the Netherlands where the level was probably not much above 30 litres. From 1885 to 1900 production in Belgium rose 50% but it could not keep pace with rising consumption. Belgian output in 1900 was 1,476,300,000 liters and per capita consumption was 221 litres. In the same year the Netherlands mustered only 211,000,000 liters of beer or 41.9 liters per head. That put the Netherlands tenth among European countries at 2.1% of German output, 2.4% of United Kingdom output or 10.4% of Belgian output. From 1874 to 1880 Dutch production averaged 130,000,000 liters and from 1881 to 1890 152,000,000 liters per year, a 17% increase. In the two periods per capita consumption rose as well, from 33.1 liters per person per year to 34.6 but still consumption lagged behind production. Total output seems to have stabilized from 1890, though there were still shifts from smaller to larger breweries, from smaller towns to the larger centers, and toward greater international trade in beer. In 1890 total production in all of Britain was 5,236,800,000 liters or some 35 times the Dutch level. Not only did all the totals dwarf Dutch production, but British per capita consumption was well ahead of that in Holland. From 1875

⁵⁶ Frederick William Salem, *Beer, Its History and Its Economic Value as a National Beverage* (Springfield, Mass., 1880), pp. 48-49; Sickenga, *Geschiedenis der Nederlandsche Belastingen*, pp. 173-174.

through 1879 in Britain the rate was 150.4 liters per year. From 1900 to 1904 it fell to 136.8.⁵⁷

Brewing in the Netherlands, despite its growth up to 1914, was still not as important as that even of smaller Belgium. In the decade before the start of World War I annual production in the Netherlands, stable at around 150,000,000 liters, put per capita output at some 32 liters in 1901 falling slightly to 29 liters by 1911.

Dutch brewers did at least succeed in one of their goals, that of replacing imports. In 1867 when Dutch brewers had just embarked on making Bavarian style beer, exports almost equalled imports. Imports peaked in 1887 at 3,802,000 liters but by 1890 they were down to 2,831,000 liters. More important than the gradual decline in imports was a sharp rise in exports. That resulted in a marked improvement in the trade balance in beer. By the period 1887-1896 the average surplus of exports over imports was about 500,000 liters. By 1911 it had climbed to 4,080,000 liters, a great improvement but still only a small portion of total output. Up to about 1880 the largest and indeed almost exclusive export markets for Dutch beer had been the East Indies and Surinam. As a result Amsterdam and Rotterdam brewers dominated exports. After that date, though, the new Bavarian style beer found customers in Europe and by the First World War the colonies were the second largest export market, after Germany. Annual average production in the province of Holland between 1620 and 1640 has been estimated at 1,140,000 barrels or 218,550,000 liters, higher than the revived Dutch industry around 1900. The figure was down to about 990,000 barrels by 1652 and 885,000 by the period 1665-1669. The figures are probably underestimates of total production so should be taken as something close to the minimum. It is doubtful that output was as much as twice what the records indicate but it was probably higher than the reported figures.⁵⁸ Even at the reduced level of the 1660s of about 137,000,000 liters per year Holland production still was comparable to what industrial brewers turned out in the entire Kingdom of the Netherlands at the end of the nineteenth century.

⁵⁷ Gourvish and Wilson, *The British Brewing Industry 1830-1980*, pp. 24-40, 76-69; Jansen, *Bier in Nederland en België een geografie van de smaak*, p. 269; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, pp. 55-56; Salem, *Beer, Its History and Its Economic Value as a National Beverage*, pp. 166-67; Siebel, *One Hundred Years of Brewing*, pp. 697-699, 716; John Vaizey, *The Brewing Industry 1886-1951: An Economic Study* (London, 1960), p. 3; Richard G. Wilson, "The British brewing industry since 1750," in: *The brewing industry A guide to historical records*, Lesley Richmond and Alison Turton, eds. (Manchester and New York, 1990), pp. 4, 7-9.

⁵⁸ Blink, "Geschiedenis en verbreiding van de bierproductie en van den bierhandel," p. 106; Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie*, pp. 56-58; Yntema, "The Brewing Industry in Holland, 1300-1800: A Study in Industrial Development," pp. 63-68.

Concentration, a tendency started in the Dutch industry back in the sixteenth century, continued and intensified in the late nineteenth. While Belgium might see an increase in the number of breweries in the last fifteen years of the nineteenth century the trend in the Netherlands, especially after 1910 was emphatically in the opposite direction. The circumstances for growth and success in brewing improved as the century wore on. That was even more true after the 1871 tax revision in the Netherlands. The total number of breweries might be the same or higher but production was increasingly concentrated in the hands of a few large firms.⁵⁹

A consistent trend failed to develop because new breweries opened and took advantage of the positive economic and technical climate, while old small ones closed. Brewing tended to migrate to the larger towns in Holland as transportation improved, though. Many of the smaller breweries survived on making beer of low quality and of a lower price than the pilsners of the big breweries. The larger brewers found that falling costs and improved transportation made it possible for them to compete even toward the lower end of the consumption spectrum. After 1890 concentration began in earnest. Average production in 1880 was 253,000 liters and in 1910 it was 489,000 liters. From 1890 to 1920 beer production increased by 25% while the number of breweries fell by 50%.⁶⁰ In 1900 Amsterdam had only seven of the breweries in the Netherlands, but of those four had more than 100 workers and another more than 50, significantly bigger than the largest enterprises of a century before. Rotterdam had two breweries with more than 100 workers in 1900 and The Hague had one with more than 50 workers.

In 1890 10 limited liability companies made beer in the Netherlands but in 1900 there were 30 and with more than double the paid up capital of the 10 of a decade earlier.⁶¹ The growth in size and capital promoted the change in financing the industry, all part of the more capital intensive brewing of Bavarian style beer. The different type of beer was not the only cause, however. The shift to joint-stock enterprises in Britain, where traditional beers dominated the market, had already started in the 1880s and a bit earlier in Sweden.⁶² The old system, common everywhere including Holland, was individual ownership or partnership. The latter became more necessary as breweries grew but it brought a com-

⁵⁹ Jansen, *Bier in Nederland en België een geografie van de smaak*, p. 31; Siebel, *One Hundred Years of Brewing*, p. 698.

⁶⁰ Jansen, *Bier in Nederland en België een geografie van de smaak*, pp. 34, 269.

⁶¹ Blink, "Geschiedenis en verbreiding van de bierproductie en van den bierhandel," p. 106; Schippers, "Bier," pp. 196, 210; Siebel, *One Hundred Years of Brewing*, pp. 26-29.

⁶² Thunæus, *Ölets historia i Sverige*, 2, pp. 233-235; Wilson, "The British brewing industry since 1750," p. 11.

Table XII-1

The Number of Breweries in Netherlands, 1850-1910

<i>Year</i>	<i>Number</i>
1850	658
1855	610
1859	582
1867	564
1873	566
1875	540
1880	542
1890	543
1901	494
1910	440

Sources: Richard T. Griffiths, *Industrial Retardation in the Netherlands, 1830-1850* (The Hague, 1979), p. 97; A. Hallema and J. A. Emmens, *Het bier en zijn brouwers. De geschiedenis van onze oudste volksdrank* (Amsterdam, 1968), pp. 193-194; A. C. M., Jansen, *Bier in Nederland en België een geografie van de smaak*, Nederlandse Geografische Studies, 39 (Amsterdam, 1987), p. 50; Gerrit Z. Jol, *Ontwikkeling en Organisatie der Nederlandsche Brouwindustrie* (Haarlem, 1933), pp. 40, 48-50; H. Schippers, "Bier," *Geschiedenis van de Techniek in Nederland De wording van een moderne samenleving 1800-1890*, volume 1, H. W. Lintsen, ed. (Zutphen, 1992), p. 180.

plexity of shares of varying fractions and the need to end the partnership and renew it, in some form, after a fixed term or when one of the partners died. Joint-stock eliminated associated problems and also made innovation easier to decide on and implement.

Dutch brewers, most notably *Heineken*, chose not to own any outlets but rather signed supply contracts with taverns. They lost the advantages of assured outlets and the profits from the retail trade but they also lost the problem of finding the capital to finance a network of owned or "tied" outlets. In Holland circumstances never promoted the development of brewery-owned outlets, not at any time from the Middle Ages through the nineteenth century. Interested though Dutch brewers were in keeping the right retailers, they competed more on quality of their product, the ability to deliver in the right quantities and on time and on personal ties rather than on price. Such non-price competition is also an explanation for the early and abiding interest of brewers in advertising.

The shift to production of pilsner meant rapid growth in brewing enterprises virtually everywhere. Such growth was possible in the late nineteenth century outside of Holland, another sign that Dutch brewers were still working at catching up. *Heineken* had known rapid sales increases and the breweries in Amster-

dam and Rotterdam proved unable to keep up with demand in the 1870s. In the twelve months of the 1873-1874 bookkeeping year *Heineken* produced 2,804,700 liters but five years later in 1878-1879 production had more than doubled to 6,040,000 liters. In the early 1880s rapid expansion truly began and five years later in 1883-1884 Heineken's breweries produced 9,824,500 liters. That was about 6.5% of total Dutch output. In 1889 at the World's Fair held in Paris *Heineken* beer won a gold medal of honor so there seems to have been little question about the quality of brewing in Holland.⁶³ There also seemed little question about the technical level of production which at least the largest of Dutch breweries could achieve. The success of Dutch brewing in the twentieth century, the ability to compete internationally, would demonstrate that more fully.

⁶³ Korthals, *Korte Geschiedenis der Heineken's Bierbrouwerij Maatschappij*, pp. 75-76, 84, 115.

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EPILOGUE

BEER IN HOLLAND

By the end of the nineteenth century the principal features of the Industrial Revolution had reached brewing. It was not just the use of a different source of power which marked the new character of the industry. The industrialization of brewing after 1870 was combined with a novel reliance on knowledge of chemistry generated by laboratory experiment, translated into practical ways to make a product. The industry was hardly comparable anywhere in the world to its predecessors of the Middle Ages and the Renaissance.

Beer making in Holland was transformed in the high Middle Ages from a collection of domestic brewers with a few commercial operations in towns to an industry concentrated in a handful of major centers with large numbers of firms and employing directly a high percentage of the population. The fifteenth century industry also became a major exporter and sold its product widely in northern Europe. It set a precedent to be followed by other industries in the Netherlands and in other parts of Europe. It combined local products with imported raw materials and then used the transportation network which brought in those raw materials as a vehicle for the distribution of the finished product. The period of stability in the sixteenth century that followed the rapid growth of the late fourteenth and fifteenth was also a period of consolidation and gradual technical improvement. The seventeenth century, on the other hand, saw the decline of brewing, a decline which continued to the 1860s. Starting then Dutch brewing finally entered a new period of growth, expansion and increasing exports.

Public authorities placed strict limits on what brewers could do. In the short term the performance of the industry depended on the decisions of individual producers about what to do in making and distributing and selling their beer. They acted within certain institutions and arrangements for the administration of brewing established by governments. The law played a greater role in brewing than in almost any other industry in medieval, Renaissance, or early modern Europe. The demands and needs of government had a deep and abiding effect on the industry. Brewers were skilled people. They usually had superior knowledge about how to carry out a complex process. Their technical skill and their uniqueness increased over time. The internal organization of the trade, however, always made them entrepreneurs, owners and operators of their own business, rather than only skilled craftspeople. In that they may not have been much dif-

ferent from butchers or bakers or cobblers in the high and late Middle Ages, but as industries changed in the sixteenth and seventeenth centuries brewing maintained much the same organization and employment scale. Within that stable framework and the strict limits created by the regular surveillance of the authorities, brewers had to function and to make the choices which created the long term pattern of rise and stability and then decline and finally growth again.

Over the long term many changes beyond brewers' control determined the performance of the industry. The long term development of the economy of Holland and of northern Europe in general fixed the scale and scope of what brewers could do. The long term evolution of grain prices always played a major role in determining brewers' costs. Though methods of production and the product of the brewery might change, grain remained the most expensive raw material. Only water used in making beer exceeded grain in volume. Even in the period of greatest success of Dutch brewing in the fifteenth century, beer makers bought only a small portion of the total grain on the market and so were price takers, accepting what the market dictated. They could adjust their buying among different grains and could perhaps have a small impact on the price. They lost access to any grain at all when governments drove them out of the market entirely. Towns did that to guarantee adequate supplies for making bread, always a higher priority. Urbanization was also beyond brewers' control but certainly affected their costs. The value of land rose and so increased their capital requirements. It also increased pollution and so forced brewers to find water outside of the towns and to ship it to their breweries which added to costs.

The general trends in the economy, translated to brewers as changes in the cost structure, limited their actions just as the regulations of government did. Brewers in Holland faced another problem, also variable and unpredictable. They were not the only beer makers in northern Europe. In the fourteenth and fifteenth centuries they faced little competition in the southern Low Countries, France and England. Outside of north German port towns, the lack of international competition gave Dutch brewers flexibility. The competitors who generated constraints for the brewers in the towns of Holland were their compatriots in the countryside, the brewers making beer just beyond the legal limits of the towns. In the sixteenth century beer brewing developed in Leuven, London, and many other towns in what had been Dutch export markets. The competition of the sixteenth century, however, was small in comparison to the intense and highly developed competitive environment which Dutch brewers confronted in the eighteenth and even more so in the nineteenth century. When Dutch brewers invested in the making of Bavarian beer in the 1860s, their relatively small industry faced firms in Germany and Britain which dwarfed their own. The capital and expertise of those companies made them formidable opponents. As it turned

out, though, Dutch brewers fared as well or better than their competitors and even gained ground on them in the years up to the First World War.

Dutch brewers faced competition from another source beginning in the seventeenth century. Beer had long been the preferred drink to wash down the salty foods that made up medieval and early modern diets. It had long been the preferred alcoholic beverage. Those two different sectors of the market each had new entrants which by 1700 posed serious threats to beer sales. Distilled spirits offered alcohol in a more convenient and less expensive form. Coffee, tea and cocoa offered stimulation of a different sort. More important as prices for the tropical drinks collapsed in the eighteenth century they served as alternatives to weak beer as a drink to have with meals.

Throughout the history of brewing from the ninth through the nineteenth century technology played a central role in establishing the opportunities and constraints faced by brewers. The principle changes in the industry, in total production, organization and even in government regulation depended directly on changes in the technology of making beer. The method of brewing changed markedly over the long run. In the thirteenth and again in the nineteenth century those changes yielded a product which was very different from the one made by brewers before. In the former case the change was dramatic enough that a different name had to be used for the new commodity. In the latter the new beer had little in common with its predecessor, other than the raw materials and the alcohol content. It was the invasion of hopped beer from northern Germany in the fourteenth century which caused the first major transformation in brewing in Holland. The local industry, already in place and growing with the increase in population, was forced to react when faced with competition from a product which was superior in a number of ways. An invasion of a new type of beer from Germany was to be repeated in the second half of the nineteenth century. A much different brewing industry was forced again to react, to adjust, to accommodate and embrace the new type. In so doing, Holland brewers had to adopt different technologies to retain and then, in both instances, enhance their position first in the domestic market and then in the international one. Though circumstances were not the same in the fourteenth and the nineteenth centuries, the reactions by brewers in Holland were similar and so too were the results for the industry.

In many instances the changes in technology in brewing were internally generated. The brewers themselves experimented with new materials, equipment and methods. More frequently, though, and especially by the eighteenth and nineteenth centuries, brewers borrowed from other industries, from learned disciplines, and from new and different branches of knowledge to improve the making of beer. Brewers used hops long before the thirteenth century just as

they had made pilsner beer long before the nineteenth. It was a matter of perfecting the process, making it reliable and making the product as well as production consistent. Brewers learned how to do that through trial and error. Over time externally generated technical change increased and by the second half of the nineteenth century became as important as what the brewers developed themselves. The introduction of the thermometer and then the saccharometer meant that brewers relied on scholars to describe the use of new instruments in the production process and on instrument makers to give them specialized and accurate tools. The studies of fermentation by chemists in the nineteenth century, culminating in the work of Louis Pasteur, gave brewers ways to make more stable and predictable beer. Twenty years after Pasteur published his work on diseases of beer, brewers themselves were carrying out experiments and making superior yeasts. The most progressive of beer makers quickly absorbed the new knowledge and new methods. The same rapid borrowing of technology from outside brewing came with the evolution of mechanical refrigeration equipment. No matter the greater reliance on externally generated technical change, no matter the more complex technology and the complex relationship with science and other technologies, the brewing industry in the late nineteenth century enjoyed the opportunities and suffered the constraints that new ways of brewing created. Despite being relatively quick in the fourteenth century in adopting new methods and stealing the march on others in western Europe, brewers in Holland lagged behind those in Bavaria, Austria and England in exploiting the opportunities created by technical advance in the eighteenth and nineteenth centuries, a pattern only changed from the 1860s.

While there might be a similarity with other industries in the relationship brewing had with technical change, beer making was still unique in the singular relationship it always both enjoyed and suffered with government. Virtually no other industry in medieval or early modern Europe was in the same position as brewing. Brewing was always tied to public institutions. Though there may have been a connection between governments and the making and selling of beer before the Middle Ages, it was in the tenth century that public power and brewers became entwined in a complex to control the income from malt beverages. First established for large institutional brewers like monasteries, the government taxation of brewing thrived once urbanization led to the establishment of commercial brewing outside of the home, carried on by men and women who made their livings as beer makers. Brewers and brewsters became more than tradespeople using their skill to practice their craft. They were forced into being, to some degree, government agents. The extensive regulation of the industry, the careful surveillance of what brewers did and the ever expanding government

supervision of the production and sale of beer put manufacturers in the position of being tax collectors. Government dependence on income from taxes on beer, already great in the Low Countries by the fifteenth century, forced brewers into being part of the apparatus of extracting money from citizens. Not all brewers and brewsters cooperated all the time and in the full spirit or letter of the law. The same was true of retailers of beer. Brewers acted as tax collectors not only out of a sense of civic duty. The government, wanting to maximize income, did what it could to allow brewers to maximize profits, profits which the government then shared with the brewers. That left the question of how town and brewers would divide the spoils with the town typically enjoying superior bargaining power. Efforts to generate freer trade in beer, such as in the province of Holland in the fifteenth and sixteenth centuries, were never fully successful. Not only brewers but governments, civic and comital, did not want their income from the sale of beer to fall.

It would be wrong to see Dutch brewing as a public utility and certainly no contemporary in the sixteenth or seventeenth century would have understood brewing in that anachronistic way. However, governments did think demand would be fairly constant within a narrow price range and within a broad range of quality. Despite improvements in the durability of beer in the fourteenth century, most beer was still sold locally or within a short distance of where it was made. There was no natural monopoly, but the combination of the high cost of shipping a good that was mostly water and regulation that was complex enough to impede the movement of beer meant that governments looked on brewers in the way they would later look on distributors of electricity, gas and telephone services in the first half of the twentieth century. The conception of the industry as something like a public utility explains the debate between producers and governments over the proper return from their enterprise. In Holland from the middle of the sixteenth century and perhaps before, cities and in some instances the provincial government showed little concern for the long run development of brewing. They were passive, just reacting to ever more frequent petitions from brewers asking for tax relief so they could retain their profit margins and a reasonable return on capital. The government treated the brewers' request with little interest and moved only slowly if at all. The results from the mid seventeenth century were disastrous. In the short run, governments regulated the industry to maintain their income from it which had bad long term results both for brewers and governments. The public authorities found, however, that as brewing declined they could turn to other sources of income. As long as there was enough beer to avoid public disturbance for lack of supply and as long as brewers contributed to their coffers governments persisted in the special relationship with brewing which had emerged in the early

Middle Ages and resisted any dramatic adjustment no matter how much the industry declined.

Any history of brewing is the history of expansion and retraction. The history of brewing in Holland from the early Middle Ages through the nineteenth century is a tale of a gradual and then a rapid rise in output, stability at a high level and then a long decline followed by another and even more dramatic rise. It is the history of an industry which passed through a series of changes in virtually every aspect of the operation. It is almost the history of different industries so different were the products, the techniques and the markets over the long run. It is certainly the history of an industry repeatedly adjusting to varying and changing circumstances, sometimes with success and sometimes without.

The history of brewing in Holland from the early Middle Ages through the nineteenth century as business history is a tale of firms which exploited changing circumstances and seized opportunities as they appeared. It is also a tale of firms which were always faced with constraints and pressures beyond their control, some physical, some technical and many created by man. Those constraints and pressures had a powerful influence on the success or failure of the strategies brewers used to deal with the day to day problems of carrying on business. More so than with virtually any sort of enterprise in late medieval and early modern Europe, government action played a critical role in determining the performance of the business of brewing.

The history of brewing in Holland from the early Middle Ages through the nineteenth century as economic history is the tale of the interplay of dramatically changing technology with the relative costs of inputs which presented the owners and operators of breweries a range of choices. The choices might increase in variety and scope with some novel method or product. It was not just new ways of making beer that expanded the range. Developments, long and short term, in the supply of the raw materials of the trade were translated to brewers as variations in prices. In some periods like the eighteenth century the range of options was narrow and no solution seemed adequate to the problems faced. In some periods like the years after 1871 the choices were extensive and success was well within the grasp of many. The structure of costs and the state of knowledge of how best to make beer along with the structure of demand for beverages dictated the place of the brewing industry in the economy.

The history of brewing in Holland from the early Middle Ages through the nineteenth century as a component of the history of economic policy and the history of economic thought is a tale of tension between what may have been some informed theory and what certainly was the pressing need of governments for funds. Eli Heckscher, following earlier writers including Adam Smith, talked of the period of the sixteenth and seventeenth centuries as one of mercantilism. He

called it "...a phase in the history of economic policy".¹ He saw in the period an understanding of the economy which led to a body of policies, followed by many European governments, of protection and promotion of domestic economic activity, especially trade and industry. Heckscher said such policies began with towns in the late Middle Ages with provincial and then national governments imitating those urban policies. Certainly Heckscher's work has not escaped criticism. Whatever the advantages or shortcomings of his description and use of the term mercantilism, it is obvious that brewing and government policy on brewing fitted into that larger context which Heckscher chronicled. It is also obvious that the economic policy, both civic and comital, that affected brewing in Holland involved much more than is included in the idea of mercantilism, no matter how broadly the word might be interpreted. Governments cared about their incomes. In some instances fiscal considerations dominated their actions while in others the development or protection of the industry stood first among the reasons for what they did. Government and brewing were tied together by the income from beer sales. Some of the men who ran breweries also sat in town governments. It is often difficult to identify not only why things were done but also what, in the end, was done. Declared policy and actual practice easily diverged. Though the concept of mercantilism might fall short in treating all the complexity of government policy toward brewing, that is not to say that Heckscher was right or wrong about mercantilism. It is true, though, that the history of town governments and brewing in the later Middle Ages does help in understanding where ideas about protection and specific policies for protection started. It also helps in understanding where ideas about mercantilism started. The concept of a policy of free trade which in theory dominated the Europe of the second half of the nineteenth century is as inadequate as the concept of mercantilism in describing government policy toward beer making. As the Dutch government moved to drop excise taxes, to limit its involvement in the economy and even to reform the tax on beer, culminating in the legislation of 1871, beer making still remained subject to regulation, surveillance and taxation. The unique nature of the relationship with government, created by the character of demand for beer, always prevented brewing from fitting fully into any broad category of government policy.

The history of Dutch brewing from the early Middle Ages through the nineteenth century as social history is a tale of fashion and of changes in tastes. Consumers' choices had a place in establishing whether wine or beer sold and in what quantities. Those choices also had a place in establishing which of the many kinds of beer were consumed. Though there were other reasons for the

¹ Eli F., Heckscher, *Mercantilism*, E. F. Söderlund, ed., Mendel Shapiro, trans. (London, 1955), 1, p. 19.

choices than sheer fashion, especially among luxury drinks, taste did have an effect. The difficulty is trying to isolate the extent of the influence of fashion. Arguments about economic change based on changes in taste are notoriously circular and devolve to nothing more than saying that things changed because they changed. Such arguments also have serious theoretical problems since they may come down to nothing more than identifying that which can not be explained in any other way. The fact that consumption patterns changed slowly up to the eighteenth century and still moved far from rapidly even by the end of the nineteenth century suggests that changes in taste, though they did affect the brewing industry did so always to a limited degree. Governments do not seem to have cared about tastes. They dealt with beer making as if taste and for that matter demand were in general immutable. Brewers in Holland in the fourteenth and fifteenth centuries had gradual success in influencing consumption choices, but their counterparts in the seventeenth and eighteenth centuries seem to have done little to sway taste.

The history of Dutch brewing from the early Middle Ages through the nineteenth century as social history is also a tale of how consumption of alcohol, a popular pastime, could generate an entire industry and a whole complex of economic and political relations reaching far beyond the industry and having a longevity beyond that of the prosperity of the industry itself. From the earliest days of commercial brewing in towns, brewing created a class of entrepreneurs with a prominent place in public life. Brewers were among the richest and most prominent citizens. They were often holders of the highest of public offices through the seventeenth century and even into the eighteenth.² With that came something brewers' enemies in Rotterdam called "their pompous lifestyle".³ In the late nineteenth century brewers again, after a short hiatus, played a major role in the political life of Holland towns and of the Kingdom of the Netherlands.

Brewing created a mass of workers who operated almost entirely in small units. Even with the adoption of Bavarian brewing practices and massive capital investment, there were few breweries in Holland in 1900 with over 50 workers. The workforce in the industry compared to the total number of people employed and compared to the total population was on the other hand always large in the fifteenth and sixteenth centuries. The sizeable body of workers in brewing always included a high proportion of women. Through the seventeenth century they

² Hoekstra, "Het Haarlems Brouwersbedrijf in de 17e eeuw," p. 11; De Jongste, *Onrust aan het Spaarne*, p. 14; Ten Cate, "Verslag van een onderzoek naar de geschiedenis van het Amsterdamse brouwersbedrijf in de 17e eeuw," p. 17; Wijsenbeek-Olthuis, "Ondernemen in Moeilijke Tijden...", p. 75.

³ Visser, *Verkeersindustrieën te Rotterdam*, p. 75.

could be as much as 50% of the labour force and rarely less than 20%. The division of labour meant that equality among employees was neither possible nor thought desirable, but there was not a sharp demarcation between men and women in Dutch breweries. Through the sixteenth century and beyond women operated their own breweries as entrepreneurs in their own right. If there was pressure on them to join in partnership with members of the opposite sex the pressure was, at least up to the seventeenth century, economic and technical rather than legal.

Brewing created conceptions and understandings of society and of human behavior as well as common practices, common aspects of everyday life that were, with all the ups and downs of the industry, an integral part of the lives of people in Holland from the ninth century through the nineteenth. Histories of brewing share many shortcomings. They are typically too convoluted, too involved, too descriptive and too devoted to the subject of the drink itself. The reason is not just that such works are produced by devotees of the drink. The character of beer brewing made it an important part of the commerce and industry of Europe for centuries. The character of beer drinking made it an important if not central part of daily life. To extract and isolate the industry, the economics, and technology of beer making from that complex and extensive social and economic history is not only impossible but also improper. The history of brewing in Holland from the early Middle Ages through the nineteenth century is the history of many aspects of the times and places. That condemns the history of brewing to being clumsy, complex, rich, varied and highly revealing about the society that emerged, thrived and declined in Holland through that millennium.

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APPENDIX ONE

MAKING BEER

The first task in making beer was, and is, to malt the grain and then grind it very coarsely to create the grist. The second is to add warm water to the grist to create a porridge-like mash. Then the liquid or aqueous extract, called the wort, is separated. Warm water can be applied to the mash again creating even more wort but with a lower concentration of vegetable matter. Third, the wort is boiled, usually in the presence of some additive or additives. Fourth, after clarification and cooling the boiled wort is fermented by yeast. Fifth and last, after maturation and clarification the beer is packaged for delivery to the consumer.¹ In each stage a series of biochemical changes take place and it is those which the brewer tries to promote and control.

Malting was not done exclusively for making beer but brewers were the greatest consumers of malt. Grain is made to germinate and, just as growth gets underway it is arrested. The process changes the chemical composition of the grain and gives a change in taste. During germination various enzymes attack the food store of the grain, partly degrading starches and proteins. The physical weakening of the endosperm layer or food store is called modification so malted grain can be said to be under-modified, well-modified, or over-modified. The last is preferred for distilling and vinegar manufacture, both malt users, while well-modified malt is best for beers. The grain for the process must be carefully selected. The ideal is grain that will germinate evenly and easily. Only with grains of uniform size is that likely to happen. Malt is most stable and least subject to infection when kept dry and cool, that is below 15 C., temperature always being measured in degrees centigrade and indicated by C.²

To malt, the grain is spread out over a malt floor at an even but not too great depth, about 10-15 centimeters. The floor must be porous and preferably warm. Covered with water which is then let to run off after 12 to 24 hours and kept in temperatures ranging from 15 to 25 C., the grains open and small rootlets emerge. Grains showing the emergence of the root sheath are said to have "chitted". Only a small portion of that nitrogenous material finds its way into the rootlets. To guarantee uniform growth the malt is turned at regular intervals.

¹ Hough, *The Biotechnology of Malting and Brewing*, pp. 4-5.

² Hough, *The Biotechnology of Malting and Brewing*, pp. 4, 8, 15-16, 25.

The process generates carbon dioxide which in turn inhibits growth so aeration of the malt is critical. Using wooden shovels the grain is thrown into the air in a process called forking or raking. The amount of nitrogenous material that can be extracted in the mashing process rises in the first two days of germination but then declines from a peak. From the third to the sixth day, growth is rapid. Enzymes continue to degrade starch into less complex sugar molecules. Condensation appears on the grains and so they need to be turned two to three times a day, and spread out more thinly to allow growth to go on. Water is added, sprinkled on the chitted grain as needed to maintain the pace of growth. If the temperature gets above 25 C. there is the danger of loss.

The malster must keep careful control over temperature, moisture and aeration. The pace of the entire process depends on the conditions under which the grain was grown, the size of the grains, the variety or varieties of grain used and the temperature of the water. Since grains vary so much in condition there are many different possible patterns of development which means that the malster must have extensive experience to know exactly what to do. By the sixth or seventh day the rootlets should be .67 to 1.5 times the length of the grain. A shorter length indicates insufficient modification of the grain and longer indicates unnecessary loss of grain. At that point the pace of growth slows and for most malts the process is stopped at seven to eight days. For an over modified malt, growth can be allowed to go on for as many as 10 or 11 days. Using modern equipment where temperature and moisture content of both the air and the grain are carefully controlled the process can be shortened to three to four days. By splitting the modified grain transversely with a finger-nail and rubbing the contents between two fingers the malster can tell if germination has gone far enough. The test is far from scientific and, done at the end of the process, it cannot help in measuring the pace of modification along the way.

Germination is stopped by drying the modified grain in a kiln. Moisture content in kilning drops from 45% to 5% or less. Enzymes can survive high temperatures so long as they are not in aqueous solution, so the art of kilning is to drive out much of the moisture using low temperatures at the outset and then, once moisture content is down to 12%, boosting the temperature above 38 C. In fact there are two phases to kilning. The first is drying and the second is heating or curing. For dark malts, temperatures are raised to 45-50 C. at the outset and kept there. For pale malts drying is slow at much lower temperatures, under 38 C. for up to 24 hours and then rising slowly over the next 15 hours to 65-75 C. when moisture goes down to 5-8%. Then the final step is to cure at 80-100 C. for an additional five hours to get moisture down to final desired levels. To guarantee even drying and curing the malt should be turned several times each day. After curing, the malt has

a moisture content of 2-5%.³ In fact it is very difficult to get rid of the last bit of water. Having been dried so extensively, the malt will take up moisture rapidly. If the level gets above 5% there are problems with grinding. The simple solution is to grind the malt immediately. If the malt picks up too much moisture, that is becomes slack, then it is best to redry it. Though subject to moisture problems, in general malt is highly stable and can last for months and even years if properly stored. Malts were often made in the winter and so by the end of the summer they were often slack which raised the risk of a less than ideal beer. On the other hand, the quality of the beer can be reduced by using malt just out of the kiln. The optimal time between drying and using malt is about three weeks.⁴

The goal of the miller in grinding malt is not to break the husks, keeping them in tact but reducing the endosperm to a fine flour. That is possible only with properly modified malts. The resulting grist, then, should be gritty. If the malt is too fine during mashing it becomes thick and spongy. The husks can serve a worthwhile function in mashing. If they are the right size the spent grains go to the bottom of the vessel and it is easier to draw off the wort. If the husks are too small they clump at the bottom of the vessel and form an impermeable bed. After grinding the malt can be stored for a few hours without danger but should be mashed in a short time to avoid deterioration.⁵

For the second stage, mashing, the brewer puts the grist in a vessel and covers it with warm water, at a temperature of about 65 C. The first step in the past was to make a dough of the ground malt and water, using a rake to mix the two, and then adding more water. Along with the ground malt brewers often add other unmalted grains in combination both to keep down costs and to add certain features. For example, wheat flour as well as barley flour seem to improve the stability of foam. In the United States in the late twentieth century unmalted cereal makes up about 40% of what goes into mashing. The remainder is malt. Over a period of some 40 years from around 1930 in Britain brewers used 80% malt, 5.5% cereal adjuncts and 14.5% brewing sugars. The cereal adjuncts can also use up surplus enzymes and enhance the taste of the final product. They can also improve the stability of the flavor and in turn the shelf life of the beer. Certain adjuncts will also affect the color of the beer and give certain characteristic flavors, all at relatively low cost.⁶

³ De Clerck, *A Textbook of Brewing*, 1, pp. 151-158, 181-182, 192, 197; Hough, *The Biotechnology of Malting and Brewing*, pp. 21-23, 26-38.

⁴ De Clerck, *A Textbook of Brewing*, pp. 217-218.

⁵ De Clerck, *A Textbook of Brewing*, 1, pp. 249-250; Hough, *The Biotechnology of Malting and Brewing*, pp. 54, 56-57.

⁶ De Clerck, *A Textbook of Brewing*, 1, p. 268; Hough, *The Biotechnology of Malting and Brewing*, pp. 64-66; T. Wainwright, "Biochemistry of Brewing," in: *Modern Brewing Technology*, W. P. K. Findlay, ed. (London, 1971), pp. 130, 135.

The brewer has to be concerned not only about the chemical composition of the grain but also about the chemical composition of the water added in mashing. Soft water is generally better for extracting vegetable matter. Hard water is typically but not always bad since during boiling the carbonates in hard water combine with positive hydrogen ions and so decrease the acidity of the solution. The acidity must be kept high enough to impede the growth of unwanted organisms and also allow certain enzymes to function effectively. Malt contains considerable amounts of phosphoric acid and if there is calcium carbonate in the water the phosphoric acid ionizes and forms highly insoluble calcium phosphate. That process also removes positive calcium ions which are needed for the enzyme alpha amylase to act. The enzymes alpha and beta amylase are necessary for breaking down starches into smaller units. Hard water has advantages in that both calcium and magnesium ions are needed for the proper functioning of some enzymes but concentrations can not be allowed to rise to an excessive level.

Mashing should take place at about 65 C. The water added to the grist should be at about 70 C. The performance of specific enzymes, which break down amino acids and starches to get fermentable sugars, depends on the temperature and the acidity of the solution, so the brewer can, in theory, control the character of the product. If the temperature of mashing is low, that is from around 30 C. to 45 C. the acidity of the wort will increase. This can improve the quality of the beer, but if the temperature is left too long at that level the risk of infection from undesirable microorganisms increases rapidly. The work of the enzymes gradually makes soluble what is in the grist particles with only a small amount of undegradable material left. Only some 10-15% of the extract comes from dissolving. The rest comes from the action of enzymes. The extracted material is dissolved in the water and then drains out the bottom of the mashing tun, passing through the bed of husks. The water drained off, rich in carbohydrate and nitrogenous material, is wort.

The grains can be treated a second time by having a new quantity of water poured or sprayed over them. The water used should not be too alkaline nor should it be too hot, that is not above 75 C., since there is the danger of carrying off some unconverted starch still in the grain. That can generate a haze in the final product. The wort that comes through is, of course, weaker with a lower concentration of vegetable matter. At some point the concentration is so low, with a specific gravity of about 1.005, that it is not worth continuing. Using a single mash tun, that is using infusion mashing, is simple but does mean that many different processes go on at the same time in a single vessel. This makes control of chemical and physical changes difficult. In recent years variations using more than one vessel have been developed to deal with difficult malts or to speed the mashing process. By the late twentieth century most breweries use something

more complex than the simple infusion system. In part they avoid having too much material of high molecular weight in the wort which can take away from the clarity of the beer and in part they decrease amino acids which makes less likely infection by lactic acid bacteria.⁷ Having high quantities of fermentable sugars in the wort is more efficient since it takes the same amount of energy and space to brew and cool beer no matter the gravity. The beer can always be watered down later. There are dangers, though. The taste of the beer may be adversely affected from the way the yeast reacts in beers of higher specific gravity so brewers have to be careful about the available sugar. The wort, warm and with many nutrients, is an ideal medium for the growth of bacteria many of which can cause rapid spoilage. The temperature of the wort must be kept above 50 C. to avoid the growth of such bacteria. The wort cannot be left sitting either, since that increases the chance of the growth of dangerous organisms and still other bacteria which, even in small quantities, can adversely affect the flavor of the final product.⁸

At the end of the mashing there are two products. The wort should have a bright appearance from the colloidal solution of sugars and proteins. The spent grains or draff are 80% water. That means there is still extract in the residue and the remaining material is simply lost. The nutrients can be reclaimed by using the grains as feed for animals. It can be given to them directly or dried. In the latter form it can be ground again, into a fine flour, and then used to make bread, food for people. The quality is not equal to that of flour made directly from grain but whatever its final use the draff certainly still has some value.

The next step in making beer, "...the most challenging and exasperating of the whole brewing process...",⁹ is boiling the wort. This often takes place in the presence of additives. Boiling stabilizes the wort, sterilizes it and stops enzymatic action. It also causes coagulation of unstable colloidal protein. Boiling will affect the color of beer, in part because sugars are caramelized and in part because of oxidation of tannin from hops, that is when hops is used as an additive. Boiling tends to reduce the acidity of the solution, as oxygen is taken up from the air and can speed chemical reactions. The goal of the brewer is to keep the acidity, the pH at around 5.2 during boiling. To do that, the brewer often has to add some acid. It takes only about 15 minutes at 102-105 C. to sterilize and, with normal acidity, to destroy totally all enzymes. There is also some distillation as boiling

⁷ De Clerck, *A Textbook of Brewing*, 1, pp. 257-259, 270, 285; Hough, *The Biotechnology of Malting and Brewing*, pp. 46-48, 58-66.

⁸ Ault and Newton, "Spoilage Organisms in Brewing," p. 175; Hough, *The Biotechnology of Malting and Brewing*, pp. 67-71.

⁹ M. G. Royston, "Wort Boiling and Cooling," in *Modern Brewing Technology*, W. P. K. Findlay, ed. (London, 1971), p. 60.

drives off some unwanted volatiles which might harm the flavor of the beer. A vigorous boil helps as well since the stream of bubbles that comes up from the bottom helps in the coagulation of proteins. The longer the boil, the greater the concentration of wort. That concentration can be increased as well by adding sugars to extend the wort, dilute the nitrogen content and improve flavor. The wort is boiled in a kettle or copper. Though virtually any material can be used for the kettle, copper has long been preferred. The volume of the copper has to be about the same as the volume of the fermenting vessels where the beer goes after boiling. The mash tun on the other hand can be smaller though in some cases and historically the same vessel can be used for both mashing and boiling.¹⁰

The standard additive for beer since the fifteenth century is hops. The boiling serves to extract hop resins. Their principal function is to act as an antiseptic and keep beer from contracting diseases. Louis Pasteur proved the value of hops by heating hopped and unhopped beer to 60 C. and finding that unhopped beer became infected while the hopped beer did not. The original and principal purpose for using hops was their preservative value with the change in taste an added bonus.¹¹ Female hops plants are grown in the presence of male hops plants, in a ratio of about 1 male for each 200 female plants. They twine upward, so need supports. Their rapid growth tends to exhaust soil so hop gardens typically need fertilizing. The female hop cones, the ones used for brewing, are harvested in late August or September, until about 1950 typically by hand. They must be harvested before pollination since the valuable oils are to be found at the base of the female flower and not in the seeds. The cones are then dried in kilns, typically for about ten hours at around 50-60 C., to get the moisture content down from 75% to about 10%. While hops, once dried, can still be used two years or more later it is usual to store hops for two to three months before use in brewing. Hops contain bitter resins, humulones, and essential oils, a complex mixture of several hundred components including various esters, ketones, aldehydes, acids and alcohols. Boiling converts the bitter resins of hops to colloidal resins and isohumulone, necessary if they are to stay in solution and so give beer its characteristic flavor. Boiling too little will mean those oils will not remain in solution. Boiling too much will drive off the essential oils. To avoid loss of the oils the brewer can add the hops near the end of the boiling process or add portions of the hops at different stages in the boiling process. In some cases brewers have added hops dry after they finished boiling the beer. That practice of 'dry hop-

¹⁰ De Clerck, *A Textbook of Brewing*, 1, pp. 302-304; Hough, *The Biotechnology of Malting and Brewing*, pp. 85-86; Royston, "Wort Boiling and Cooling," pp. 60-66.

¹¹ Ashurst, "Hops and Their Use in Brewing," p. 31; Ault and Newton, "Spoilage Organisms in Brewing," p. 179; Pasteur, *Studies on Fermentation*, p. 16.

ping' known in the seventeenth century was abandoned when beer came to be pumped out of barrels to be served. The loose hops clogged the pumps. The optimal time for boiling with hops present is between one and two hours with negative effects on the wort if boiling goes on longer than two hours. There is no doubt, however, that a longer boil means a longer shelf life for the beer.¹²

The type of hops and the quantity used has a strong effect on taste and aroma. Large quantities of hops can obscure poor taste in beer. Hops can be ground before being added which decreases the amount required but does run the risk of damaging taste. After boiling, the hops are removed, usually by passing the liquid through a strainer. As with the spent grains the hops retain a significant quantity of wort, about six to seven litres of wort for each kilogram of hops, and so they can be sparged with hot water to extract some of that vegetable matter. The spent hops, rich in humus and potassium, make excellent fertilizer. The spent hops cones also collect small particles called trub, proteins which coagulate during boiling. To speed coagulation of those positively-charged proteins brewers can add extracts of seaweeds although hops tannin does act as well to clarify the wort and precipitate unwanted material. There is a danger that valuable hop material will be lost in the process of combining with such unwanted proteins.

The wort after the boiling process contains from 2% to 22% extract with the common figure being around 12%. It is the concentration which is measured as Original Gravity. The extract is made up of about 80% carbohydrates, about 10% nitrogenous material, and about 4% minerals. The rest is varying amounts of bitter compounds from the hops, tannin, some coloring matter and a range of organic acids.¹³ It is that wort which passes on to the next stage in the process, fermenting.

Yeast carries out the fermentation. Yeast can not survive at temperatures over 40 C. so the wort is first cooled. Cooling is rapid. Since the wort is vulnerable to infection at 25-40 C. it is best to move the liquid through that temperature range as quickly as possible. Yeast is then added because without the addition spontaneous fermentation will take place. Material also settles out of the wort during cooling. The hot break, formed as the temperature drops, is made up of more than 50% proteins and some hop resins, the latter absorbing copper and iron ions which in turn are toxic to yeast. The hot break is small in quantity, usually some 30 to 60 grams/hectoliter of wort. The cold break, formed after the wort

¹² Sanborn C. Brown, *Wines & Beers of Old New England: A How-To-Do-It History* (Hanover, New Hampshire, 1978), p. 63; De Clerck, *A Textbook of Brewing*, 1, pp. 54-55, 69, 307, 322; Hough, *The Biotechnology of Malting and Brewing*, pp. 73-85; Royston, "Wort Boiling and Cooling," pp. 61, 64.

¹³ De Clerck, *A Textbook of Brewing*, 1, pp. 311-312, 319-324, 523-525; Hough, *The Biotechnology of Malting and Brewing*, pp. 85-88.

falls below 60 C. and rising in quantity as the temperature falls, is made up largely of amino acids. They form a haze as the beer is cooled. Filtration will get rid of the larger particles but after a few days, during fermentation, a haze may form as the smaller particles gather together. Yeasts that ferment in the absence of air produce a better quality beer with more of the aroma of hops preserved, but above all a stronger beer. In the absence of air the yeast reaction produces carbon dioxide and alcohol. The residue from yeast that has acted in the absence of air is also easier to revive and therefore easier to reuse. Some of the effects of fermentation in the absence of air can be achieved by fermenting in deep troughs. Only the surface is aerated while the bulk of the liquid remains out of contact with the air. Deep coolers also decrease the loss through evaporation which in flat vessels can be as high as 10%.¹⁴ The disadvantage with using deep fermenting vessels is that cooling is slowed which increases the chance of disease in the yeast.

Yeast is a living culture and runs the risk of invasion from a wide range of different microorganisms. At the start of fermentation the greatest danger is from coliform bacteria or acetic acid bacteria. Toward the end the danger is lactic acid bacteria along with acetic acid bacteria. If left exposed to the air in the presence of the latter, beer turns to vinegar. Lactic acid bacteria can give a butter-scotch flavor to beer. Coliform bacteria can also generate strange and unwanted tastes.¹⁵ Traditional shallow coolers, square or round made of wood and open with a depth of two to four meters, did allow the trub to settle out to the bottom easily but they were exposed to the air. Windows or louvred openings allowed water vapor to escape but could also let in insects and birds, attracted by the warm humid atmosphere. The animals were a dangerous source of contamination.

Yeast grows by budding, with new cells staying attached to the mother cell after splitting. One cell can produce as many as thirty offspring, in a long chain, in a lifetime. As the yeast grows, feeding on the vegetable matter in the rich wort, the solution becomes more acid, the increase in acidity shown by a fall in the pH from about 5.3 to 4.1. The growth produces ethanol, up to 3-4% of the weight for each unit of volume. The concentration of sugars, amino acids and vitamins falls as the yeast oxidizes the sugars, generating carbon dioxide and water. In this new state there is much less for the bacteria to feed on. Contamination is also inhibited by the greater acidity of the solution. There are some 350 species of

¹⁴ De Clerck, *A Textbook of Brewing*, 1, pp. 333-340, 379-380; Pasteur, *Studies on Fermentation*, pp. 3-4, 22, 347-350.

¹⁵ Ault and Newton, "Spoilage Organisms in Brewing," p. 183; Hough, *The Biotechnology of Malt-ing and Brewing*, pp. 108-110.

yeast which are, in general, of two types. One remains on the top of the wort during fermentation and the other falls to the bottom of the vessel. With the latter type, because of the difficulty of those strains in separating from the mother cell, long chains are formed and they fall, that is unless buoyed up by a bubble of carbon dioxide. Still other strains clump together in masses of cells and then fall because of their own weight. The great variety of yeasts and their common occurrence makes the appearance of unwanted or wild yeasts in breweries a recurring problem, though some of those wild yeasts are needed to produce certain types of beer. It was only in the nineteenth century that yeast was isolated and examined scientifically. Once brewers became aware of what they were dealing with they became very interested in yeasts cultures and in maintaining their purity. Cleanliness and sterility therefore became essential though many brewers had already discovered that hygienic conditions reduced the chances for infection.¹⁶

There are typically two stages to fermentation: a primary stage where the bulk of the fermentable matter is changed to alcohol and carbon dioxide, and a secondary stage where the beer matures. For yeasts that stay at the top, the temperature at the start of fermentation is around 15 C., rising over the following 36 hours to 20-25 C. The surface is covered with yeast foam and carbon dioxide. Over the following 72 hours the beer cools to 17 C. The yeast is then skimmed from the top and after storage at low temperate is filtered to recover any trapped beer, called barm ale. Such a fermentation takes the wort from a specific gravity of 1.040 to one of 1.008-1.010. For beers using bottom fermentation the wort enters the vessel at six to 11 C. The lower temperature means a slower rate of fermentation, traditionally eight to 10 days. The temperature rises slowly over the first three to five days and there is a yeasty foam on the surface. As the temperature goes down, though, the clumps of yeast, which look like the heads of cauliflower, fall to the bottom of the vessel. In such a fermentation the specific gravity of the wort goes from 1.040 to about 1.011. All yeasts change the sugars that have a specific gravity greater than water to carbon dioxide, which escapes as a gas, and to alcohol, which has a specific gravity less than water. The transformation guarantees that the specific gravity of beer at the end of fermentation is less than that of wort at the start.

The speed of fermentation can be controlled by temperature, by the amount of yeast used to inoculate the wort, by the size of the vessel, and by stirring. Large vessels, though less expensive to build for a given quantity of beer, are slower to cool. Agitating the beer by stirring increases the possible sites for reac-

¹⁶ De Clerck, *A Textbook of Brewing*, 1, p. 391; Hough, *The Biotechnology of Malting and Brewing*, pp. 90-104, 123.

tions to take place. Chemicals such as hydrogen sulphide or hydrogen cyanide can inhibit the growth of yeast. Fermentation can also be arrested by the use of some urethanes among other chemicals. The faster the yeast grows, the less likely is infection. Twentieth century brewers typically use high inoculation rates, about 1.5-2.5 grams of pressed weight yeast for each liter of wort. The rate can be dropped somewhat for top fermentation which starts off at a higher temperature and therefore goes on more quickly. The inoculum multiplies four or five fold which is the equivalent of each cell budding two to three times. To grow, yeast needs not only assimilable carbohydrates but also other constituents of wort. Wort contains a wide range of amino acids, other simple nitrogenous material, mineral salts including calcium, magnesium, sodium, potassium, iron, zinc, copper and manganese. There are also vitamins such as biotin, pantothenic acid, inositol, thiamin, pyridoxine and nicotinic acid. In the process of transforming sugars such as glucose, fructose and maltose into ethanol and carbon dioxide, yeast harness only 29% of the total energy. The remainder escapes as heat. A variety of alcohols, in fact, comes from the process and can influence the flavor of beer. Some esters can also be produced along with some sulphur compounds which affect both aroma and flavor. During fermentation, the hop resins are largely eliminated either by the increasing acidity or because they are adsorbed on the surface of yeast cells. That means the beer loses much of its bitter taste. As much as 50% of bitter material disappears in primary fermentation. The beer becomes saturated with carbon dioxide which, if retained in the solution gives the beer a better head and more sparkle. The carbon dioxide that escapes in the brewery can be a danger since at levels as low as 4% by volume in the air it can cause asphyxiation. It is extremely dense and so tends to collect on the floor or below it. At the end of the fermentation process from 70-80% of all the carbohydrate content of the wort has been transformed.¹⁷

Using top fermentation the beer can be fermented in casks, letting the yeast run out of the bung hole during the primary stage. Alternately fermentation can take place in vessels and then be transferred to casks. In both instances the beer can be clarified by adding finings to coagulate yeast and the remaining protein particles so they will settle out of the beer. Then it is ready to be filtered and put in casks. For bottom fermented beers after the 10 to 12 days of primary fermentation the beer is placed in casks or closed containers and stored or lagered for a period of two to three months at temperatures near 0 C. At the end of the storage period it too is ready to be filtered and put in casks. The rate at which the yeast settles out of solution depends on the variety of yeast but also on the reaction between the

¹⁷ De Clerck, *A Textbook of Brewing*, 1, pp. 382, 384, 400-405, 411-412; Hough, *The Biotechnology of Malting and Brewing*, pp. 114-124, 129-130, 132.

yeast and the constituents of the wort. Brewers prefer yeasts with good flocculating power and will even over time try to acclimatize their yeasts to settle out of solution. Brewers do want to keep some yeast in the beer to carry out a secondary fermentation and convert any remaining fermentable matter. That secondary fermentation also diminishes the chance of invasion by bacteria.¹⁸

Coming out of the fermentor the beer can be subjected to a variety of treatments up to a total of six different processes. For shipment and final consumption the beer can have carbonation added, the flavour and aroma can be modified, the color can be standardized, the beer can be clarified, it can be stabilized against haze and flavor change, and against biological change. At its most simple, processing can mean simply delivering the beer straight from the fermenting troughs since it is ready to drink. More typically brewers condition the beer. That allows the yeast and other turbid matter to settle out, allows the beer to become saturated with carbon dioxide, allows the chill haze of residual proteins to precipitate. Conditioning has to be done with minimal exposure to oxygen since too much air will harm the taste. Though it is possible simply to let the beer sit in vessels and have the sediment settle out, the use of additives such as finings along with other actions such as filtering can produce a better quality product with a longer shelf life. A number of other additives can be used to precipitate solids. Isinglass, the dried swimming bladders of sturgeon, was and is popular for fining the beer. The finings, almost pure collagen, cause material to settle out collecting it in something like a molecular net with electrical charges to attract particles. The finings, proteins and lipids that are collected after one to four hours form a coagulum at the bottom of the vessel or cask. If shipped though, that coagulum will go back into suspension so the beer must be left to sit before it can be served. Getting the right combination of finings to work effectively with the yeast, which had its own rate of flocculation, has always been difficult. Some yeast and some fermentable matter always has to be retained for secondary fermentation. Filtering, with the beer passing over a mass of cellulose fibers and particles being adsorbed onto the fibers, eliminates many problems. Modern brewers often cover the filter with kieselguhr, an earth made up of the siliceous skeletons of diatoms, sea creatures of the Miocene period. The kieselguhr on a replaceable filter sheet acts as an especially effective collector of even small particles. Parlite, a volcanic material is sometimes used in place of kieselguhr. Filtering has the advantages of no loss of carbon dioxide, no oxidation of the beer and little danger of infection.¹⁹

¹⁸ De Clerck, *A Textbook of Brewing*, 1, pp. 361-364, 390-397, 403; Pasteur, *Studies on Fermentation*, p. 222.

¹⁹ De Clerck, *A Textbook of Brewing*, 1, pp. 363, 428-431, 447; Hough, *The Biotechnology of Malting and Brewing*, pp. 137-138, 142-147; Royston, "Wort Boiling and Cooling," p. 80.

For packaging, the traditional carrier of beer was a wooden cask. Oak is the best wood, seasoned and made tight at the joints by linseed oil or paraffin. The interior can be coated with a thin layer of brewers' pitch so that the beer does not come in contact with the wood, reducing the chance of infection. The hoops have to be strong since the beer in the cask is under pressure. Casks have two holes, the bung hole in the bulge and a hole in the head, called the keystone, where the tap goes in to draw the beer. Casks need to be washed after use with hot water to sterilize them and prevent infection.²⁰ That is as true of twentieth century metal as it is of wooden containers.

The secondary fermentation that goes on in the cask increases carbonation, that is so long as the pegs in the holes are impermeable. Brewers can add small quantities of sugar to promote fermentation. They often add hop cones or hop oils to the cask as well to restore some of the hop aroma lost in fermentation. Despite the additives and filtering there remains the danger of what trub is left coming out as a haze. In some cases the haze will be permanent and stable. Low levels of dissolved oxygen and ions of heavy metals help to minimize the chance of permanent haze. Alternately, the beer can be brought down in temperature just before final filtration so that tannins will come out of suspension and be caught by the filters.

Additions are typically in small quantities, whether made in the cask or in tanks used for storage before the beer is put in casks or bottles. The storage or lagering tanks in fact are a convenient place to adjust color, aroma and flavor with additives like hop extract or caramel. Compounds such as dextrans and beta-glucans with high local viscosity help the foaming of the final product and can be added too. Since the late nineteenth century one of the last stages of preparation of beer is pasteurization. That can be done in tanks or in the final container. Beer is raised to a temperature of about 75 C for a few seconds to kill any microorganisms. The heating must take place under pressure to prevent loss of carbon dioxide. To keep the beer free from infection it then must go into sterilized containers. There are clear advantages, then, to pasteurizing in the final container. Heating beer to too high a temperature or keeping it at a high temperature for too long can damage its flavor. If there are few contaminants when the beer enters pasteurization then heating can be minimized and the brewer can still be sure that the final product will be free of disease-causing organisms. In casks or in bottles and kept at temperatures of from 10 to 20 C., the beer is ready for delivery to the drinker.

The beer the drinker gets contains something on the order of 400 different

²⁰ De Clerck, *A Textbook of Brewing*, 1, pp. 476-480; Hough, *The Biotechnology of Malting and Brewing*, pp. 135-136, 151.

compounds. The most abundant constituent is water, followed by carbon dioxide and ethanol. There are various macromolecular proteins, carbohydrates, lipids, nucleic acids, and B-vitamins including riboflavin, thiamine and vitamin B12.²¹ It would take some four liters of beer to provide the daily riboflavin requirement and 20 liters for the daily protein requirement of an adult. A liter of beer on the other hand will provide from 300 to 400 kilocalories. "Beer is therefore a calorie-rich beverage but certainly not a balanced food."²²

The making of beer involves a lengthy series of chemical changes in a changing medium. Beers range widely in strength, color, aroma, taste and appearance because of the choices made by brewers in producing beers. Historically the character of the chemical changes may not have been understood by brewers but it is clear that they could identify the critical stages and they did have some sense of the outcome from certain decisions. They were also mystified, undoubtedly, by some results which were totally unexpected, totally inconsistent with their experience. Brewers were involved in a long term search for ways to guarantee the quality of the final product. Often that search took the form of adhering to proven practice but at times it meant striking out and trying new methods, new ways of making beer.

²¹ De Clerck, *A Textbook of Brewing*, 1, p. 533; Hough, *The Biotechnology of Malting and Brewing*, pp. 138-141, 147-155.

²² Hough, *The Biotechnology of Malting and Brewing*, p. 155.

APPENDIX II

MEASURES

Quantities of beer are measured in barrels. The size of barrels varied over time and with the jurisdiction. Though subject to regulation and surveillance by town officials and to efforts at standardization there were still inconsistencies which make measuring the activity of the brewing industry difficult.

A barrel in Hamburg in the fourteenth century, a *Fass*, contained 175 liters of beer.¹ This made it significantly larger than a Dutch barrel. All estimates for Hamburg beer production and shipment are based on the larger Hamburg barrel.

In Denmark in the seventeenth century beer was measured by *laest* of 12 *fade*. The *fade*, or *ton* in turn was made up of 120 *potter*. That would give a figure of about 116 liters for the barrel and 1,394 liters for the last. That made it smaller than the last for salt or grain but larger than that for herring. Those estimates are used for the figures on exports from the Baltic as reported in the records of the Sound tolls.

The Antwerp *ame* was 148.75 liters². The *ame* or *aam* was usually divided into four *anker* and each *anker* had 16 *stoop* so there were 62 *stoop* for each *aam*. A *mengel* was one half of a *stoop* or could be equated with 2 pints. The wine *vat* had much the same divisions in Holland. After 1820 in the Netherlands the wine barrel came to be fixed at 100 litres, so definitely less than a beer barrel.

The exact size of the Dutch barrel, called a *vat* or *ton* or *tun*, is not known but if all other figures are to be believed it was between 100 and 160 liters. The Haarlem barrel or vat was 88-91 *mengelen* or about 113 liters and so smaller than the sixteenth century Amsterdam barrel of 155 liters³. There were also half barrels, quarter barrels and one-eighth barrels. Governments preferred that smaller units be avoided since it reduced the accuracy of taxation. Distinctions were made in some cases between the *smalvat* of some 124 liters and the *grofvat* of *volle ton* of about 155 liters.

Publicans served beer by the *kan*. There were 80, 100 and sometimes 112 *kan*-

¹ Huntemann, *Das deutsche Braugewerbe*, pp. 14-15.

² Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, p. 63.

³ Doorman, *De Middeleeuwse Brouwerij en de Gruit*, p. 63; Doorman, *De Haarlemse brouwindustrie voor 1600*, p. 58.

nen to the barrel. That put the *kan* at from about 1.4 litres up to almost two litres. The publican could also sell by the smaller, though not that much smaller, *mengel*, and by the definitely smaller pint which was of the order of 0.50-0.65 litres.

For the sake of uniformity and to avoid unnecessary confusion the Dutch barrel is assumed to be of 120 liters up to and through the sixteenth century, with any exceptions noted. For figures for the size of brew produced by Doorman⁴ he is able in most cases to distinguish with some consistency among the various sizes of barrel. The choice of a standard of 120 liters yields a tendency to overestimate by a small percentage most figures for the fifteenth century but generates a consistency and better understating in some cases of the figures for the sixteenth century. For figures from 1600 on the standard barrel of 155 litres is assumed in all cases for data from Holland.

A barrel of beer in the United States is 31 American gallons or 117 liters, that is approximately equal to a sixteenth century Dutch *tun*. At some 330 American bottles of beer per barrel then 100 liters of beer is equal to about 282 bottles of American beer. The British barrel is of 36 Imperial gallons and so 164 liters. That barrel would be made up of 288 pints of beer. There are 176 pints per 100 liters, each pint containing 0.57 liters.

	<i>Imperial Gallons</i>	<i>American Gallons</i>	<i>Liters</i>
British barrel	36.00	43.23	163.65
American barrel	25.88	31.00	117.35
Dutch barrel	.95	1.32	155.00
100 litres	22.00	26.42	100.00

An English quarter of barley is 448 pounds or 203.6 kilograms while a quarter of malt is 336 pounds, that is 152.7 kilograms⁵. The English quarter of eight bushels is also 290.94 litres or alternately 100 liters of grain is equal to 2.75 bushels.

The specific gravity of wheat was between 0.70 and 0.85⁶ so the figures can be converted from volume to weight and throughout, again for the sake of consis-

⁴ Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, pp. 96-98.

⁵ De Clerck, *A Textbook of Brewing*, I, p. 587; Hough, *The Biotechnology of Malting and Brewing*, p. 161.

⁶ Doorman, *Techniek en Octrooiwezen in Hun Aanvang*, p. 61.

tency, a standard conversion of 0.80 is used for all grains, accepting the small percentage error introduced by using the single figure.

Currency conversions are carried out on the assumption that one Flemish pound was equal to six guilders.

	<i>Grooten Flemish</i>	<i>Pennies Flemish</i>	<i>Stuivers(Dutch)</i>
Pounds Flemish	240	1920	120
Grooten Flemish	1	8	2
Dutch guilder	40	320	20

The Dutch guilder then contained 20 stuivers or stivers and was equal to 320 pennies. The Flemish pound was equal to 20 shillings and 240 grooten. The guilder first appeared in the Low Countries in 1521 as a gold coin. The silver carolusguilder was first minted in 1544. Though an actual silver coin did not come out of mints from 1556 until 1681 the guilder remained a money of account and calculations and transactions were carried out in that mythical currency which had established rates of exchange with existing real coins. The value of the guilder in grams of silver is taken from N. W. Posthumus. The guilder proved to be stable for much of the period from the 1570s through to the First World War and from 1681 to 1914 only underwent one change in the silver equivalent⁷.

⁷ N. W. Posthumus, *Inquiry into the History of Prices in Holland*, pp. liv-lv, cviii-cix.

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