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THE DEVELOPMENT OF THE GLASS INDUSTRY ON THE RIVERS
TYNE AND WEAR , 1700 - 1900.

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List of Abbreviations

CC Books	Newcastle Common Council books, Tyne and Wear County Council Archives
CCB	Isaac Cookson's cash books, 1816 - 1842*
CDB	John Cookson's day book, 1744 - 1748*
CLB	John Cookson's letter book, 1748 - 1765.*
2DE	Delaval Mss, Northumberland Record Office,
DRO	Durham County Record Office
NC	The <u>Newcastle Courant</u>
NDC	The <u>Newcastle Daily Chronicle</u>
NRO	Northumberland County Record Office
PRO	Public Record Office
SDE	The <u>Sunderland Daily Echo</u>
SG	The <u>Shields Gazette</u>
TWRO	Tyne and Wear County Council Archives
UDDP	University of Durham, Department of Paleography
ZCK	Cookson Mss. Northumberland Record Office
ZRI	Ridley Mss. Northumberland Record Office

*See note to list of sources, p. 607.

NOTE:

Throughout the text of this thesis the Thirteenth Report of the Commissioners of Inquiry into the Excise: Glass, 1835(15) XXXI has been referred to as "the 1835 Report", and the accompanying evidence as "the evidence given to the 1835 Commissioners".

ABSTRACT

The subject of this thesis is the development of all branches of the glass manufacturing industry on the rivers Tyne and Wear, including the glass works at Hartley on the Northumberland coast and Seaham Harbour on the Durham coast, during the eighteenth and nineteenth centuries. The account of this development is primarily descriptive and is based on separate, chronological accounts of each of the three branches of the glass industry: flat glass, bottles, and flint glass or table-ware. The fortunes of the individual north-east firms are treated in some detail and the thesis also establishes a broad chronology of the growth and decline of the industry within the region.

There are two major areas of analysis: firstly, the influence of the region's economic structure on the development of its glass industry; and secondly, the effect of excise taxation, between 1745 and 1845, on the British glass industry as a whole (a brief history of the glass excise with particular reference to the role played by north-east glass manufacturers in shaping its legislation, is included).

The main conclusion of the study is that the regional context was a fundamental influence on the growth and decline of the north-east glass industry during this period. During the eighteenth century the glass industry was encouraged by the region's natural resources, its established predominance in the London glass trade, and the presence in the region of complementary industrial and commercial activities. As changes in the nature of glass manufacturing rendered these favourable regional conditions less significant so the north-east industry declined, and its decline can in large part be explained by north-east manufacturers'

continued but misplaced confidence in the region's traditional strengths, and their consequent failure to adapt to the changing circumstances of the industry.

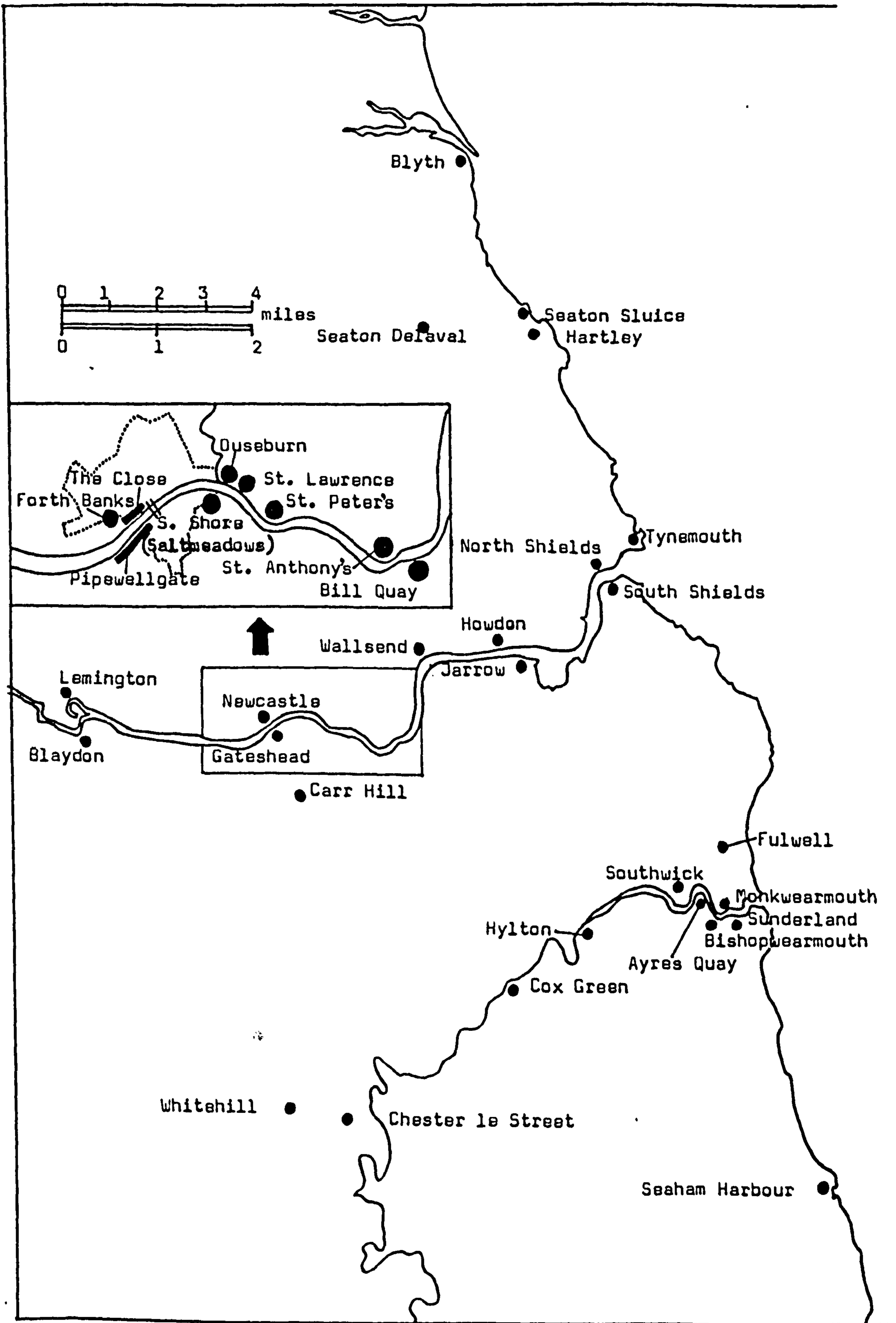


Figure 1 : Map showing places mentioned in the text.

PART I : 1700 - 1850.

CHAPTER ONE: THE NORTH-EAST AS A LOCATION FOR THE GLASS INDUSTRY

In 1835 the Commissioners of Inquiry into the glass excise described the north-east, and Newcastle in particular, as the "principal seat" of the glass industry in Great Britain. The excise statistics provided in the Commissioners' report leave little doubt that the description was a fair one at that time: in 1832 the Northumberland and Durham collections amounted to £310,179 or 41.7% of the total of £748,097 collected on glass in Great Britain; of the 126 glass houses licensed by the Board of Excise in 1832, 41 were in the north-east.¹ Although the north-east was not to retain this predominant position, it seems fair to say that it had been broadly true of the preceding half century; that from the 1780s to the 1830s the north-east was the leading area of glass production in Britain. Although the lack of excise statistics for the north-east collections alone means that this claim cannot be backed up by comprehensive evidence,² what evidence that is available, and which will be examined in detail in the following chapters, consistently supports it. Even when the industry is broken down into its three separate branches the north-east's predominance in at least two of these branches is well supported by evidence. The most important branch of the industry was the manufacture of flat glass (or plate glass, crown glass and broad glass which were all types of flat, or window, glass of varying degrees of quality) and here the predominance of the north-east even in the earlier half of the eighteenth century is in little doubt. As we shall see this predominance was a well established one, being, in large part, a heritage of Sir Robert Mansell's monopoly which had bestowed many advantages on the flat glass industry at Newcastle during the seventeenth century. In 1832 north-east glass houses paid 43.8% of the crown glass duty collected in England, 35.8% of the broad glass duty, and 25.2% of the

plate glass duty. The second branch of the industry, the manufacture of glass bottles, had been established in the north-east much later than flat glass and had enjoyed nothing of the advantages inherited from Mansell. Nevertheless the industry had flourished, had experienced an impressively rapid growth and by 1832 the north-east contributed 63.9% of the English bottle duty. The remaining branch of the industry, the manufacture of flint glass or table-ware, was the branch in which the north-east's claim to national importance is least justified. In 1832 north-east flint glass houses contributed only 17.3% of the English flint glass duty and this represented a comparatively recent spurt of growth in the industry; for the greater part of the eighteenth century only a minimal amount of flint glass was produced in Newcastle and was destined, almost entirely, for a local market.

The various developments of the three branches of the glass industry will be examined separately in the following chapters for in many respects they were quite different types of industrial undertakings, serving different markets, demanding different quantities of capital, and subject to different pressures. The separate branches did, however, have much in common, not least their situation in the north-east and so it is worthwhile to begin by looking at the north-east glass industry as a whole and exploring the broad question of why this particular industry flourished so luxuriously in this particular part of the country throughout the eighteenth century and well into the nineteenth century. What factors in the region were so favourable to the glass industry and to what degree did the particular local environment encourage and influence its growth?

Any answers to these questions must begin by considering the natural resources of the region and the raw material requirements of the glass

industry. There can be little doubt that in respect of natural resources the north-east was a particularly suitable situation for the glass industry. On a direct level the region was able to supply many of the industry's raw material needs. On the indirect level the region's resources gave rise to a particular type of local economy into which glass fitted with ease being complementary to a number of other commercial and industrial activities within the region and this in itself was a source of considerable benefit to the glass industry. The most important natural resource of the region was of course coal, and coal illustrates well both the direct and more complex indirect way in which the north-east glass industry profited from its situation.

Coal was a raw material that the north-east could supply to its glass industry in abundance, but the advantage to the glass industry lay not merely in the availability of coal but in its cheapness. Glass manufacturers within easy reach of collieries enjoyed the considerable advantage of using the poor quality small coal which, if not used for manufacturing purposes, was merely burnt at the pit head. The advantage of using small coal was simply that it was cheap; although the price of small coal varied according to individual circumstances, a reflection of the fact that ^{it} possessed no "market price", it was considerably lower than the market price for the better quality, and saleable, round coals. At Sir John Delaval's Hartley bottle works on the Northumberland coast, for instance, small coal was supplied to the bottle works at 5 shillings per chaldron throughout the last half of the eighteenth century during which period the price of round coal (at the pit head) rose from 12 shillings to 19 shillings: from July to December 1772 the bottle works consumed 1,719 chaldrons of small coal at 5 shillings per chaldron and 49 chaldrons of round coal at 15 shillings; from June 1792

to June 1798 the works consumed 5,411 chaldrons of small coal at 5 shillings and 64 chaldrons of round coal at 18 shillings.³ The low price of 5 shillings reflected the fact that both the colliery and bottle works at Hartley were under the same proprietor. When, in 1813, the bottle works was let to an independent firm the price of small coals rose to 9 shillings, although not without some argument as to what was a fair "market price". Eventually the problem was presented to the experienced colliery viewer John Buddle for his opinion:⁴

Messrs. Harrison who have purchased the bottle houses at Hartley are furnished with small coals at 8 shillings per chaldron by Messers Jobling and Co. who have lately demanded 9 shillings per chaldron which Messers H. think is more than they are worth considering the quality of the coals The proprietors of the bottle houses are to be supplied with coal at "a market price". The question is therefore what is the market price of such coals if a market could be obtained for them?

One interesting possibility about the previous low price of 5 shillings per chaldron is that it may have been fixed according to what the bottle works could afford rather than with any reference to the colliery's costs. This was certainly the case with the small coal supplied to the salt pans at Hartley; in 1781 Delaval was told by his agent that "the present price of salt does not leave more than 3s 6d per chaldron for the coals they consume".⁵ These small coals were identical to those supplied to the bottle houses for when small coals were scarce the pans were left to go idle and only restarted once there was surplus to the bottle works' requirements.

Evidence from other glass houses confirms that prices for small coals, although always remaining considerably lower than the market price for good coal, varied according to circumstance. The colliery owner Walter Featherstonhaugh was said (in 1807) to supply his bottle houses at Sunderland with coal at 5 shillings per chaldron.⁶ Stock

accounts for the Ouseburn bottle houses in 1780 valued their small coal at 9 shillings⁷ per chaldron. As late as the 1840s the Cooksons' crown and plate houses at South Shields were being supplied with coal at 13s⁸ per chaldron.

Cheap coal was perhaps the single most important advantage the north-east glass manufactuerers possessed over their rivals in London who had to make use of the better quality but considerably more expensive round coal bought at London prices. Although the decline of the glass industry in London during the eighteenth century has not been the subject of any detailed study it seems certain that high fuel costs were a crucial factor in this obvious decline: in the late seventeenth century London contained 26 glass houses producing all types of glass, by the time of the 1835 commission only three remained all producing high quality flint glass table ware. The evidence of builders' price books (see fig. 4) shows that throughout the eighteenth century north-east flat glass was consistently undercutting the price of London flat glass and a similar price difference was true of bottles. Even in the flint glass trade where the London houses were, in some degree, able to retain the market for quality goods, the market for goods where low price was a more significant consumer attraction was lost to those areas enjoying low manufacturing costs. An estimate of the cost difference was made during the 1830s by the London flint glass manufacturer Apsley Pellatt:⁹

Mr. Pellatt a celebrated metropolitan glass manufacturer informs us that about twelve pounds weight of Newcastle coal is required to manufacture one pound of flint glass; and that when coals sold in London at about 38 shillings the chaldron and the glass at fourteen pence a pound, the advantage of a manufacturer at the pit mouth might be about three farthings a pound over those of the London manufacturer.

The local glass industry clearly benefited from the availability of cheap coal, but the nature of the relationship was complementary in that coal also benefited from the consumption of small coals by the glass houses. Again Delaval's colliery and bottle works at Hartley provide a good illustration of this and Delaval himself summed up the relationship when he spoke of the "mutual and inseparable profit" between his colliery and his bottle works.¹⁰ He explained this more clearly in a letter to his London coal factor:¹¹

Were it not for my glass works, salt works, copperas works etc. in which I consume annually several thousand chaldrons of my small coals, I could not work the seam I furnish the London market from and send such large coals as I do without a loss that would be insupportable.

An echo of this is found in a letter written by John Cookson, a bottle and flat glass manufacturer, in 1755 intended to give advice to a prospective colliery owner:¹²

If you can have a sufficient quantity of brass lumps no trade will yield you so much profit as making copperas. If you cannot sell your coals otherwise a bottle house may consume them.

*Small coal was an inevitable by-product of a colliery, even one working seams of better coal, and it was clearly in the colliery owners' interest to get at least some return, however small, on it. As a memorandum to the Commissioners of Excise from the Supervisor of Glass at Bristol in 1769 notes, small coal was unsaleable for anything other than manufacturing purposes:*¹³

The proprietors of the coal works acquaint me that if it was not for the glass, copperas and tin manufactories that kind of coal could not be vended for any other use.

Glass benefited from this complementary relationship in that many colliery owners found it in their interests to invest in glass works. Among the many examples of men with interests in both coal and glass are Richard Pemberton and Walker Featherstonhaugh of Sunderland,

Matthew White and Richard Ridley who both owned glass works at Newcastle, Joseph Liddell, the founder of the South Shore bottle house who owned collieries on Gateshead Fell, and Joseph Airey. Many of these men had shares in bottle houses rather than any other type of glass houses and it does appear that bottles was the most attractive branch of the glass industry to the colliery owner. Why was this? It is hard to find a clear answer but there are three possibilities. Firstly that as bottle glass was a dark coloured, poor quality glass it was not devalued by contamination from the sulphurous fumes that were present in small coals. Secondly, furnaces in bottle houses were kept at higher temperatures than in other glass houses and therefore bottle houses may actually have consumed greater quantities of small coal than white glass houses. Thirdly bottle manufacturing demanded less capital than the manufacture of better quality glass and therefore was the most suitable form of subsidiary undertaking for a colliery owner.

A further link between coal and glass existed in matters of trade and transport, and here again it is clear that both industries benefited from the presence of the other; Glass benefited from the extensive opportunities for shipping provided by the coal trade. Although during the seventeenth century glass had been shipped to London in the holds of the colliers (see Appendix 2) by the eighteenth century glass was more frequently shipped to London on its own as a commodity in its own right; however the coal trade still provided valuable opportunities for shipping small amounts of glass to other parts of the country where demand was not so constant. Coal ships benefited in return by being able to carry raw materials needed for the glass industry on their return journeys to Newcastle; notably white sand from Lynn in Norfolk,

or soapers' ashes from London and Yarmouth. Indeed in times of financial pressure these transport arrangements could develop into a convenient barter as, for instance, in 1793 when coal sent from Hartley to Yarmouth was paid for in part exchange by ashes, an arrangement that was initiated by Delaval's agents at Hartley:¹⁴

We wish to have brown ashes in exchange, an article essential for the glass works. We have fixed the price at 14 shillings a chaldron and ready settlement if they send ashes.

As we shall see the main suppliers of soapers' ashes to the north-east glass works were coal merchants.

What of the other raw material needs of the glass industry? Glass at its most simple is silica fused into crystals by high temperature. In practice a flux is added to ease the fusion and strengthen the glass and this usually takes the form of some alkaline ingredient. During the eighteenth century both alkaline and siliceous ingredients varied enormously according to the quality of glass that was required. Both affected the final colour and quality of the glass and this was well understood at the time. The properties of the most commonly used ingredients were set out in a memorandum to the Treasury in 1757 on the subject of the differences in the ingredients used at Stourbridge and Newcastle for flat glass and bottles:¹⁵

	<u>NEWCASTLE</u>	<u>STOURBRIDGE</u>
Bottles	kelp brown soapers' waste fresh ashes Newcastle river sand	kelp brown soapers' waste common sand lime
Broad:	kelp white soapers' waste fresh ashes Yarmouth sea sand	kelp brown soapers' waste common sand common sand
Crown:	kelp, Lynn sand	

All these materials yield a salt except sand. Some afford not only a greater quantity but a whiter and stronger salt than others, consequently when those materials are used or when a greater proportion of such materials are used in the mixture the whiter will the glass be. Kelp yields the strongest salt considerably next the fresh ashes and lastly the white soapers' waste which is much preferable to the brown as they (sic) are produced from Barilla and pot ash and the brown from ashes which are the produce of our own country such as wood ashes. Sand is what gives a body to glass. the smaller and whiter it is, the whiter will the glass be. Small white sand is used for white glass and any coarse hard sand for bottles and common green glass - such is the sand in the Newcastle river and that which is dug out of rocks and banks at Stourbridge, but Yarmouth sea sand, which is of a much better quality was never used for bottles or any other coarse green glass.

The best quality glass was plate glass which, particularly when used for the manufacture of mirrors, had to be as colourless and near perfect as possible. The alkaline ingredient most commonly used in plate glass was Spanish barilla which yielded a purer and stronger alkali than kelp; the ingredients of plate glass listed in a book of 1757 were barilla, salt petre, Lynn sand and cullet (or broken glass which, when added to the batch, eased the fusion of the other materials.)¹⁶ Crown glass, although it was occasionally manufactured with barilla, was more commonly manufactured with Scottish kelp: in 1815 Samuel Parkes listed the ingredients of crown glass as Lynn sand, Irish kelp and slaked lime.¹⁷ This was a more or less identical list to that contained in the Excise memorandum of 1757 as was Parkes' recipe for the poorer quality broad glass, namely soapers' waste and coarse sand. Bottles were also manufactured from a poor quality metal (or the fused and molten ingredients) made from coarse sand and soapers' waste, although in 1815 Parkes noted that at Newcastle bottles were said to be manufactured with a mixture of sea sand and lime wet thoroughly with sea water. Parkes confessed that he could not speak decisively on this as he had doubts whether lime and sand by themselves would be able to decompose salt and produce a suitable flux, but it is clear from several other contemporary references that this method was used by north-east bottle manufacturers.¹⁸

Flint glass was a slightly more complex form of glass than the others in that the metal included oxide of lead or litharge which imparted lustre and refractiveness to the glass. Again a fine quality white sand such as Lynn sand was used but the flux was usually American or Russian pearl ash plus lead in some form. Small quantities of minerals such as manganese or zaffre were also added in order to improve the colour of the glass (see p. 294 for an early nineteenth century recipe for flint glass). Although the ingredients for the various types of glass varied, common to all was the basic method of manufacture whereby the ingredients were calcined (or fritted) and then fused at a high temperature in large clay pots in coal fired furnaces. Broadly speaking then, the necessary raw materials for the manufacture of glass during the eighteenth century were coal, sand, an alkaline ingredient or flux, lead and other minerals, fireclay for pots and furnace stone.

Perhaps the most interesting material to consider, and certainly the one which like coal demonstrates to good effect the interconnections between the various sections of the north-east economy, is the alkaline ingredient or flux. The recipes given above all make use of vegetable alkalis such as kelp, barilla or pearl ash but the rising price of all three, and in particular kelp, created a considerable incentive for glass manufacturers to experiment with alternative forms of alkali synthesised from cheaper substances. North-east glass manufacturers were clearly encouraged in these experiments by the presence in the region of related manufactures which were able to supply cheap raw materials to experiment on; manufactures such as salt, alum, soap and eventually the synthetic alkali industry itself. The relationship between these four industries and the glass industry, centering round their common interest in alkali, are complex but two clear points

specifically concerning glass do emerge. Firstly that the particular character of the north-east's economy encouraged north-east glass manufacturers^{to} explore the possibilities of using a synthetic alkali as a substitute for kelp. Secondly, that their initial explorations were important and perhaps necessary precedents to the early emergence of a separate synthetic alkali industry in the region; it has already been suggested that the location of the alkali industry in the early nineteenth century depended on "the juxtaposition of one or more of the soap, glass and textile industries within a region which was largely treating kelp as opposed to barilla for its supply of natural soda"¹⁹ and the evidence provided here tends to support and amplify this.

The emergence of a commercial synthetic alkali industry in the region was, of course, the establishment of Losh and Dundonald's alkali works at Bell's Close in 1791. Although this certainly was a new departure in the commercial sense, as the first works devoted to the production of alkali for sale to other industries, its novelty in the chemical sense must be qualified in view of the practical activities of glass manufacturers in the same field for at least thirty years previously; Losh and Dundonald's works is arguably better seen not as a new departure but as a natural progression in an existing chain of developments. Indeed this is to some degree implied by what we know of the Bell's Close works; according to R.C. Clapham²⁰ the works was not based solely on Dundonald's own patent for synthesising alkali from Glauber's salt but employed at least six different processes to decompose salt. The fact that six different processes were available and were used "according to the price of the materials at the time" suggests that a body of knowledge already existed on Tyneside and that there had already been some degree of experiment into suitable processes for decomposing salt.

For three of the processes listed by R.C. Clapham, decomposing salt by alum, copperas and by potash, there is no doubt that previous practical experiments had been carried out by glass manufacturers. The emergence of the synthetic alkali industry is a subject of considerable interest and for this reason it is perhaps worth looking in some detail at the activities of north-east glass manufacturers in their search for a substitute for kelp, for the significance of glass in relation to the emerging alkali industry, although certainly acknowledged, has not, perhaps, been fully appreciated.

The early activities of north-east glass manufacturers in this field produced three patents: in 1764 Evan Deer, a bottle manufacturer of South Shields patented a method of manufacturing glass using alum slam;²¹ in 1766 Thomas Delaval, the founder of the bottle works at Hartley patented a "flux for glass";²² in 1780 James King, a partner in the Newcastle Broad and Crown Glass Company patented his "British barilla".²³ These three patents, it cannot be emphasised too strongly, do not represent disinterested enquiries into the problem of producing synthetic alkali in itself but attempts to produce something more specific, namely a cheap flux for glass. Despite the common ground between the three glass manufacturers and other experimenters into the mineral alkali field - men of science such as Alexander Fordyce, James Watt and James Keir -, and despite the fact that Delaval at least could fairly claim to have produced a true mineral alkali, the glass manufacturers were not concerned with mineral alkali as such but only with a mineral alkali sufficiently pure for making glass. Furthermore the glass manufacturers, whatever their degree of scientific knowledge, were entirely motivated by commercial considerations and this is underlined by the fact that all three patents were taken out in periods following a disruption of the Scottish kelp trade.

Evan Deer's patent, for instance, was taken out following a sudden and dramatic rise in the price of kelp in the early 1760s, a rise that is confirmed by letters written by John Cookson, Deer's partner in bottle manufacturing and a crown and plate glass manufacturer in his own right. In June 1763 Cookson wrote to his agent in London asking him if he knew of any correspondants in Carthegena who could supply barilla or salsa since the shortage of home produced kelp was critical: "I never knew kelp so scarce or dear in my life. People are riding along the coast and buying up everything they see".²⁴ His situation was somewhat eased when one of his London bottle merchants found him a supplier of (probably Irish) kelp. Cookson told him to offer £4 a ton for large kelp and £3 10s a ton for small kelp adding that, in his opinion "the great demand for it in making alum has raised it to that pitch".²⁵ According to his letter book, in 1761 the price of round and small kelp per ton had been 50 shillings and 40 shillings respectively.

A similar rise in price was said to have been behind King's patent of 1780. According to the agent of Sir John Delaval;²⁶

On account of some Association raising the price of kelp coming from the Orkneys several glass owners met to consider some substitute for kelp. They at last resolved to make the same flux you now make but before much was done in it James King sent to London and has got a patent for it.

The interest of other Tyneside glass makers in a substitute for the increasingly expensive kelp is confirmed by a petition sent to Parliament in 1780 by Isaac Cookson (John Cookson's son) and Edward Wilson, glass manufacturers of South Shields, against special priviliges being extended to Alexander Fordyce allowing him to manufacture mineral alkali using salt duty free. According to Cookson and Wilson they too deserved this privilege:²⁷

... many years ago (the petitioners) prepared a mineral alkali from sea salt as a substitute for kelp and barilla, sufficiently pure for making glass but on account of the then low price of kelp and barilla and His Majesties' high duty on salt, was laid aside as impractical; and that on the late great advance in price and scarcity of kelp and barilla, the petitioners have again made expensive experiments in preparing an alkali from common salt, they beg for the same exemption and drawback, this will enable the manufacturers to extend their commerce to foreign countries which they cannot at present serve on account of the scarcity and exorbitant price of kelp and barilla.

It is perhaps worth noting in passing a slight hostility on the part of the two glass manufacturers to the - as they no doubt considered Fordyce to be - dilettante in their insistence that glass makers themselves were the best people to prepare their own fluxes as they had the best understanding of what was required (since Fordyce had set up his works in South Shields, virtually next door to their own, their hostility, faced as they were with the prospect of him alone being allowed duty free salt, is understandable). A similar hostility was expressed but with even more force by James King the following year in a letter to Sir John Delaval:²⁸

I suppose this is a scheme of Fordyce's to obtain thereby an exclusive privilege to himself, taking it for granted that none but he has discovered the secret of decomposing the marine acid and rendering it into an alkali. How far he has or has not made this discovery I know not - but this I know to be a matter of fact, that a material has been invented upon this river to flux crown glass, broad glass and bottles and making of alum (sic), for which a patent has been granted, and by which good glass and alums actually been made and at this very instant is making in glass works that I am concerned in as a proprietor.

The commercial impulse behind all three patents is clear. It follows from this that the major question to ask about all three is whether they were commercially effective and did they succeed in providing a cheap alternative to kelp? The patent about which we have the most information is Thomas Delaval's and it is by far the most interesting of the three not least because there is clear evidence that the patent had practical issue and the "patent flux" was made use of at Hartley

bottle works for over 60 years; a licence to manufacture mineral alkali was taken out in 1782 by the then owner of the works, Sir John Delaval, and it continued to be manufactured paying the mineral alkali duty of 20 shillings per ton until the repeal of the salt duties. Unfortunately there is scant detailed evidence in the Delaval papers on the subject of the flux, and in particular exactly what process was used to produce it. Delaval's patent specification was brief and merely mentioned boiling and evaporating ashes, copperas, soot, arsenic, animal dung and salt water, "the proportion of each according to the strength", until the mixture came to a suitable consistency. Basically it appears to have relied on the decomposition of salt by copperas and the flux was patented in conjunction with a separate process by which copperas was used for gunpowder; copperas was manufactured at Hartley and was therefore a comparatively cheap and easily available raw material.²⁹ What evidence there is does suggest that the original method was not rigidly adhered to and the ingredients both of the flux and of the bottle metal (or molten glass) varied according to circumstance; in 1778 during a shortage of ashes, lime was introduced to the metal in place of ashes and eventually it was decided to reintroduce a small amount of kelp instead of the flux and lessen the amount of lime used in order to be "less harmful to the pots".³⁰ The corrosive action of the metal containing the flux on the pots was a constant problem at the bottle works and in 1790 kelp was once again introduced with evident success:³¹

Since the introduction of kelp in part with the alkali in the making of bottles the Pots are found to stand much better and a considerable increase in goods each journey (sic) which affords sufficient encouragement to continue it in use.

That the flux was indeed commercially effective and emancipated the bottle works from the market price of kelp is self-evident from the fact that it continued to be made use of. John Delaval had no doubts on this point and claimed c. 1780:³²

They cannot make their bottles at Shields and Newcastle so cheap as at Hartley by 30% which is in great measure owing to having substituted the Patent Flux for kelp, and lime prepared with sea water (which was never tried till last year) for ashes.

The cost effectiveness of the flux did however depend on the price of kelp and a calculation made in 1775 revealed that once the extra cost of the pots had been taken into account the difference between using kelp and using the flux was not at that time so great:³³

Account of costs, October 14 - November 11, 1775

1st House: To	kelp	@ 60s per ton			
	burnt ashes	@ 22s	"		
	cullet	@ 35s	"		
	sand	@ 3d	"		
	clay cullet	@ 4s	"	£	s
	lime	@ 7s	"	58	15
					9½
	Duties on 979 cwt. 3qr. 19lbs.			114	6
	4 pots set @ 50s per pot			10	0
				183	2
					3¼

2nd House: To	flux	@ 22s per ton			
	ashes	@ 22s	"		
	cullet	@ 35s	"		
	sand	@ 3d	"		
	clay cullet	@ 4s	"	48	18
					3
	Duties on 941 cwt. 3qrs. 8lbs			109	17
	6 pots set @ 50s per pot			15	0
				173	15
					10

The rising price of kelp underlined this difference however and by 1798 the financial advantages of using the flux were sufficiently significant to continue its production despite the inconveniences occasioned by the new salt act (largely because the new Act prohibited the manufacture of mineral alkali and white salt in the same place and up to that date the alkali had been manufactured at Hartley salt pans); Delaval's agent was adamant that the manufacture of mineral alkali must continue,³⁴

We must for the use of the glass houses continue to make the alkali at any rate without which, or kelp, the metal cannot be fluxed, and kelp is this year, I believe, from £5 to £7 a ton.

The basis of Evan Deer's patent of 1764 was alum slam or the sediment of silica and iron oxide left in the alum tank after the alum solution had been drawn off. In the same way that Delaval used a material that was cheap and easily available to him so Deer had easy access to a supply of alum slam through his bottle manufacturing partner John Cookson who manufactured alum at South Shields at a subsidiary of the larger Whitby alum works. Both Deer's patent and the connection between the alum works at Shields and Whitby were noted by Gabriel Jars on his visit to Whitby in 1765:³⁵

The deposit in the tank into which the solution runs from the chaldrons and the sediments in the latter are washed with fresh water and sold to a glass maker who has discovered the secret of making bottles from this material. He has the patent of doing this for fourteen years The alum factory at Shields, eight miles from Newcastle, is a dependant of Whitby. The reason for transporting the liquor to Shields was the rising cost of fuel and coal is more available there.

Both Cookson and Deer also owned salt pans at Shields. Deer's patent is not so interesting as Delaval's in that it did not produce a distinct alkaline substance but merely, as the specification describes, concerned the use of alum slam within the manufacture of glass. According to the patent specification the slam was pounded in a stone trough, mixed with soapers' waste, wet ashes and sea sand then calcined and melted as any other bottle metal would be. According to the Attorney General to whom Cookson submitted the proposed patent in January 1764 this was scarcely a new "invention" and could only be described as "adding a new button to an old coat",³⁶ nevertheless Cookson and Deer thought the method worthwhile enough to be patented in both England and Scotland. Unfortunately evidence on the practical application of Deer's patent has not emerged

however there seems little reason to doubt that it was made practical use of. John Cookson's letter book contains much evidence of the interconnections between his glass and alum interests with alum slam being sold to the glass houses and sandiver (or the scum from the glass) sold to the alum works in return; kelp was also frequently sold from one works to the other.

Finally, James King's patent which, like Delaval's, produced a distinct substance which King named "British barilla". Like Delaval's process, King's involved the evaporation of sea water but the catalysts in his case were pot ashes, bracken, soapers' waste and quicklime; the whole mixture was evaporated and calcined in a reverberatory furnace for two nights. King established his "British barilla works" not near the crown glass works at Newcastle in which he was a partner, but at Blyth on the Northumberland coast where his partner and mentor Sir Matthew White Ridley owned salt pans. Blyth was quite near Hartley which gave Delaval's agents an opportunity to observe him and conclude that his preparation (and Alexander Fordyce's) was similar to their own patent flux:³⁷

King and Ridley had a large pan in a cart went past here to Blyth. Ridley and him is concurred (?) there. Fordyce, the late banker has taken a place called the ten pan room at South Shields where all told he is making something nearly like it for he has ordered pans at Skinnerburn foundry nearly like them used at your works.

We have King's own word that his British barilla was actually used to manufacture flat glass and bottles but unfortunately there are no further details about it or its practical use. In 1781 King and Ridley discussed the possibility of moving the works from Blyth to Howdon Panns on the river Tyne (to land owned by Edward Anderson who also owned the salt pans at Howdon) but this does not appear to have happened.³⁸ Lack of any further evidence about the barilla works makes it highly probable

that it did not survive King's spectacular bankruptcy in 1786 (see pp. 69-70) and by the early nineteenth century the Newcastle Broad and Crown Glass Company were certainly continuing to use kelp as their major source of alkali. It is unfortunate that no further details about King's patent have emerged for at least superficially it appears to be similar to the method patented in 1795 by Dundonald which decomposed Glauber's salt by means of pot ashes, and indeed in that patent Dundonald described the method whereby common salt was decomposed by pearl ashes as "well known".³⁹

Despite the differences in their methods and raw materials, the three patents had one raw material in common, - soapers' ashes or the earthy matter rich in salts left as sediment after the lye had been drawn off. The availability of soapers' ashes on the Tyne was of crucial importance and here, as mentioned previously, the fact that returning coal ships had need of a bulk cargo as ballast was immensely useful. The soapers' ashes used at the Hartley bottle works came from two sources; from Yarmouth through the agency of the boat builders and ship owners, Messers Hurry; and from London from where ashes were sent down either in the returning bottle sloops by Benjamin Harrison, Delaval's bottle agent, or by coal merchants such as Joseph and Sarah Shakespeare who sent ashes in the returning colliers. Of these two sources Yarmouth was the most important in that by the late 1770s the Hurrys had contracted to supply Delaval with ashes on a yearly basis. The price of ashes varied according to availability and the expense of collecting them but throughout the 1770s the price remained around 7s 6d per ton. Inevitably, as the practical use of the ashes became more well known so demand affected both supply and price and in March 1778 the Hartley works was faced with a shortage and an increase in price as Delaval's agent informed him:⁴⁰

Mess. Hurry acquaint me that they have by my desire gone all over the country where soap is made to endeavour to purchase their ashes and that they had succeeded at one place thirty miles from Yarmouth but they have been obliged to remove them when made which makes about 15 pence a ton advanced price more than they buy them for in Yarmouth for your works and for which they are in contract; and have wrote to them this day that we will give the additional 15 pence for bringing them to the port . . . Mrs. Shakespeare writes me that besides the great demand from Scotland there is a saltpetre works at Chelsea that are (enhancing?) them for that work which has occasioned a rise in price. With the manufacturers of soap she promises to get all she can at the 7 shillings per ton and when she can buy them cheaper she will charge accordingly.

In May 1779 the shortage was still critical and Delaval was informed of another rise in price:⁴¹

Mess. Hurry write me that the Newcastle glass proprietors are again offering the soapers their own prices to let them have their ashes but that they will prefer the Hurrys for another year on an advance of 1 shilling per ton which I think we must comply with for the quality of their ashes.

By July the following year however, the shortage was over:⁴²

We now have a very great stock of soapers' ashes upon hand. Mrs. Shakespeare sent us several cargoes the best brown (wood) ashes that the workmen ever saw. I have wrote to her and Lynn to stop sending more at present. We have 1,400 tons on hand and a few coming by the bottle sloops, also from Yarmouth as we contract for them by the year with the Hurrys. We have more brown ashes than blue which is a great advantage.

From the evidence of his letter book John Cookson was also supplied with ashes from London and East Anglia and an interesting confirmation that the value of soapers' ashes consisted of their high salt content can be found in a letter of March 1768 to a supplier of ashes, Caleb Webster (perhaps of Norwich), in which Cookson complained that the ashes in the most recent consignment did not appear to contain as much salt as those formerly sent.⁴³

It has often been pointed out that the particular value of soapers' ashes lay in the fact that they provided duty free salt. Although this is certainly a reasonable conclusion for the period

until 1782, it must be qualified for the period following the salt act of 1782, at least for glass manufacturers, to whom the act allowed the privilege of using salt duty free for the purposes of manufacturing a mineral alkali or a flux for glass. That the effect of the salt duties on glass manufacturers was indeed minimal from 1782 onwards is clearly illustrated by the Delaval papers. Certainly after 1782 Delaval found himself able to use salt for his flux duty free on payment of a mineral alkali duty of 20 shillings per ton and although there is no clear evidence on this point it seems possible that previous to 1782 Delaval had been avoiding the salt duty altogether by reason of using sea water rather than manufactured salt; this possibility is to some degree supported by the value of 22 shillings per ton put on the flux in 1775 (see p. 16), and also by the fact that the passing of the 1782 act apparently caused an increase rather than a decrease in the salt officers' authority over the production of the flux,⁴⁴

On Monday last the collector of the salt duties informed us there was a duty of 10d a bushel on salt and that there was also a duty of £1 a ton on all fluxes or any kind of chemical preparations made from sea water, salt wells or rock salt used as kelp or barilla substitutes in the making of glass. He also said the place where the same is made and also the place where laid or deposited must be entered to enable the officers to survey and inspect the same in such a manner as they do the salt pans; that the penalties are £500 and licenses are to be taken out by the proprietors at the Commissioners' Office for the salt duties. We have at present and until we have your directions for the same shut up the flux house as there is a good stock on hand.

The salt act of 1786 which is often misinterpreted as removing the mineral alkali duty altogether in fact made an exception for glass makers provided they confined themselves to manufacturing a flux for their own use at their own works.⁴⁵ Indeed one of Delaval's agents considered that the act, if anything, benefited him by prohibiting the use of foul salt for any other purposes.⁴⁶

I am much inclined to think that the abuses complained of in the said act will rather forward than hinder your Lordships obtaining

leave to use the said foul salt, as the reason assigned for the said act was that foul salt, which was sent a great way into the country under pretence of manuring land was refined and used as good salt. Now as your Lordship can have all the use of that foul salt when applied as flux for glass (done in the presence of the salt officers) the danger to Government of it being substituted for good salt is totally (removed?) and further, as the benefit to the Government of having so much duty added to the revenue by your Lordship, being the first founder of this flux for glass, I think your Lordship is entitled to the above and every other indulgence of the kind.

The 1798 salt act restated the unique privileges granted to glass makers with two additional encouragements: firstly that the £5 mineral alkali licence was no longer necessary, and secondly that glass makers were permitted to take salt directly from the warehouses in order to make their fluxes. This act could be said to have marked the firm beginning of a separate alkali industry by extending identical provisions to the newly established works at Walker owned by Losh and Dundonald, but it is not often appreciated that the privileges granted to Losh and Dundonald in 1798 had been enjoyed by all glass manufacturers since 1782 and exclusively since 1786. How many glass manufacturers availed themselves of the opportunity to use duty free salt for the production of mineral alkali is not certain but judging from Samuel Parkes' comments in 1815 many did not, valuable though the concession was:⁴⁷

Before we proceed further on our subject I wish to inform my readers that for the production of the soda the glass manufacturer is allowed common salt free of duty; which is a circumstance of considerable importance, especially as I have reason to believe that there are several glass makers in the Kingdom who are not aware of their privilege in this respect. Every manufacturer of glass is entitled to this allowance whatever the species of glass may be which he is in the practice of manufacturing It appears to me that every glass maker should prepare his own alkali because he has the exclusive advantage of a draw back of the whole of the duty on the salt employed, amounting to £30 per ton and he will then have a more suitable alkali for his business; and considering the soda will saturate more silex than potash the saving will be at least 30 or 40% on the alkali consumed (the maker of mineral alkali for glass will have a duty of 20 shillings per ton to pay on the whole of the soda produced but as he has the liberty of finishing his process before the duty becomes chargeable he may continue to pay only upon the pure alkali, which will amount to a very trifling impost).

Parkes included in this section a detailed description of the method of decomposing salt solution with potashes in order to produce carbonate of soda. This must have been reasonably well known amongst glass manufactureres since in 1813 an Act of Parliament was passed permitting glass manufacturers to dispose of the muriate of potash disengaged by this process to alum manufacturers, on payment of 20 shillings a ton duty.⁴⁸ It was also described by R.C. Clapham as the "chief process" used by Losh and Dundonald at Walker and it was also the process used at the plate glass house at South Shields until 1832 when "carbonate of soda of commerce at half the price was substituted".⁴⁹

Can one distinguish any precise effects that the early activities of glass makers in their search for a substitute for kelp had on the emergence of an alkali industry in the region? Or is it only possible to draw the broad conclusion that their activities created a fertile climate of experiment out of which the alkali industry naturally developed? Unfortunately precise evidence is lacking: there is no evidence of any exchange of knowledge between, say, Delaval and Dundonald, nor does there appear to be any detailed chemical evidence from which to draw conclusions about the similarities, if any, between the various patented methods. Nevertheless the broad conclusion is perhaps sufficient for this argument namely that the glass industry enjoyed a complementary relationship with other industrial and commercial activities in the region.

For the period after 1798 however, more precise conclusions can be drawn about the mutually beneficial relationship between glass and the alkali industry. The emerging alkali industry clearly benefited from the presence of the glass industry in the area, firstly as a customer for its products and secondly as a source of capital and enterprise.

Although in theory the fact that glass makers were able to manufacture their own alkali reduced the potential market for commercial alkali, there is evidence that Dundonald's alkali was made use of by local glass makers; the Northumberland Glass Company and R.T. Shortridge & Co. (both flint glass manufacturers) advertised in the local papers in 1797 that they had found Dundonald's pearl ash to answer as well as foreign pearl ash for flint glass⁵⁰; the plate glass works at South Shields was also said to have used Dundonald's soda in place of barilla.⁵¹ Perhaps a more important benefit to the alkali industry however was the fact that some glass manufacturers chose to extend their industrial activities by establishing separate alkali works. The best example of a move from glass to alkali is Isaac Cookson jr. a partner in the plate and crown glass firm of Isaac Cookson & Co. Cooksons certainly made use of the privilege of manufacturing soda at their glass works in South Shields and during the late eighteenth century were said to have used copperas to decompose salt.⁵² The firm later used a process passed on to them by Losh's partner, Thomas Doubleday. In 1822 Isaac Cookson jr. and William Cuthbert jr. established a completely separate soda works at Templetown in South Shields. Although this was established using the Le Blanc process the works was not successful until certain improvements were introduced by Robert Rough (the manager of Cookson's plate warehouse in London) following his visit to a number of French chemical factories. In 1828 the works were moved to a larger site and became the Jarrow Alkali Company. Both Cookson and Cuthbert remained partners in the South Shields glass works which ceased manufacturing its own alkali in 1832.

Another example is Charles Attwood a London glass dealer who purchased a crown glass works at Gateshead in 1831. It seems more

than likely that Attwood availed himself of the privilège of manufacturing soda at his glass works since in 1817 he patented a method of manufacturing crown glass using carbonate of soda instead of kelp and followed this up with a patent in 1819 for a mode of manufacturing mineral and vegetable alkali. Attwood's first patent, as we shall see in more detail in the chapter on flat glass, was a considerable advance in the glass chemistry of the time since crown glass, unlike the pure soda plate glass, was not naturally suited to the use of pure soda. Although Attwood's method retained a certain part of the kelp, the earthy insoluble residue, he laid the foundations for further developments which finally succeeded in doing away with kelp altogether. According to R.W. Swinburne Cooksons played a major part in these later developments:⁵³

The analytical examination of this insoluble portion of kelp was undertaken in 1829 by the employes (sic) of a large crown glass manufacturer of South Shields, with the assistance of the late eminent Dr. Turner of the London University, and after a long series of experiments, most seriously impeded by the excise duty and regulations, it was discovered that kelp in any form might be safely abandoned, and that better results with a great saving could be obtained by the use of lime and carbonate of soda than by kelp or any of its expensive preparations.

Attwood, like Cookson, eventually established his own separate alkali works at Friar's Goose near Gateshead, and took out a further patent concerning the manufacture of soda in 1833.

Partly as a consequence of Attwood's patent, other crown glass manufacturers were not able to follow his lead until c. 1830 when the use of carbonate of soda and later sulphate of soda in the manufacture of glass of all types became widespread. Many larger glass manufacturers established their own alkali works, for instance R.L. Chance & Co. of Birmingham did so in 1834, but it is quite interesting to note that for a small period around 1830 Isaac Cookson and William Cuthbert, as the Jarrow Alkali Company, were supplying soda

to many of their glass making rivals.⁵⁴ A particularly large customer was R.L. Chance who first purchased a parcel of soda in April 1828 and by the end of the year had purchased soda worth £1,215. He continued to be one of the Jarrow Alkali Company's best customers purchasing £1,850 worth in 1829, £1,528 in 1830, and £1,548 in 1831. Other crown glass manufacturers to purchase soda from the Jarrow Alkali Company were William Richardson & Co, in 1827, the South Tyne Glass Company and the Edinburgh and Leith Glass Co. in 1828, Lucas Coathupe & Co. of Bristol and the Sunderland Glass Company in 1831. None of these firms made large or regular purchases but the benefit to the local glass works of having a convenient source of alkali in the region must have increased as the use of soda in glass became more common place.

What of the other raw materials needs of the glass industry, namely pot clay, furnace stone and minerals? The north-east was fortunate in possessing extensive deposits of a wet sandstone suitable for lining furnaces with; furnaces usually had to be rebuilt every eight months. The north-east furnace stone appears to have been particularly well suited to its purpose. In 1663 Christopher Merrett, in his annotated translation of Veri's "Art of Glass" had noted that the best furnace stone in England was to be obtained in Durham,⁵⁵ and according to Andrew Ure writing in 1839:⁵⁶

The best stone for building furnaces is fire stone from Cox Green in the neighbourhood of Newcastle. Its quality is a close grit and it contains a greater quantity of talc than the common fire stone which seems to be the chief reason of its resisting the fire better.

During the 1840s the Cox Green quarry was owned by Walker Featherstonhaugh, the owner of the Deptford bottle works at Sunderland and some confirmation of the quality of the Cox Green Stone is found in the fact that he supplied firestone to glass manufacturers in Lancashire.⁵⁷ By the

1870s the Cox Green quarry plus a quarry of similarly good stone at Penshaw were owned by Horn & Scott of the Ayres Quay Bottle Company. During the eighteenth century most of the furnace stones for Delaval's Hartley Bottle Works came from the neighbouring Burradon quarry but in 1790 his agents were fortunate enough to find a suitable seam at Hartley itself.⁵⁸

We have great hopes of meeting with a fire stone in the New Harbour Close for glass house furnaces. Many stones have been used for the teaze holes and stand very well; a working hole has been put in the last furnace a few days ago of this stone and looks very well indeed. More stones shall be put in the next furnace as a further trial (if this answers) before a whole furnace is built with it but there is little doubt of its answering I believe, and if so there will be a considerable saving in expense for the bearing of the stone is trifling and all working stones will be used about the place for one thing or other I expect the Quarrymen will win a furnace cheaper here than was done at Burroden on account of the situation.

The Burradon quarry was owned by the Cookson family during the early nineteenth century.

The north-east was also able to provide deposits of pot clay but although some use was made of Northumberland clay most north-east glass manufacturers chose to make use of Stourbridge clay, despite the extra expense of shipping it to the north-east. Stourbridge fire clay was exceptionally fine grained and well able to withstand the heat of the furnace. This was a crucial factor in the success of the whole manufacturing operation; as John Cookson put it "no neglect is so fatal as a neglect in the pots".⁵⁹ A seam of clay at Thirston in Northumberland was worked for a while during the eighteenth century but fell into disuse in the 1770s on account of the competition from the Stourbridge clay which was said to be "brought by sea for a trifle as ballast for ships".⁶⁰ Clay from Rivergreen near Morpeth was also made trial of at the St. Lawrence Bottle works in 1778 and 1781 but was only found to answer if mixed with equal quantities of Stourbridge clay.⁶¹

Despite the claim that Stourbridge clay was brought to the north-east for a trifle, evidence suggests that the cost was quite high. During the 1760s for instance the price of Stourbridge clay at Bristol was 35 shilings a ton and the freight from Bristol could be as high as 16 shillings depending on the quantity shipped.⁶² Evidence also suggests that although it was frequently transported as ballast in the holds of timber ships returning to the north-east, it was a commodity of sufficient value to merit being shipped in its own right. John Cookson combined his need for clay with his trade in window glass to Dublin from where the ships would return to the north-east via Bristol picking up a cargo of clay; on one occasion he wrote to his correspondent in Dublin that he would be "obliged" to send another consignment of glass soon as he was quite out of Stourbridge clay.⁶³ The Bristol sea route was also used by Delaval until the opening of the Worcester and Staffordshire canal in 1773 made an alternative route available ^{via the Trent and Mersey canal}. In 1773 Delaval was approached by two Gainsborough merchants, Joseph and Aaron Smith, offering to deliver clay at Gainsborough for 44 shillings a ton; even allowing for the freight from Gainsborough this compared favourably with the cost from Bristol. In 1776 the Smiths, in an effort "to encourage the conveyance of clay this way", offered an even more favourable price of 44 shillings a ton delivered at Hartley. By 1800 the value of Stourbridge clay had risen to 86 shillings a ton but the north-east manufacturers continued to be supplied from Stourbridge and in particular by the firm of Hill and Waldren (who were also glass manufacturers besides clay merchants at Stourbridge). Mr. Waldron made a yearly journey to the north-east in order to collect the sums owed to him.

Minerals were also easily obtainable in the north-east, in particular lead for flint glass and it is not surprising to find some lead merchants becoming concerned in flint glass companies: Thomas Airey, for instance, was a lead merchant and a partner in the flint glass company Airey

Cookson & Co. John Cookson was also a partner in the company and had shares in the company working Fallowfield lead mines near Hexham.

Fallowfield was also the source of particularly pure crystals of

witherite, which was used as a flux in plate glass and like lead imparted a brilliance to the metal.

In matters of raw materials, then, the north-east glass industry was well served by its situation. Many of the industry's raw materials were easily available within the region and the remainder was able to be supplied with ease with the help of the region's other industrial and commercial activities. In respect of raw materials the north-east was a highly favourable environment for the eighteenth century glass industry. There is one further advantage of the north-east that remains to be discussed and that is the region's comparative nearness to the lucrative markets for glass along the east coast and in particular London. The short and cheap sea carriage from the north-east to London was a vital factor in the growth of the industry throughout the eighteenth century. On the one hand, the minimal effect of transport costs on total costs protected the north-east manufacturers' price advantage over London manufacturers. On the other hand, the comparatively long sea journey from other low cost glass manufacturing areas such as Stourbridge and Liverpool protected the north-east from further competition in the London market. The practical problems faced by the north-east manufacturers in the London market - for example the relationship between them and London glass merchants, or the competition from other provincial areas - will be considered in more detail under the separate branches of the industry. However it is worth emphasising here that the north-east manufacturers' predominance in the London market was of vital importance in stimulating growth in the north-east industry.

As we shall see there can be little doubt that the connections between the north-east glass industry and the London glass trade were exceptionally close. Many north-east manufacturers considered themselves to be manufacturing specifically for the London market much in the tradition of Mansell. All of the larger firms enjoyed firm connections in the London glass trade and many owned their own warehouses in the capital for retail sale. In return there are several examples, during the early nineteenth century, of London glass dealers purchasing shares in north-east glass houses.

This chapter has attempted to look in the very broadest of terms at the reasons why the north-east proved such a favourable location for the glass industry throughout the eighteenth century and until the period 1830 - 1850. The reasons can perhaps be summed up in three points. Firstly, the north-east was an area of low manufacturing costs thanks largely to the availability of cheap coal and other raw materials. Secondly, the growth of the glass industry within the region was encouraged by the particular character of the region's economy; glass was complementary to other industrial and commercial activities and this not only benefited it in matters of raw materials but made it an attractive investment for local capitalists. Thirdly, thanks to the easy sea carriage to London, the growth of the industry was greatly stimulated by the rising demand for glass in the London market, a demand that the north-east was able to exploit to the full. The combination of these three points provided the north-east glass industry with natural advantages that few other areas, if any, could match. With entrepreneurs in the north-east able to exploit these natural advantages it is hardly surprising that the local industry should have experienced a steady growth (see Figure 2) and should have reached

national predominance by the 1830s. This position was not to be maintained and after 1850 the north-east industry experienced a decline that, by reason of its speed, was more spectacular than its growth. If the growth to 1830 can in part be explained by the region's natural advantages it should perhaps also be said here that its decline can in part be explained by the undermining of these advantages by changes in the glass industry and the glass trade. The development of gas fired tank furnaces, for instance, cancelled out the simple connection between low manufacturing costs and cheap coal. The improvement of inland transport nullified the north-east's advantages of cheap sea carriage to London. The increasingly large capital demands made by the glass industry in the last half of the nineteenth century proved, in many cases, more than the local private capital market could supply. These changes were not only to remove the advantages enjoyed by the north-east for so long but were to place those north-east manufacturers unwilling to adapt to them in an increasingly disadvantageous position.

Figure 2: Number of glass houses at work in the north-east and in England, 1700 - 1832.

Date	The Tyne and Hartley				The Wear			TOTALS		
	Broad	Crown	Bottle	Flint	Plate	Bottle/Broad	Crown	Flint	North-east	England
1700	5 or 6*	-	2 or 1*	1	-	3	-	-	11	-
1732	6	1	5	1	-	3	-	-	16	-
1745	6	2	6	1	-	3	-	-	18	47
1775	4	2	8	2	1	3	-	-	20	c.66
1800	4	7	10	4	1	3	1	-	30	82
1811	11		11	7	1	4	2	1	37	102
1825	2	12	11	6	1	7	2	1	42	32
1832	1	12	11	7	1	6	2	1	41	102

*it is not clear if the Bill Quay house was manufacturing bottles or broad glass at this time.

(The figures for England are taken from Licence returns (see Fig. 22) and, pre 1785, from PRO CUST 48/17, 282 which states that the number of licenced glass houses in England had increased from 47 in 1746 to 66 in 1767. The local figures are partly based on John Houghton's list of 1696, lists in the CC Books of 15 June 1832 and 27 September 1842, figures in several local histories and the excise returns for 1832 reprinted in the 1835 Report.)

CHAPTER TWO: THE MANUFACTURE OF FLAT GLASS

It is arguable that during most of this period flat glass manufacture in the north east was a national industry that happened to be located in the north-east rather than a purely local industry and therefore that it is more suitably analysed on a national scale. To treat the north-east's flat glass industry narrowly, purely within its local context, would certainly be foolish in view of the industry's obvious national importance; an importance that is easily seen by even a casual look at writings on building and architecture from the seventeenth century onwards. An early commentator on building materials was Sir Roger Pratt, Charles II's commissioner supervising the rebuilding of London after the Great Fire, and he wrote in 1660 "the best glass that we have here of our own is that of Newcastle".¹ Nearly two centuries later the architect Peter Nicholson wrote "The colour is one of the most important considerations in estimating the quality of the glass; and on this account chiefly the glass manufactured in the vicinity of Newcastle is most esteemed in the market".²

Although the case for approaching the north-east industry from a national view point is a sound one, nevertheless there are both difficulties and dangers in such a comprehensive approach. Firstly the task demands a knowledge of the development of other glass making areas in England, plus a knowledge of the London glass trade, equal in detail to that of the development in the north-east. Secondly, by analysing the north-east manufacturers on a national scale there is a risk of treating them as one homogeneous group; of emphasising their similarities at the expense of their differences. From the broad national view point all north-east manufacturers could be said to have been working under identical conditions with equal advantages of cheap

fuel and water transport. Yet this view would not do justice to the considerable internal differences between the individual firms.

A less ambitious but equally valid approach, adopts a much closer view point and sees the development of the glass industry in the north-east as primarily the development of the individual firms that made up the industry. The advantage of this approach is that it recognises the internal differences between the various firms and the crucial influence these differences exerted on the firms' varying rates of growth. The growth of the firm is the major theme of this approach and in this particular study is a particularly rewarding one since it helps to answer many of the questions that emerge from the evidence: why, for instance, did the Cooksons's firm outstrip its rivals in terms of size? Why did only three firms survive the turbulent decade of the 1840s? These and similar questions can only be answered by examining the idiosyncratic characteristics of each firm such as the size of its capital and the abilities of its owners and workmen.

An ideal study of the north-east flat glass industry would succeed in treating the national and local contexts of the industry in equal detail. However this ideal is a somewhat unrealistic one for the present study and it must be said at the beginning that this study approaches the subject from the more local view point and treats the subject primarily as a study of the individual firms, their internal organisation and growth. The national glass trade is not of course ignored but the sections concerned with national factors inevitably rely on secondary sources and isolated examples rather than a comprehensive and detailed body of evidence. In short, this study does not attempt to analyse the development of the flat glass industry in Great Britain

even though during most of this period the flat glass industry in the north-east constituted the major part of the national industry.

The natural starting point of this chapter is the foundation of the two companies that made up the whole of the eighteenth century industry in the north-east and provided the model for others to follow: The Newcastle Broad and Crown Glass Company, which was founded by a deed of trust in 1729, and the company associated with the Cookson family, which was founded in 1738 as Cookson & Jeffries. Before turning to these companies however it is necessary to say something about the national glass trade in the period leading up to their foundations, in particular the period following the surrender of Mansell's patent of monopoly in 1642. Certainly in the case of the Newcastle company, its foundation was more of a reaction to events of the recent past than an ambitious enterprise with an eye to future profits.

1. Mansell and the post-monopoly period

The period of Mansell's monopoly has been chronicled and analysed in admirable detail by Eleanor Godfrey,³ but some of her points need to be repeated here in order to bring out the particular situation of the north-east houses. Broadly speaking, the monopoly - at least in its initial thirty years - was an invaluable encouragement to glass manufacturing in England for it significantly accelerated the transformation of a medieval craft into a modern industry. The three most important achievements of the monopoly in this respect were; firstly, that it led to the separation of capital and labour in glass manufacturing; secondly, it made possible the transition from woodburning furnaces to furnaces fired with coal; and thirdly, by increasing production it encouraged a wider market for glass than it had hitherto enjoyed. These were all important stimulants to glass manufacturing but there was another aspect to the monopoly and one that was far less of an encouragement to the infant industry. Although creating the potential for further growth, the monopoly, by its very nature, proved a severe restriction on that growth by minimising competition and discouraging the entry of new capital into the industry. This double effect, the establishment of an infant industry and the restriction of its further growth, can be seen quite distinctly in the flat glass branch of the industry where the period saw the establishment of the industry at Newcastle and the failure of any other area in England to develop flat glass manufacturing on a comparable scale. There was no competition and growth was limited to one area alone.

The kernel of Mansell's flat glass industry was the three large furnaces he erected at Newcastle, all of which were said to be fully operational by 1617. These Newcastle furnaces were in effect the old London furnaces relocated to an area of low costs, low fuel costs in particular, which enabled them to function economically. They were intended specifically to supply the London market which, as might be expected, constituted the largest single source of demand for window glass. Mansell did not directly prohibit the establishment of furnaces in other parts of the country, in fact to a certain degree he encouraged it and leased out the privilege of working his patent to glass makers in the midlands and north-west of the country with the intention that they should supply window glass to those areas of the country that did not enjoy convenient water transport from Newcastle. The rent he charged was a remarkably low £60 per annum. However whilst not directly prohibiting the development of flat glass manufacturing in other areas Mansell effectively restricted its growth by dictating the market conditions in favour of his Newcastle houses. The semi-independent houses were not permitted to sell glass in the lucrative markets of London and the east coast towns, nor were they allowed to sell at a competitive price for they were to sell their flat glass at 22s 6d per case at the furnace door which was the same price that Mansell charged in London for Newcastle glass after transport from Newcastle. Thus Mansell ensured that the most profitable markets were reserved exclusively for his own houses.

The situation that resulted from these conditions was a flat glass industry heavily centred in Newcastle. In 1624, according to Mansell, the total number of flat glass houses in England was nine, of which his three at Newcastle were certainly the largest and most

capitalised. Mansell claimed to have spent over £2,000 at Newcastle erecting not just the glass furnaces but store rooms, warehouses, dwellings for the workmen and two of the six quays on the Tyne. Besides this initial capital expense there was the cost of the "fourty sayle of ship" employed in transporting the glass to the capital and the cost of its distribution there. There is no evidence at all that any of the semi-independent houses approached this scale of investment. Nor is there any evidence that the total number of semi-independent furnaces had increased by the end of the monopoly in 1642 which, considering their unsatisfactory position of having to supply their own capital, take all risks upon themselves and yet operate under Mansell's dictates, is hardly surprising.

Another aspect of the monopoly period should be mentioned here - the glass trade in London. Like the pattern of production that was established during this period, the pattern of trade that was established in London was to influence the subsequent development of the industry. The London glass trade centred on the members of the London Glaziers' Company whose power to control the practice of their trade, like that of many other trade guilds, had waned during the seventeenth century as glazing increasingly came to be practised by other tradesmen such as plumbers and house carpenters. By collaborating with Mansell however they regained some of their lost authority, not so much by controlling the practice of their trade but by controlling the supply of its raw material - the glass itself. The practice established in Mansell's day was for the glass to be shipped to London in uncut slabs, distributed to some of the wealthier members of the Glaziers' Company who would then cut the glass up into usable squares and act as glass merchants for the small glaziers in the city and the surrounding countryside. This

practice tended to produce an alteration in their roles; instead of being working glaziers the leading members of the Glaziers' Company became glass merchants or "glass cutters" which is how they were most usually described. The importance of the London cutters in the London glass trade was to last until the nineteenth century. A good description of their function is to be found in Richard Neve's The City and Country Purchaser of 1724 in which he clearly describes how the country glazier sends up to the London cutter an exact draft of the amount and dimensions of the glass he requires and the cutter cuts it out accordingly "so that it shall fit each window though he be forty miles remote from it as well as if he were by it".⁴ In some respects the cutting of the slabs of glass into squares economically was a more skilled job than the actual fixing of the glass into the window frames and it was into this one highly skilled aspect of their work that the London Glaziers' Company retreated.

It is still fair to say that the monopoly period was one which saw a great encouragement to glass manufacturing in England but from the national point of view this must be qualified by the fact that the infant industry that was established was a highly unnatural one with the production of glass controlled by a monopoly and its distribution in the major market controlled by a guild company. Altogether, the industry possessed the potential for further growth and yet this growth was inhibited by restrictive market conditions and the discouragements to new capital entering the industry. From the point of view of the north-east, the achievements of the period need no such qualifications. Locally it was an extremely fruitful period which saw the establishment of the industry on an extensive and profitable scale offering employment for hundreds and substantially increasing the trade of Newcastle.

The consequences of the surrender of the patent in 1642 on the industry nationally were to a certain extent predictable; the greater freedom that followed did indeed encourage new entrants into the industry and accelerate the pace of growth. The effects on the glass houses in Newcastle were less predictable for the greater freedom had to be balanced against the loss of Mansell's capital on which the local industry had relied completely plus the loss of the north-east's guaranteed predominance in the London market.

The development of the glass industry in the period that immediately followed Mansell's monopoly has not, unfortunately, been analysed in any comparable detail. This is a pity as the period between the ending of the monopoly in 1642 and the beginning of excise taxation in 1746 appears to be a most interesting one and certainly the period which the industry, free, on the one hand, from the restrictions of the monopoly and on the other from the distortions of the excise, saw its most "natural" growth. Certain broad developments are however clearly apparent from the available evidence. Firstly, and most importantly, the Restoration period saw a rapid increase in the number of glass furnaces working in England. This increase is best seen by comparing the nine furnaces of Mansell's day with John Houghton's figures of working flat glass houses in 1696⁵:

	<u>Crown & Plate Glass</u>	<u>Window Glass</u>	<u>Window glass & bottles</u>
London district	4	-	-
Woolwich	1	-	-
Chellwood, Somerset	-	-	1
Bristol district	-	-	1
Oakengate, Shropshire	-	-	1
Stourbridge	-	7	-
Warrington	-	1	-
Newcastle upon Tyne	-	6	-

From Houghton's table it is clear where the main growth had occurred; in the common green window glass (or "broad glass") houses of Stourbridge and in the crown glass houses of London. There had been some growth at Newcastle but not sufficient to maintain the predominance that the area had enjoyed under Mansell. Looking at these figures with the Newcastle houses in mind, the question that immediately follows is to what degree the growth in the industry in these other areas posed a threat to Newcastle; were the newer houses gaining trade at the expense of the older ones? In so far as this can be answered from the available evidence, it seems likely that the challenge from the new areas was not, at this time, a serious nor a damaging one to Newcastle. The Restoration period was one of rising standards of living and an increased amount of building; in London of course the rebuilding of the city following the Great Fire ensured a constant demand for all building materials including glass. Given this increasing demand it seems fair to assume that no glass house experienced hardship as a result of competition from other areas and certainly there is no record of any Newcastle glass house being laid up in this period of increasing production. However if competition was not yet sufficiently serious to cause alarm, there is no doubt that an element of competitiveness was entering the glass trade. A clear suggestion of competition is found in a petition to Parliament from the broad glass makers of Newcastle in 1696 against the war tax on glass and river borne coals in which they specifically complain that "several other glass works using no water borne coals, they will undersell the petitioners".⁶ This was almost certainly a reference to the broad glass makers of Stourbridge who posed the greatest potential challenge to Newcastle in the production of this particular type of glass.

It was almost inevitable that the lapse of Mansell's monopoly should herald the resurgence of glass making in Stourbridge.⁷ The area possessed natural advantages equal to if not greater than those of Newcastle and in particular the presence of exceptionally fine clay suitable for manufacturing glass house pots from. So well suited was the area to glass making that the original foreign broad glass makers, the families of Henzell and Tyzack who had been brought to England in the late sixteenth century, settled in the area of their own accord. The monopoly had effectively restricted the activities of these foreign glass makers except for those who had been induced by Mansell to move from Stourbridge to Newcastle to staff his own glass houses. Many Henzells and Tyzacks had remained in Stourbridge and in many cases did well in business with the result that when the trade was thrown open they were well placed to provide capital for new ventures. One broad glass house, belonging to Paul Tyzack, had remained in production throughout the monopoly and thus glass making skills were also still in the area. The agreement of 1703 between the broad glass makers of Stourbridge and a Bristol merchant house is evidence that at this date the broad glass houses were largely owned by Henzells, Tyzacks, and other foreign glass making families. In the 1696 petition the Newcastle glassmakers, (Peregrine Tyzack, Peregrine Henzell, John Henzell and Jacob Henzell) had claimed they were the descendants of those glass makers who had first brought the manufacture of broad glass to England, but the same descent, and possibly a more direct one, could also have been claimed by the Stourbridge broad glass makers.

Despite this common family descent there is no indication of any co-operation or indeed sympathy between glassmakers of Newcastle and Stourbridge. On the contrary, the evidence suggests that the Stourbridge

glassmakers, in the early years of the eighteenth century, were making a determined effort to sell in the London market, traditionally the preserve of their Newcastle cousins. They faced the considerable difficulty of the inconvenience and expense of water transport to London and, evidently not being able to finance this operation on their own, appear to have followed a policy of offering their glass at the furnace door at a price sufficiently low to induce London merchants to undertake the transport themselves. To this purpose they advertised in the London Gazette on 10th January 1712, saying that the price of broad glass in London had long been 26s per case but that it was now available at 22s per case from Stourbridge. Further reductions were advertised with glass being offered at 16s a case in 1717. Further evidence of an attempt to displace Newcastle's traditional hold on the London market is found in an advertisement placed in The Postman in October 1709 stating that as the agreement between the Newcastle glass makers and the London glass cutters had expired, tenders for the supply of broad glass to London were invited; to which the Newcastle glass makers replied:⁸

Whereas an advertisement was put in the Postman insinuating that because the contract between the Glassmakers and Glass cutters was expired, the Glaziers could not be furnished with Newcastle glass as heretofore, which insinuation is altogether groundless for that the said glassmakers are as capable as ever to serve the Glaziers either from Newcastle or from their warehouses at London, with as good a commodity and at as reasonable rates: the design of the said advertisement thereof is only the project of some men to make confusion in the trade and to draw in (by specious pretence) men not knowing the true circumstances of the Glass Trade.

These isolated newspaper advertisements certainly do not add up to overwhelming evidence of a serious attack on Newcastle's traditional hold on the broad glass market in London. They do perhaps serve to illustrate that by the early decades of the eighteenth century Newcastle broad glass was not the only type of common window glass available and its

position in the market less well assured; although there is no doubt that because of the convenience of sea transport from Newcastle to London, the Newcastle men were still able, as the advertisement claimed, to provide a good commodity at a reasonable price.

An invaluable account of the different types of glass available to the London house builder in this period is contained in The City and Country Purchaser by Richard Neve.⁹ The second edition of 1726 in particular contains an extremely detailed account of the various types of glass and a comparison between their various qualities and prices. The choice available to the builder was a surprisingly large one: Crown glass (of two sorts, Lambeth or Ratcliff), French or Normandy glass, German glass (of two sorts, white or green), Dutch glass, Newcastle glass, Staffordshire glass, Bristol glass, Looking glass, Jealous glass and Woolwich glass. Of these ten types the German, Dutch, Newcastle, Staffordshire and Bristol glass were similar "common green" or "broad" glasses. There were variations in quality with Newcastle appearing to be the worst in respect of blemishes but the price of all was generally similar; "of about the same price as Newcastle glass". From Neve's comments on the English common glass it is particularly clear that Newcastle was the type most commonly available in London. He has little to say on Staffordshire (or Stourbridge) glass:

This sort of glass which is made in Staffordshire I could never yet learn any certain account of; for 'tis a sort of glass but but seldom used in these parts of the Kingdom.

His entry on Bristol glass is equally brief:

This is made at the City of Bristol; but by reason they have not the conveniency to send it by sea (as they have from Newcastle by coal ships) it is very rare to have any of it in London tho' it be as cheap and better than Newcastle glass .

Presumably the same transport difficulties prevented the Staffordshire glass from reaching London. By contrast, Neve's entry on Newcastle glass is long and detailed (see appendix 2) and there is no reason to doubt his statement that Newcastle glass "is the glass that is most in use here in England".

The best quality of glass available was looking glass, or looking glass plates which were ground and polished before being sold. This, according to Neve, was by far the best quality of glass available with the clearest colour but " 'tis a dear sort of glass" costing as much as 4s per foot. Jealous glass was a type of plate glass that was moulded into patterned squares and used in the lower lights of sash windows "to prevent people's seeing what is done in the room as they pass by". Like looking glass it was relatively expensive, the reason being "the looking glass plate makers do not care to make these sort of squares but only when their pots are almost out and they are a little at their leisure; for they say it wastes glass too much for their profit". In between common glass and plate glass both in price and quality were French and crown glass. French glass was not particularly to Neve's liking; although it was thinner and more transparent than Newcastle glass it was also more expensive, "it used to be of a middle price betwixt crown and Newcastle glass but some say 'tis now (we have a war with France) near as dear as crown glass". Neve reserved his highest praise for English crown glass, particularly that made at Ratcliff which "much exceeds French glass in all its qualifications". Both Ratcliff glass, which was a light sky blue colour, and Lambeth crown, which was slightly darker and greener, were more expensive than Newcastle glass yet Neve at least was in no doubt that the colour of crown glass and its freedom from blemishes made it the most attractive glass in the market.

The establishment of crown glass houses in London appears to have posed a far greater threat to the Newcastle broad glass makers than any attempt at competition from the broad glass makers of Stourbridge. Crown glass was a distinctly different type of glass to broad, manufactured in a different way and using different ingredients which produced a distinctly improved colour and quality. Exactly when crown glass was first manufactured in England is not entirely certain but Neve dates its firm establishment to June 1691 in which month he testified to the qualities of English crown in an advertisement in The London Gazette. According to him the first crown glass was made at the Bear Garden glass house in Bankside and was introduced by an English glass-maker who had travelled to France to learn the French method of manufacturing. On returning to England "he set up making of crown glass and therein much outdid his teachers as Englishmen usually do". Whatever the details of its original introduction are, it is clear that the technique was known in the 1690s and rapidly spread to other glass houses in the London area. By the time Neve was writing it was well established in the market, particularly the products of Lambeth and Ratcliff (the Bankside house had by this time gone completely over to plate glass). Woolwich was another London crown glass house but, according to Neve, "by reason they met with some discouragement in their proceedings there they have laid it down for some time and do not now make it there".

The establishment of crown glass in the market seems to have gone hand in hand with the establishment of a new and, in architectural terms, revolutionary type of window - the sash window. Both sash windows and crown glass date from the last quarter of the seventeenth century; both were taken from continental models and both spread rapidly from the

fashionable south-east to become accepted architectural features by the 1720s (the events most usually mentioned as the significant ones in the introduction of the sash window are its use at Chatsworth c. 1676-80 and at Whitehall Palace in 1685: glass for sash windows was being advertised for sale in the London Gazette in 1686). Before the sash window the typical English window had been the casement window consisting of small diamonds, or "quarries", of glass set in lead in the frame. Inevitably such a window was heavy and thus this method of glazing was not suited to the sash window which demanded lightness. To glaze a sash window glass was cut up into larger squares and fixed into the wooden frame with putty rather than lead. A good account of the difference is found in the description of the glazier's work in Robert Campbell's The London Tradesman of 1747. This also incidentally suggests that the transformation of the London Glaziers from working glaziers to glass merchants was accelerated by the advent of the sash window, the glazing of which was evidently a far more straightforward job able to be undertaken by someone with no special glazing skills.¹⁰

This branch was more employed before the invention of sashes than now; if our house is sashed he has only to put in the panes: he cuts the glass with a small diamond fixed in the end of a pencil and fixes them with putty made of whiting and linseed oil. But as to the garrett windows we must have iron frames made by the smith into which the glazier puts the glass with lead; lead is drawn for their use through an engine which prepares it for them ready to cut into lengths and soldered (sic) together. He buys the glass from the glass house in chests and his profits arise from the difference between the buying and selling prices. This branch of mechanics requires neither great strength nor much ingenuity and is in fact but a poor business.

Besides producing a lighter window, the use of larger squares of glass produced a far more aesthetically pleasing appearance to the building when seen from the outside, and a less interrupted view of the outside from within. The attractions of the sash window were manifold and it was rapidly adopted by English builders with the result that the sash window of twelve panes or "lights" became the standard eighteenth century English window.

Newcastle glass was not suitable for this new type of window and it was usually crown glass that was cut up into the larger sash squares and Newcastle glass that was cut into the smaller "quarries". This was not an absolute distinction and Neve clearly describes Newcastle glass being used in large squares; however it is not hard to imagine that the warps in Newcastle glass would not have fitted it well for sashes. The evidence seems to indicate that on the whole the spread of sash windows throughout the country was inseparable from the spread of crown glass and it is perhaps worth picking out one illustration of this from the north-east itself.¹¹ In 1718 Robert Cotesworth erected a new house for himself near Gateshead. It was fitted out with fashionable sash windows and, although locally made glass was good enough for the kitchen and rear windows, the main facade was glazed with glass sent from London. It is worth drawing attention to this one example as evidence of the size of the challenge posed to Newcastle broad glass by London crown. It must surely have been seen at the time as distinctly alarming that for the first time in living memory window glass was being manufactured in London and sent down to Newcastle instead of vice versa.

The obvious counter to this new and serious challenge was for the Newcastle broad glass makers to establish the manufacture of crown glass in Newcastle. This is just what they did do and we can date the firm establishment of crown glass manufacturing on the river to 1729 when a company was formed, consisting of all the broad glass owners on the river, specifically for the purpose of manufacturing crown glass. Before looking at the 1729 company it is perhaps worth trying to establish exactly when crown glass was first manufactured on the Tyne for the 1729 company was merely the legal recognition of events that had already taken place and it is clear that crown glass had been manufactured on the Tyne for some years previously.

The first apparent mention of locally manufactured crown glass is found in 1715, in the order book of the Newcastle Company of Plumbers and Glaziers when it was ordered that "no brother of this Company shall cut at any time either by himself or by agents any crown or broad glass or other glass for the glassmakers of the glass house in Newcastle".¹² This order was prompted by complaints that the glass makers had been employing their own cutters who were not members of the company and had been cutting glass for home sale. The established practice was that the glass makers were permitted to cut glass into squares or quarries for export but not for the home market, which was the job of the glaziers. These complaints figure frequently in the glaziers' minute books and an especial offender was one William Linton who was a member of the company but employed directly by the glassmakers and, for instance, in 1717 was fined "for cutting crown glass for the makers of the Western glass house very much to the prejudice of the several brothers of this company". Linton was fined so frequently that he was eventually forced to petition the Common Council complaining of unfair treatment from the glaziers. In 1720 the Council attempted to reconcile the two sides by writing a clear definition of each group's sphere of activity into the lease of one of the glass houses:¹³

The free glaziers shall have what glass they have occasion for at 3ls per case, or 1s 6d more than the like glass is sold for at London and when the free glaziers want any glass to send for Scotland they shall have the same for 1s. less than the prices above, applying to some of the principal glassmakers and assuring them that the glass is to be sent to Scotland. And that the glassmakers shall cut no glass for land sale. And that these covenants shall be void if the free glaziers send any glass south of Tynemouth harbour without consent.

Despite this, the quarrel continued until at least 1728 when the Glaziers ordered that "no glazier shall work for the glassmakers till such times that the difference between them be made up and signed by all parties"; this order was withdrawn in 1736.

The main importance of this quarrel in this context is that it provides evidence that crown glass was being manufactured on the Tyne from at least 1715. This crown glass was almost certainly largely experimental and was manufactured in one of the broad glass houses, probably the Western broad glass house. A more serious start to the manufacture can be dated to 1724 in which year a new crown house was erected. The lease to the land on which the Western broad house was built was held by Jane Tyzack, Nicholas Fenwick and Matthew White who in June 1724 petitioned the Common Council for its renewal with the plea that a low toll should be charged on "the crown house intended to be erected thereon".¹⁴ This was the glass house that was to be used by the 1729 company and the deed of trust by which the company was established transferred the lease of the crown house from the three original lessees to the whole company.

To date the firm establishment of crown glass manufacture on the Tyne to 1724-9 fits in opportunely with the date of 1726 which we can give as the date of the adoption of the sash window in the area. In December 1726 the Newcastle Company of House Carpenters petitioned the Common Council complaining of obstruction from another body of tradesmen - the Joiners.¹⁵ The point at issue was who was to fit sash windows and the eventual judgement was that all windows where the glass was fixed with lead i.e. the old fashioned casement window, were to be made by the house carpenters but sash windows of wood where the glass was fixed with putty were to be constructed by the joiners. It seems reasonable to assume that the greater availability of crown glass in the area would have encouraged house builders to construct houses with modern sash windows. It is also worth mentioning that the Stourbridge glass makers appear to have adopted crown glass at about the same time. The earliest

mention of crown glass being manufactured at Stourbridge is when it was advertised for sale from Batchelor's glass house in 1728.

Broadly speaking, the period following Mansell's monopoly seems to have been a period of vigorous growth in the glass industry and a period which saw a significant shift in the flat glass market towards a new and better quality glass. Both these developments posed a challenge to the Newcastle broad glass makers whose houses had been established, and had flourished, under very different circumstances. The events of the post monopoly period created conditions which demanded a new impetus from the Newcastle broad glass makers. This new impetus was expressed in the formation, in 1729, of a company specifically intended to organise the manufacture of crown glass.

2. 1700 - 1790

(i) The Newcastle Company of Broad and Crown Glass Owners

The 1729 deed establishing a company to manufacture crown glass at the newly erected crown glass house was signed by the thirteen owners of the five existing broad glass houses on the Tyne: the western, eastern and middle broad glass houses, the St. Lawrence house and, further down the river at Wallsend, the Howdon Panns house. The partners and their shares in the new crown glass company were:¹⁶

		<u>shares</u>
Matthew White	of Newcastle, merchant	24
Jane Tyzack	of Newcastle, widow	8
Jonathan Hall	of Durham, doctor of divinity	12
Ralph Davison	of London, gentleman	15
Peregrine Henzel	of the glass houses, gentleman	8
James Proctor	of Morpeth, gentleman	8
Jonathan Tyzack	of the Low glasshouses, gentleman	10
Edward Henzell	of Howdon Panns, glassmaker	4
Joseph Henzell	of Bill House, glassmaker	4
Jane Roddam	of Newcastle, widow	11
Elizabeth Tyzack	of Norwich, widow	10
Rachel Colt	of Ouseburn, widow	2
Peregrine Henzell jr.	of the glass houses, glassmaker	<u>4</u>
		<u>114</u>

Two points of interest stem from this deed which, although described as a "deed of trust", must be seen as serving the purpose of a deed of partnership by reason of the fact that it divided up shares among the partners. Firstly it provides a good illustration of the fact that the form business organisation took during the eighteenth century was dictated more by local and individual circumstances than by any one ideal type of partnership arrangement; the 1729 differed from what might be called more typical partnership arrangements and this reflected the peculiar local circumstances surrounding the enterprise. Secondly, the deed was to be crucial to the future development of the company which was profoundly influenced by the size of the partnership and the diversity of the partners.

The 1729 deed differed from more typical eighteenth century partnerships in its perhaps surprising lack of attention to formal detail. No total joint capital was specified, no responsibilities or liabilities defined and no legally binding commitment to the partnership was mentioned for the whole deed had been drawn up after a more informal agreement had been reached; "the undersigned are now in partnership for the making of crown glass and have for that purpose latterly made crown glass at their joint costs and charges". Legally, the deed bound the signatories to only two things. Firstly, to a joint tenancy of the crown glass house, which although built beside the western broad glass house on land leased from the Corporation by Matthew White and Jane Tyzack, had been built at the joint cost of the partners. The partners agreed to pay part of the yearly rent to the Corporation and thus become tenants in common for the remaining years of the lease. The second legal function of the deed was to divide up the shares of ownership and "issue and profits" which, as has already been mentioned, seems to make the deed into a deed of partnership. No evidence of any other deed of partnership between the signatories has been found.

The unusual features of the 1729 deed could be explained as necessary precautions to avoid offending against the Bubble Act which limited the number of partners in a speculative venture to six. There is some truth in this as the company was not incorporated by Act of Parliament as technically such a large partnership should have been. A more immediate explanation, however, lies in the local circumstances of the partners and the enterprise in which they were investing. Most importantly all the partners were already owners of broad glass houses and the new crown glass company was certainly seen as an extension of the broad glass trade rather than a completely new venture. This perhaps explains

the lack of formal detail in the deed since the partners' existing interests must have guaranteed their commitment to the glass trade; and the capital to be advanced may well have consisted of materials, equipment, facilities and workmen rather than a defined sum of money. The size of the partnership should not perhaps be taken as an indication that the initial capital requirements of the venture were, in cash terms, large, rather the opposite, that by including all the owners of the existing broad glass houses, the actual capital requirements were substantially reduced. Not only could the existing broad glass houses provide equipment or facilities, the owners were already well within the network of credit and trust through which the glass trade operated.

This closeness between the crown and broad glass houses on the Tyne must be underlined for although the 1729 company was formed exclusively for the manufacture of crown glass, and the five broad glass houses remained in the hands of smaller partnerships until the nineteenth century, in practice the crown and broad glass owners were identified as, and traded under the title of, "The Newcastle Company of Broad and Crown Glass Owners". The legal separation of the five broad glass houses into five distinct partnerships appears to have meant nothing in practical terms for the owners manufactured and marketed broad glass in common and received remittances as one company of broad glass owners. Even the profits appear to have been divided out on a common basis with, for instance, Matthew White Ridley receiving £192 for his 16/24 share in the western broad house and £96 for his 8/24 share in the middle broad house in 1779.¹⁷ Why the broad glass owners did not formalise this situation into a single company is not known but it may well have been a matter of minimising personal risk in matters of repair or rebuilding. The intimacy of the connection between the broad houses and the crown

glass company is made quite clear by the fact that shares in the crown company appear to correspond to each partner's share in a broad glass house. Thus Matthew White, who owned 16/24 of the western broad house and 8/24 of the middle house, received 24 shares of the crown company: Jane Tyzack's eight shares represented her 8/24 of the western broad house.

The second point that arises from the 1729 deed is the size of the partnership and the diversity of the individual partners, both of which were to have a profound influence on the company's future development. The company was a large unincorporated partnership containing an extraordinarily diverse cross-section of people of varying degrees of wealth and social standing: from a Prebend of Durham Cathedral to the widow of a glassworkman at the Ouseburn; from ex- and future mayors of Newcastle to those who were denied even the freedom of the city by reason of their religious persuasion. These people appear to have been united less by their common purpose as by their common good fortune in finding themselves part owners of a broad glass house. Some of the partners had deliberately bought their way into the glass trade but others appear to have become owners more by chance and circumstance. This lack of common purpose makes it difficult to place the crown glass company into any clearly definable type of business organisation. It was not wholly an undertaking done in the capitalist spirit of "the rationalistic pursuit of unlimited profit" yet neither was it wholly a self protective company in the sense of an old guild Company - the banding together of people with a common interest in one trade in order to protect their livelihoods and to provide security for them and their families. Perhaps the most satisfactory analysis of the crown glass company was that it served in both these roles; it was both an organisation

for profit and a means of protection for the glassmakers and their families. These two roles were not mutually exclusive and it seems reasonable to assume that at its foundation the partners wished the company would both make a profit and provide family security for its members. However as the company developed it became less easy to accommodate both these aspects of the company's nature. Before describing the way in which the company did or did not develop in the eighteenth century it is worth exploring the nature of each partner's interest in glass to bring out the differences between the aspirations and ambitions of the partners.

Broadly speaking we can divide the 1729 partners into three categories: wealthy capitalist merchants who had no traditional family interest in glass; members of the traditional glass making families of Henzell and Tysack who took an active part in the business; and sleeping partners including widows and daughters who played no active role, or if anything a very limited one. Of these three the most significant were the wealthy merchants, Matthew White and Ralph Davison, who represented an important injection of outside capital into the industry. The departure of Mansell in 1642 caused a serious withdrawal of capital from the glass houses and it was not really until the late seventeenth century when an alternative capital source was found in these wealthy Newcastle merchants that the industry fully recovered.

Immediately after Mansell's death several attempts had been made to finance and organise the industry but none with any great success. In 1645 the lease to the old glass houses was taken over by a Mr. Edward Harris from London in partnership with Richard Haynes from Newcastle but their lease was revoked in 1653 on their failure to pay arrears of rent.¹⁸

They were followed by John Hatterhill, William Pollicot and Robert Tainton representing "a company of citizens and glaziers of London" (Tainton and Pollicot were Masters of the London Glaziers' Company at the time).¹⁹ Neither were the glaziers successful and in 1662 their lease to the old eastern and middle ^{houses} was revoked and granted to two glassmakers, Isaac and Peregrine Henzell. This was followed in 1679 by a lease of the western glass house to Henry and William Tyzack and Daniel Tittory.²⁰ There seems little doubt that the leasing of the glass houses to the glass makers rather than London merchants or glaziers marks an attempt by Newcastle Corporation to gain some measure of control over the production of a useful and valuable commodity; into the 1679 lease was written a clause obliging the glass house owners to supply glass to the free burgesses and free glaziers of the town at a certain rate. These leases could be said to have marked the beginning of the interest taken in the glass houses by those in power at Newcastle.

The first appearance of substantial local capital in the industry can be dated to 1684 when the lease to the eastern and middle glass houses were renewed.²¹ In addition to two Henzells (the descendents of Isaac and Peregrine Henzell) four other lessess were named: Timothy Davison of Newcastle, gentleman; John Airey of Gateshead, soap boiler; Peregrine Tysack and John Tysack of Newcastle, both gentlemen. From later documents it appears that they each took 1/6th of the property but a few days later Davison sold 3/8ths of his share to Jonathan Roddam who, like Davison himself, was an affluent Newcastle merchant. The most significant of these newcomers was Davison who, as a governer of the Merchant Adventurers Company and a former Mayor, was a powerful and wealthy figure in Newcastle. Davison soon extended his interest in the glass industry by helping to erect a completely new glass house, the St. Lawrence broad

glass house. In December 1687 a lease was granted by the Corporation to Joseph Tyzack, Peregrine and John Henzell of a parcel of land at St. Lawrence shore with liberty to erect a new glass house.²² Davison almost certainly had a hand in this for five days later the three transferred 1/6th of the property to him. The glass house was erected but, according to a petition to renew the lease in 1720, "a misunderstanding happening among the leasees the glass house fell down some years ago".²³ The petitioners of 1720 were Ralph Davison (Timothy's son), Joseph and John Henzell and Jonathan Tyzack who wished to renew the lease as "the petitioners intend to build a new glass house which will cost them above £300," which they accordingly did. By 1729 Ralph Davison owned at least 1/6ths of the middle and eastern glass houses and 1/4 of the St. Lawrence house.

Three other local merchants were to follow Timothy Davison's example and become involved in the glass industry: Jonathan Roddam, who left substantial shares in the middle and eastern glass houses to his widow Jane, Matthew White and Nicholas Fenwick who both became shareholders in the western glass house c. 1700. The most important of these three was Matthew White who like Davison was a powerful figure - twice Mayor of Newcastle and a governor of the Hostman's Company which organised the coal trade on the river. His son, also Matthew White, added to the glass house shares inherited from his father when in 1727 he bought Nicholas Fenwick's share in the western glass house plus "all his part share and proportion in the glass house now erected and built and employed at Suddick".²⁴ Suddick, or Southwick, was on the Wear at Sunderland and a broad glass house had certainly been erected there during the 1690s.²⁵ It is interesting to discover this connection between Suddick and the owners of the glass houses on The Tyne for

it possibly explains why the Suddick glass house apparently fell into disuse in that it is possible that the house was deliberately closed down by the Newcastle men in order to concentrate the production of broad glass on the Tyne. By 1729 Matthew White owned 16/24ths of the western broad house and 8/24ths of the eastern and middle broad house.

The involvement of men like Davison and White in the glass house held out many advantages for the older owners. In order to maintain the predominance of Newcastle glass in the London market whoever owned the glass houses needed a strong source of working capital to finance the transport of glass to London and this was best provided by men who were already involved in a similar venture, the transport of coal to London. Davison and White could also supply raw materials on advantageous terms (Matthew White's ledger shows that he frequently shipped clay for the use of the glass houses) and in addition an association with men of power and influence proved an advantage in negotiating favourable rents and tolls from the Corporation. The rent of the western glass house charged to the London glaziers in 1658 had been £70 per annum. For the Henzells it was reduced to £60 but in 1710 when Nicholas Fenwick and Matthew White petitioned for its renewal they pleaded that the £60 was "burdensome" and it was further reduced to £50. When this lease was renewed in 1724 they also pleaded for further concessions on the tolls in order "to enable them to manufacture glass at as easy rates as any that have or may attempt to set up any such manufacture without the liberty of the town" which were granted them. The Corporation also granted them an exceptionally long lease of thirty one years but noted that "this shall not be taken as a precedent in granting any lease in the future".

What of the other members of the 1729 company, in particular the Henzells and Tyzacks? It would not be entirely true to class all male members of the families as representing the skilled labour the company required since, although those who are described in the deed as "glass makers" were certainly actual workers in the glass houses, those Henzells and Tyzacks who are described as "gentlemen" almost certainly played a less menial role as managing partners and, like White and Davison, suppliers of capital. Although his family fortune stemmed from glass, by the 1720s Peregrine Henzell was an established merchant and ship owner (a one time master of Trinity House) besides being "the principal person then remaining of his family and one of the chief owners of the glass houses".²⁶ His social standing is reflected in the fact that his son Thomas, who was to inherit his shares in the glass houses, did not go into trade but became an attorney. Less is known of Jonathan Tyzack but he also appears to have been a man of some wealth whose active role in the glass business was a managerial one.

By contrast the female Henzell and Tyzacks played no significantly active role and all could be said to have represented the strong family bonds that existed in both families. Rachel Colt (nee Henzell) had inherited her shares from her father Peregrine Henzell of St. Lawrence. Jane Tyzack was the widow of the Peregrine Tyzack who had held 8/24ths of the western glass house. Elizabeth Tyzack was the widow of another Peregrine Tyzack who had held a large share in the middle and eastern glass houses. Bequeathing shares to widows or daughters with no other means of support was to become, as we shall see, a characteristic of the company which always contained a substantial proportion of sleeping female partners. In this care for the female members of their family the behaviour of the Henzells and Tyzacks was not unlike that

of the Protestant Dissenters and it is probably not surprising that one branch of the Tyzacks should have become Quakers for there are recognisable similarities in the values that both groups were encouraged to hold in order to survive. Like the non-conformists the foreign glass makers formed a close knit and resilient group, conscious of a degree of separateness from the rest of society. Indeed they may to some extent have encouraged this separateness in order to preserve the art and mystery of their craft; even as late as 1785 according to John Brand, "they (Henzell and Tyzack glass makers) will admit none of any other name to work with them".²⁷ This was not strictly true in 1785 yet marriage bonds show that although marriages were made outside the two families by far the greatest proportion was between Henzell and Tyzack. In addition the Henzells and Tyzacks evidently sensed a deep connection between their work and their self-esteem; glass making was a matter of family pride and for that reason industry was always to be encouraged.

The Quaker Tyzacks were represented in the 1729 deed by Elizabeth Tyzack of Norwich, the widow of Peregrine Tyzack who had been one of the six lessees of the middle and eastern glass houses in 1684. In addition to him two of the other lessees, John Tyzack and John Airey, were also Quakers.²⁸ During the 1790s both John and Peregrine Tyzack left Newcastle; John moved to London where he appears to have taken an active role in promoting the glass houses' interests.²⁹

Newcastle cut glass, good and sizeable, may be had by all merchants and others at 13 shillings per hundred foot. Apply yourselves to John Tyzacke at the Glass Warehouse near Old Swan Stairs.

Peregrine Tyzack moved to Norwich where he was unsuccessful in business and died in 1717. All the Quaker shares in the glass houses at Newcastle appear to have been vested in another prominent Quaker, Joshua Middleton, whose name often appears as an owner of the glass houses during the early eighteenth century. On Middleton's death the shares passed to his sister Elizabeth who had married Peregrine Tyzack of Norwich and who thus became a shareholder in the 1729 company. Elizabeth Tyzack, if not playing a significantly active role in the company, at least promoted its interest in Norwich:³⁰

At Mrs. Elizabeth Tyzack's at the sign of the six bottles in St. Margaret's Upper St. is a large parcel of glass bottles now to be sold, and she intends to carry on the said business and will sell them as reasonably as anyone in Norwich being one of the owners of the glass houses in Newcastle.

Her son Peregrine Tyzack was sent back to Newcastle to be apprenticed and eventually act as managing partner in the glass houses. He remained a committed Quaker throughout his life and by the time of his death in 1777 had become a respected merchant with considerable interests besides glass.³¹

The connections of the two remaining partners - Jonathan Hall and James Procter are less easily established. Hall, however, is the best example amongst the partners of a person who had come to be interested in glass by circumstance rather than design. His share in the crown glass company represented the major share in the broad glass house at Howdon Panns that had been established, probably during the 1660s, by Timothie Tyzack of Gateshead, a Merchant Adventurer who appears to have come into a greater fortune than other members of the Tyzack family. On his death in 1684 his estate passed to his widow Elizabeth who made a second marriage in 1698 to Anthony Hall of Durham

from whom the glasshouse shares passed to his brother Jonathan. The Halls were a distinguished Durham family who had provided the city with a number of mayors and aldermen.³² Jonathan had studied at and been made a fellow of St. John's College Cambridge after which he had become chaplain to the Governor of Berwick. In 1723 he returned to Durham to be made a Prebend of the cathedral where he remained until his death in 1743. By his will his "right title and interest in and to the glass house at Howdon Panns in Northumberland and the other glass houses at Newcastle"³³ were left to his nephew Anthony Hall of Wombwell in Yorkshire.

It seems probable that, like Hall, James Proctor's shares in the crown company represented a share in the Howdon Panns glass house since his name never appears on any of the Corporation leases to the Newcastle glass houses. Nothing is known about Proctor, he does not appear to have taken any active part in the glass trade and appears to have sold his shares by the 1760s. The glass house at Howdon, although founded by a Tyzacke and worked by the family of Edward Henzell, remained more independent than the Newcastle glass houses in that it was outside the jurisdiction of the Corporation. Newcastle Corporation did make occasional efforts to control the other glass houses on the river for instance in 1732 the council ordered tolls to be collected from all the glass houses that did not at present pay. This order provides a useful list of all the glass houses working on the Tyne at that date apart from those at the Ouseburn:³⁴

Broad glass	Howdon Panns	£15 toll
	South Shields	£15 "
Bottle glass	Closegate	£10 "
	Western bottle house	£10 "
	St. Lawrence	£10 "
	Bill Quay	£10 "
	South Shields	£10 "
Flint glass	Closegate	£ 5 "

The order was not successful and was repealed in 1742. Another constant complaint about Howdon was that "several quantities of glass and materials are unloaded and loaded directly in and out of ships and not bought to the New Quay of this town to the detriment of the tolls and dues of this corporation".³⁵

Howdon remained a working broad glass house until 1772 when it was converted into a short lived plate glass house by Matthew Ridley a wealthy merchant connected to the Whites (see Appendix 3a). It is not known how Ridley came to have an interest in the glass house but it is possible that he had purchased Proctor's shares. The newly converted house was advertised as being complete in 1772 and in February 1773 Matthew Ridley was able to tell the Parliamentary Commission on plate glass that "a manufactory he was concerned in had just begun to blow plate glass and had made one plate 65" x 3".³⁶ The whole enterprise came to an abrupt end in June 1773 when some old wood piled against the side of the building caught fire and three quarters of the works was destroyed.³⁷ Although the building was insured with the Royal Exchange, the glass house never appears to have been rebuilt and the fire effectively put an end to glass making at Howdon.

The Newcastle Broad and Crown Glass Company was, therefore, a business organisation with quite unique characteristics. Particular circumstances had produced an unusually large unincorporated partnership consisting of a wide variety of partners holding an equally wide variety

of aspirations; some, presumably, wishing for nothing more than a comfortable annuity from the company, others being motivated by a more ambitious spirit. Did this sprawling company provide an effective means of organising and financing the manufacture of flat glass on the Tyne during the eighteenth century, or did it prove an unwieldy organisation and an obstacle to progress? Broadly speaking the answer must be that the company was effective in that it was successful in most major respects. It was successful in its initial aim of establishing the manufacture of crown glass on the river. It was successful in that it survived well into the nineteenth century and it also appears to have been successful from the point of view of its shareholders most of whom appear to have led lives of reasonable comfort and prosperity.

One major qualification must, however, be made to this broad picture of success. The company does not appear to have developed or built on its resources to any significant degree during the eighteenth century. The size of the company's productive capacity, for instance, saw no increase at all and by 1800 the company's main site at the Ouseburn remained virtually unchanged with four broad glass houses and one crown glass house. The company's continuing concentration on broad rather than crown glass was perhaps the most significant aspect of its lack of development for if the trend towards the better quality crown glass was evident in 1729 it was doubly so by the end of the century. It is difficult to imagine that a more enterprising company would have remained for so long in the production of what was, by eighteenth century standards, a slightly old fashioned type of glass.

How is this lack of development to be accounted for? In many respects it is surprising as the company possessed many natural advantages: the presence of influential and wealthy men, well established

glass making skills and existing trade connections. Two reasons can perhaps be advanced. Firstly, the size and nature of the partnership made the company an ineffective instrument of growth. Secondly, the company was encouraged to keep its interests in broad glass because it enjoyed a near monopoly in the London market, unlike crown glass which encountered a greater degree of competition from London and other north-east glass houses.

The first reason is perhaps the more important. It is easy to see that a large partnership, including a high proportion of sleeping partners, discouraged the accumulation of profits for further expansion. The partnership saw no tendency to decrease in size; when the 1729 partnership was renewed in 1767 it consisted of seventeen partners; in 1780 there were still seventeen partners, eleven of whom took no active part in the glass company.³⁸ On the next renewal of the partnership in 1812 the number of partners had decreased to thirteen but the proportion of shares taken by the sleeping partners had increased with the result that the active partners took legal advice on the possibility of excluding those who contributed nothing to the firm's progress:³⁹

The present proprietors are desirous to enter a new partnership to the exclusion of some others who have become such as personal representatives of deceased partners whom the majority know little of and who, residing at great distance from the manufactory, cannot conveniently be consulted or give assistance to the co-partnership business.

As we shall see the problem of sleeping partners was to dominate the company's development, and indeed prove a considerable obstacle to the company's development, during the first quarter of the nineteenth century. Less is known about the effects during the eighteenth century but it seems reasonable to assume that they were similar, namely that the dispersal of a substantial proportion of the firm's profits to sleeping

partners did not encourage the growth of the firm. A high proportion of sleeping partners also, almost certainly, encouraged an unadventurous attitude within the company as a whole; many partners were not in the position to risk their incomes from the company by reinvesting in further risk bearing ventures.

Most shares in the company passed from generation to generation by inheritance and this process, in these particular families, seems to have resulted in a consistently high proportion of female partners: shares tended to be left to widows or daughters without any other means of support. This tendency was perhaps encouraged by the very size of the partnership for whilst there were sufficient male partners at Newcastle able to take care of the business, there was no need to leave shares to sons who would take a more active role; shares in the glass company appear to have been seen as a safe annuity. Female sleeping partners could however be the means through which more active partners entered the company; thus John Head, who managed the crown house during the first quarter of the nineteenth century, entered the partnership by his marriage in 1791 to Sarah Tyzack who had inherited her four shares from her father Jonathan and her brother John. Indeed the size of the company could have been said to have been an advantage in some respects, for it provided a number of opportunities for men with new talents and skills to enter; throughout its life the company appears to have been well served from within for managers, lawyers, ship owners, insurers and partners able to advance short term credit.

Three important outsiders, in addition to John Head, entered the glass company during the eighteenth century. The first was George Lake whose entrance was one of the few instances when shares were not left

to next of kin but were directed, by the terms of Jane Tyzack's will, to be sold by the glass owners at their discretion.⁴⁰ Lake was sold her eight shares in 1750 and he entered the partnership on the certain understanding that he was to play an active role in the business as the major managing partner. The second outsider was James King, a Quaker from a glass making family, who bought his way into the company by purchasing shares in the crown glass company and St. Lawrence broad glass house from Nicholas Tyzack during the 1760s⁴¹ Like Lake King played an active role until 1785 as chief clerk and cashier to the company. The third outsider was Alexander Adams, a wealthy India merchant, who entered the company in 1786 by purchasing the eight crown glass shares of the bankrupt James King. He too actively promoted the glass business until his death in 1817 although the major managerial role during this period was taken by John Head and Henry French.

Although Lake, King and Adams were all active within the glass company, none succeeded in making any significant changes to the company's character; for most of the eighteenth century the company appears to have run on its own momentum rather than through any injection of entrepreneurial fuel. This is interesting for all three men, and King in particular, possessed evident entrepreneurial qualities and might have been expected to express their ambition, initiative and drive through the company. In theory the company's lack of development during the eighteenth century could be explained by the lack of able entrepreneurs within its ranks but the presence of men like King suggests that there was some fundamental conservatism within the company itself, and in particular in its structure. The point is underlined in King's case by the fact that he did embark on new ventures in glass but not through the larger company, using instead quite separate smaller companies. In many cases the partners he recruited to these new ventures were, like

him, also partners in the larger company, in particular Sir Matthew White Ridley, Matthew White's heir and King's mentor, and Joshua Henzell the manager of the crown glass house during the 1770s.

Most of King's venture into new glass works occurred during the early 1780s and were almost certainly a consequence of his British Barilla patent of 1780 (see Chapter One). There is evidence of his involvement in a plate glass company in December 1780 which, although never apparently established, was to include King, Henzell, Elizabeth Lake (George Lake's widow), Mary Tyzack and the bank of Surtees and Burdon.⁴² In 1785 King erected a new flint glass house on the South Shore near Gateshead in partnership with Joshua Henzell and others. King and Ridley also established their British Barilla works at Blyth in 1780. As a consequence of these and other ventures (including a pottery at the Ouseburn, a flint mill at Newburn, a copperas works at St Anthonys, a brewery, and six cinder ovens on Brandling Quay) King went spectacularly bankrupt in 1786 and, although in theory King's smaller glass companies were separate from the broad and crown glass company, the bankruptcy revealed that King had in fact been financing them with credit given by the local bank of Surtees and Burdon on the larger company's account. The whole bankruptcy episode highlighted amongst other things the ambiguous position of an unincorporated partnership and the partners' liability for company debts.

From 1768 the glass company had regularly borrowed short term credit from Surtees and Burdon which facility was allowed them, it was later said, because of the great wealth of some of the individual partners.⁴³ Initially the agreement was a satisfactory one with the company being granted a credit amount of £1,000 on a bond of £2,000.

James King was the chief clerk and cashier at the time and it was agreed that he should make the necessary withdrawals in the company's name. At the end of each year a credit was struck by which time the company had usually exceeded by a slight amount the £1,000. At the time of King's bankruptcy the credit to the bank stood at £1,515. which, naturally, the bank assumed would be discharged by the company as usual. However the company refused maintaining that the debt was King's private one. The reason was that in 1782 King had approached the bank asking for a further credit of £1,000 and claiming the company's authority for doing so. Further credit was granted but, as it now appeared, the company had not authorised King to ask for extra credit and the money he had withdrawn had been used not on company business but to finance his other ventures. The bank was forced to take the case to law. Aubone Surtees, who wrote to John Delaval about the matter in August 1786, felt that they had been treated very badly by the glass company:⁴⁴

We have at present a Chancery suit depending in consequence of our having allowed a man, both agent and partner, to exceed by £500 the credit lodged by the other partners, men of great fortune and consequence, on account of that concern, 'tho the partners knew that in exceeding the credit we meant a particular liability to them, and 'tho one of the partners had frequently seen without disapprobation the limited sum exceeded.

King's bankruptcy appears to have had substantial local repercussions. In 1788 all five local banks met to consider the affair⁴⁵ which dragged on until the early nineteenth century; the commission of bankruptcy was renewed in 1802. It is perhaps possible to speculate that it contributed something to the glass company's lack of development both by destroying the company's credit worthiness in the eyes of the local banks and by providing a cautionary tale for other entrepreneurs in glass. Sir Matthew White Ridley certainly lost from the affair, according to a comment made in 1786 which noted:⁴⁶

... the great loss that Sir Matthew White Ridley has suffered by James King together with the purchase of Bedlington colliery ... makes it believed he is of late made poor by the above failure and purchase.

Although Ridley too was a man who might conceivably have made an effort to develop and improve the company, he embarked on no further glass ventures and it was not until his son inherited his shares in 1811 that the Ridley family resumed a fairly active role in the company's development. The bankruptcy certainly led Surtees and Burdon to be more prudent in the future and by 1797 the only industrial concern they indulged with credit facilities was Sir John Delaval's colliery and glass works at Hartley (see p. 208).

The second reason for the company's lack of development during the eighteenth century, and in particular its failure to shift its resources from broad to crown glass, was the company's apparent monopoly on the London broad glass trade. Despite its poor quality there is no doubt that there continued to be a market for broad glass throughout the eighteenth century, and that the glass's main attraction was its cheapness. Because it was made of poorer quality materials, broad glass was naturally cheaper than crown glass but the difference was underlined with the imposition of the excise in 1745 which taxed broad glass, sheltering under the description of a "necessity" rather than a "luxury", at a lower rate than crown glass. The excise thus encouraged the survival of what was really an obsolete type of flat glass well into the nineteenth century. Because of its cheapness (which is well illustrated by glaziers price lists, see fig. 4), broad glass was a suitable choice for glazing buildings where aesthetic appearance was not important: such as gaols, out houses, workmen's cottages and warehouses.

Traditionally, broad glass had been supplied to the London market by the Newcastle glass makers through the London glaziers and glass cutters and this arrangement appears to have continued throughout the eighteenth century with the Newcastle men supplying only the members of the glaziers' company in return for the glaziers' commitment to deal only in Newcastle glass.⁴⁷ This relationship was a relic of the Mansell era yet there were evidently advantages for both sides in its continued existence. It was in the interests of both the Newcastle broad glass makers and the London glass cutters to maintain the established channel of trade and minimise competition from new interests. As we shall see a far greater degree of competition existed in the crown glass market despite the efforts of the London glaziers.

That the Newcastle glass makers still found it profitable to supply broad glass to the London market is easily measured by their aggressive response when new competition did appear. The traditional competition in broad glass had come from the Stourbridge glass makers but transport costs appear to have continued to provide the Newcastle men with an effective protection against Stourbridge for the greater part of the eighteenth century. A more serious challenge came from other glass houses in the north-east. Three other north-east glass houses appear to have manufactured broad glass during the eighteenth century: the broad glass house established by the Dagnias at South Shields in 1710; Thomas Delaval's bottle houses at Hartley, established in 1762 which originally manufactured broad glass in addition to bottles; and the broad glass house at Ayres Quay near Sunderland which had been established in the late seventeenth century. Whilst these houses manufactured broad glass on a small scale for a local or an export market they did not constitute a threat to the Newcastle men but when

they ventured into more ambitious areas they provoked some measure of retaliation. For instance in 1776 the Ayres Quay house came into the possession of William Russell, an able and ambitious man who was eventually to realise a large fortune from Wallsend Colliery, whose activities forced the Newcastle broad glassmakers to take action against him. In 1780 Joshua Hensell wrote to Sir Matthew White Ridley:⁴⁸

Our company's plan to fall the price of common glass has succeeded. Mr. Russell of Sunderland came and desired the company to raise the glass to its former selling price, he also offered to sell the company all the glass he made or to let them his glass works but all were refused.

Similar action had been taken nearly twenty years previously against Thomas Delaval according to the scant evidence provided in some of John Cookson's letters. In 1763 Cookson's London partner, James Dixon, wrote to him in alarm about "the Newcastle Company's breach of their agreement"⁴⁹ which appears to have consisted of undercutting the trade price. Cookson, who as we shall see only manufactured broad glass in a casual way, was not unduly alarmed but did seek a meeting with the Newcastle men and in March 1764 was able to send Dixon "the proposals of the Broad Glass Company, it relates entirely to the London trade so you will be the best judge ... as to the fitness or unfitness of it". Whatever these proposals were (they were not copied into the letter book but were almost certainly a price agreement) it is clear that Delaval had been forced out of the broad glass trade. As a bottle manufacturer he and his brother John also came into competition with the Newcastle men but were more successful in withstanding efforts to dislodge them. In 1780 Joshua Hensell wrote to Ridley regretting the fact that they had not been equally forceful in the bottle trade:⁵⁰

Had the bottle glass owners on the river followed the Broad Glass Company's plans, Sir John Delaval's bottle trade would this day be in a similar situation with his late broad glass.

The one manufacturer who was tolerated by the Newcastle broad glass makers was John Cookson who took over the Dagnias' broad glass house in 1756. This was partly because John Cookson was already well established in the London market as a crown glass manufacturer; it was also because John Cookson does not appear to have manufactured common broad glass regularly or in large quantities. In 1762 his London partner Dixon specifically asked for some broad glass to be sent and Cookson replied that he had not made a bit of broad glass that year but would try to supply some.⁵¹ In 1767 Dixon ordered some more and Cookson told him that he would be supplied on the same footing as the London cutters were supplied from Newcastle which was at 40 shillings per case.⁵² From his letters Cookson also appears to have supplied other merchants in other parts of the country and Ireland with broad glass but only when it was ordered.

From the evidence that is available it appears that the Newcastle broad glass makers did succeed in maintaining their traditional predominance in the London broad glass market and this almost certainly was one reason why the company as a whole did not develop into a crown glass company at an earlier date. As we shall see it was not until the second decade of the nineteenth century that the company's broad glass houses were given over wholly to crown glass. Although it seems fair to see this as a failure to develop the company's potential it should not be forgotten that this failure was merely one qualification to a picture of broad success. The Newcastle Broad and Crown Glass Company was successful in preserving the status quo, which favoured the north-east, in the London glass market. By linking together the various broad

glass houses on the Tyne it created a stronger force in the trade, further fortified by the addition of the manufacture of crown glass. On the whole the company was a successful way of organising and financing the manufacture of flat glass on the Tyne during the eighteenth century but with the advent of more volatile market conditions in the early nineteenth century, its disadvantages became more apparent and, as we shall see, the company then found itself severely handicapped by its peculiarly large and, in many respects, outdated partnership structure.

(ii) Cookson and Jeffries

The crown glass company associated with the Cookson family was a more recognisable type of eighteenth century business organisation, namely a family firm whose partners and capital were drawn from a close circle of relatives and business associates. Control remained firmly in the hands of the Cookson family and the company was consolidated and extended by successive generations of the family with marked success. In terms of industrial growth the success of the Cookson firm was an almost unqualified one: not only did the original company experience a steady growth but the Cooksons extended their interests in glass to other partnership ventures manufacturing several different types of glass. Such a successful and impressive record provides an interesting contrast to the Newcastle Broad and Crown Glass Company, and one which suggests that the smaller family firm was a far more manageable unit and better suited to growth than the larger partnership. Cookson and Jeffries carried no sleeping partners and although the number of partners occasionally rose as high as six the largest proportion of shares, and hence the largest share of the profits, always remained in the hands of the Cooksons. There seems little doubt that the company's development

was financed in large part by the company's profits; though by the 1760s the Cookson family interests included, besides glass, lead mines, coal mines, salt, alum, iron and banking.

The original deed of partnership, dated 17 April 1738, was made between John Cookson, a merchant of Newcastle and Thomas Jeffries, a merchant of Snow Hill in London.⁵³ Each was bound to a thirty one year partnership to manufacture crown and plate glass at the glass house "shortly to be built" on the ballast quay at South Shields that the two had recently leased from John Cookson's father Isaac Cookson. Isaac Cookson had also advanced £2,000 of the capital for the new company and it seems probable that the whole enterprise was in part his attempt to start his eldest son in business. Isaac Cookson (1680-1743) originally came from Cumberland but had settled in Newcastle c. 1700 to make a successful career primarily in trade.⁵⁴ By 1738 he had already established some manufacturing interests with shares in an iron furnace at Whitehills and glass bottle house at Bill Quay. On his death in 1743 he was described as "one of the most considerable glass manufacturers of these parts" and it was certainly he who laid the foundations of the Cookson family interest in glass, although he perhaps does not merit the description "entrepreneur" as fully as his son John.

The 1738 deed was a business like document setting out in detail each partner's precise responsibilities and the strict manner in which the company's finances were to be arranged. The total capital to be invested in the enterprise was £6,000 divided into 32 shares, twenty of which (£3,750) were to be advanced by John Cookson, and twelve (£2,250) by Thomas Jeffries. John Cookson was to manage the glass house at Shields and control the company's finances. Jeffries was to manage

the London warehouse and "travel the principal towns between South Shields and the Sands" to promote trade. All remittances and monthly accounts were to be sent to John Cookson and a yearly meeting was to be held for an account and reckoning. Besides receiving a proportionate share of the profits, each partner was to pay a proportionate share of the losses. Dealings were to be conducted in joint names, no private debts were to be taken from the joint stock and neither partner was to "disclose the secrets of their manufacture or advise, aid or assist any similar manufacture".

The deed also made provision for the entry of additional partners. It was stated that Thomas Jeffries should be permitted to assign four shares to his brother Richard, two to James Dixon, another merchant of Snow Hill, and two to Francis Hawkes, a glass maker of Vauxhall. All three of these assignments were made the following year beginning with the assignment of two shares to James Dixon in March 1738 for the original price of £375. Dixon's specified role was "to promote the trade, attend the warehouse in London without any fee save costs ". Dixon was a merchant who had already established connections in the north-east. He was to consolidate his place in the partnership by his marriage in October 1738 to Isaac Cookson's daughter, Hannah. The Jeffries' connection was likewise to be consolidated by the marriage of Isaac Cookson's third son, Isaac, to Thomas Jeffries' daughter Mary (see Appendix 3b).

In April 1738 two further shares were assigned by Jeffries to Francis Hawkes. Hawkes' part in the concern was not explicitly stated in the deed but it was certainly a practical one of managing the actual manufacture and in particular the "founding" or mixing of the metal; the deed was most explicit in stating that Hawkes "shall not

nor will at any time hereafter discover or make known to any person or persons any of the secret or secrets relating to the merging of the metal for the making of the said crown or plate glass ". Unlike the other deeds, Hawkes' contained no clause denying him a salary which may have been as high as £100 a year for the deed stated that in the event of his death and if his executors refused to continue the management of the glasshouse they should pay £100 per annum out of the profits for putting the existing partners to the trouble of management. Hawkes' Vauxhall address makes it more than likely that he had recently been employed in the plate glass works at Vauxhall which had been established on an extravagant scale by the Duke of Buckingham in 1658.

Plate glass, like crown glass, was a beneficiary of the trend towards greater elegance both in the outside appearance of buildings and their inner furnishings. Like crown its manufacture had been introduced into England during the seventeenth century; previously plate glass had been imported into England from Italy and France. Like crown it was considered a luxury but to a far greater degree since it had noticeable advantages over crown in respect of colour and brilliancy. This finer quality was due firstly to the better ingredients that were used in plate glass, in particular barilla, and secondly to the fact that the plates were ground down and polished after manufacture to produce a uniform, brilliant and undistorted surface. This extra treatment raised the price of plate glass sufficiently high to make it ill suited for ordinary glazing purposes (in 1726 Neve had described it as "a dear sort of glass" costing 4s per sq. ft., or nearly three times as much as crown).

Instead, the major use of plate glass was in the manufacture of mirrors, for which the glass had to be silvered with lead. The fashion for pier glasses and large decorative mirrors gathered strength throughout the eighteenth century, supporting a number of trades: looking glass makers who specialised in large glasses; cabinet makers and upholsterers who manufactured less expensive glasses, and the glass grinder who was usually employed as a journey man by either the glass house or the upholsterer but who occasionally managed to set up in business on his own account. A 1763 London Directory lists twelve glass grinders and two are listed in Newcastle in 1778. R. Campbell's The London Tradesman of 1747 contains a good description of the glass grinder's work:⁵⁵

The glass grinder buys (the plates) from the glass house rough and it is his business to grind them even and then polish them which is done with sand and water. The plate of glass is fixed horizontally in a weighty frame and is rubbed backwards and forwards upon another plane on which sand and water is constantly running after the glass has been ground to a true plane it is then polished with emery and putty.

Campbell's entry on the glass grinder is interesting for the suggestion that glass plates manufactured in England at that time were being cast rather than blown, although he admitted that the manner of casting "is pretended to be a secret nor could I find any person who pretends to know it that they could give a rational account of the matter". However the evidence given to the Parliamentary commission on plate glass in 1773 makes it clear that eighteenth century English plate glass houses were blowing rather than casting plate glass though casting had been experimented with. James Dixon, giving evidence on behalf of the Cookson company, said that the largest plates they had produced were 84" x 52" "which he believes were cast" but it is almost certain that Cookson and Jeffries' glass was entirely blown. Had casting been

extensively practised at South Shields then more would surely have been said about it to the commission.

The publicity given to the formation of the British Plate Glass Company in 1773 has tended to obscure the fact that before that date there were a number of firms in England, among them Cookson and Jeffries, producing blown plate glass. Blown plate was produced by blowing the glass into a large cylinder which was then opened with shears and flattened. It differed from broad glass in that broad glass was blown in an elliptical or conical shape and opened by holding the glass near the furnace which caused it to burst at its weakest point.⁵⁶ Plate glass also differed from broad glass and crown in the finer quality of ingredients used; barilla imported from Alicante or Teneriffe and fine quality white sand. Blowing was not a particularly efficient or economical way of producing plate glass. Because of the heavy weight of the cylinder workmen could not produce much more than one large cylinder an hour and not work longer than six hours in one journey. Blowing also limited the size to under 45" - 50" long. If plates of larger dimension were produced they were frequently too thin to be polished. This uneconomical method of production was probably as much responsible for the high price of plate glass as the more expensive ingredients or the great risk of breakage.

The main demand for both crown and plate glass was in London and it is not surprising that Cookson and Jeffries should have soon established a London warehouse. This was first situated at the Old Swan, the quay at which the Newcastle ships usually berthed, but moved in July 1740 to Blackfriars, and in 1756 to Fleet Street where it remained. The London warehouse was important not merely for distribution but as an

office through which raw materials, such as barilla, could be purchased and as a source of information about the market and the products of their rival plate glass houses in London. A good example^{of} the many uses of a London agent can be found in a letter written from Cookson to Dixon in 1763 in connection with the glass house's need for a new spreading stone:⁵⁷

I have been enquiring about the spreading kiln and it is undoubtedly in our interest to have the stone as large as we can tho it were to cost £8 or £10 more. But that you may give a better guess, there was (sic) two plates lately made at Vauxhall, the largest they could make for which they had of the East India Company £200 each. The grinder is to have £100, his name is Bell and lives at the Bankside. You had best see the size which may be some guide to you, they go as a present to the Nabob in the East Indies. I find Green who I suppose is Mr. Peacock's partner has wrote to Mr. Deer for some green glass, he does not seem to be a glazier but by his writing more like a merchant's clerk but you must tell him we have none to spare. Our stock of barilla is not large and we need an additional 25 cernes (?) more.

By 1746 the number of partners in Cookson and Jeffries had risen to six with the addition of Sir John Delange, another London merchant who had brought one share from Thomas Jeffries, and Joseph Cookson who had been assigned two shares by his brother and had taken over the management of the glass house. A new partnership agreement was drawn up in 1746 in order to confirm all these assignments and to reinforce the strict accountability of all the partners. Each had to account for all money he received to John Cookson, on penalty of forfeiting his dividend. John Cookson was to account for all money to the other partners in the yearly dividend. This second partnership agreement confirms that, although London merchants were involved in the venture, control rested entirely with the Cooksons at South Shields.

The wording of the deeds with their attention to detail confirms the general impression that the partners in Cookson and Jeffries possessed a sound commercial attitude towards the enterprise in which they were investing money. They had clearly recognised their market,

sought out a skilled glass maker who was able to produce glass of the right standard for that market, and provided for the supply and distribution of glass where demand was likely to be strongest. They had committed themselves to work without salaries and to be strictly accountable for all the company's money. This was certainly a rational attitude and it appears to have proved an effective one since, according to the evidence provided in a number of legal cases, the partnership of Cookson and Jeffries was a profitable one which saw its shares steadily increase in value until its dissolution in 1770.

The first of these legal cases occurred in 1751 when Thomas Jeffries brought a Chancery suit against the other partners with the aim of forcing his re-entry into the partnership.⁵⁸ In 1748 financial troubles had persuaded Jeffries to sell his five remaining shares "on trust" to John Cookson for £2,051 on the understanding that should he subsequently raise the money he should be readmitted to the partnership. In 1751 Richard Jeffries, on behalf of his brother, offered to discharge the debt in return for the shares, but unfortunately, in the meantime, two of the shares had been sold to Isaac Cookson, Joseph Cookson's brother and a sea faring man who "at about that time had proposed to reside on the land and employ his money in some advantageous way". Thomas Jeffries was forced to bring a legal suit to recover the shares and four were eventually resold to him for £2,535 4s (or £637 16s each which represented a substantial increase from their original value of £187 10s). Although no complete account of the company's dividends or profits are available, legal cases do provide isolated figures: for instance, in 1749 the total dividend on capital was £1,200 or £37 10s on each share.

Isaac Cookson eventually did become a share holder when he was left two shares by his younger brother Joseph Cookson who died in 1750. These two shares became the subject of another legal case when, following Isaac's death in 1761, his creditors attempted to force the sale of his estate against the wishes of his widow and executor John Cookson.⁵⁹ John Cookson had assumed control of his brother's glass house shares (2/32 of Cookson and Jeffries and 3/16 of the bottle house at Bill Quay) immediately after his death but was forced to put them up for auction and purchase them himself for £2,600. Even allowing for the inclusion of the Bill Quay shares the price is further evidence of the rising value of the shares in Cookson and Jeffries. Isolated dividend figures are again provided by this legal case: in 1762 Isaac Cookson's two shares of Cookson and Jeffries received a dividend of £108 or £54 each.

The partnership of Cookson and Jeffries came to an end in 1770 when John Cookson bought the ten shares of the late Richard Jeffries, whose executors had no wish to carry on the business. The price of the ten shares was £8,000 (£800 each) which was a considerable increase from their original value in 1737 of £187 10s each. Cookson's purchase of these ten shares probably gave him sole ownership of the company although it is possible that James Dixon still owned two shares at this time. By the time of John Cookson's death in 1783 he was certainly the sole owner and the company passed in its entirety to his eldest son Isaac; his two younger sons, Joseph and John were entrusted with the shares in the bottle houses at Bill Quay and South Shields.

John Cookson's career in glass manufacturing was a most impressive one. Not only was a second flat glass house erected at South Shields, probably c. 1770,⁶⁰ but he extended his interests in glass through new

partnerships manufacturing different types of glass. The major extension of his glass interests was his purchase in 1756 of the two glass houses at South Shields and the flint glass house in Newcastle belonging to the Dagnia family. The Dagnias will be considered in more detail in the bottle chapter for, although one of their houses at South Shields was ostensibly a broad glass house, their main significance was as bottle manufacturers. Under John Cookson it seems probable that both houses were turned over to the production of bottles with broad glass being manufactured only occasionally, as we have seen. By 1770 John Cookson was also working the Dagnias' two flint and bottle houses at Newcastle and these eventually came into the possession of his son Isaac Cookson.

The diversification of John Cookson's glass interests was in some respects a more suitable development for him than the extension of the crown and plate works. He remained primarily a merchant, dealing in a range of commodities such as coal, salt, iron, lead, glass and butter and many of his letters to other merchants emphasise that he is able to supply a variety of commodities. John Cookson's career as a merchant and manufacturer was undoubtedly a successful, and even perhaps a spectacularly successful one. By the time of his death in 1783 he owned lucrative shares in, amongst other things, coal mines, lead mines, bottle and flat glass works, and the first Newcastle bank. In addition he had purchased a country house and estate at Whitehill near Chester-le-Street and was unquestionably a respected figure in Newcastle's commercial life. The final measure of the success of his career is the considerable fortune he left on his death. By the terms of his will his estate passed to his wife during her lifetime and then to

his eldest son Isaac but out of the estate two legacies worth £10,000 each were to be given to his two surviving sons and a legacy of £5,000 to his only unmarried daughter. These legacies consisted of invested capital in land or other securities and, in the case of his two sons Joseph and John, his bottle manufacturing shares: namely 8/16ths of the Bill Quay bottle house and 11/16ths of the South Shields bottle house. This arrangement gave rise to an interesting legal case which illustrates well the crucial importance of inheritance to the eighteenth century firm: the manufacturing interests that John Cookson had built up were threatened by the unfortunate fact that his son Joseph proved more interested in the army than business.

Soon after his father's death Joseph Cookson brought a Chancery suit against his mother and elder brother Isaac in an attempt to force them to realise his £10,000 legacy which he wanted in cash to advance himself in the army.⁶¹ In reply Isaac and Elizabeth Cookson argued that the terms of the will, whereby the legacy was managed by a trustee (Isaac Cookson), were specifically intended "to prevent its being spent" and that Joseph Cookson was only entitled to £10,000 invested in land or securities in the name of a trustee and that "the complainant is not nor was ever meant or intended to be entitled to have any power vested in such trustees to raise any sum for the complainant's advancement in the army". They argued further that John Cookson's intention at the time the will was made was that Joseph Cookson should be brought up for some trade or business and had been sent to the Shields glassworks and then the blast furnace in order to learn book keeping. But when Joseph Cookson had expressed a desire to go into the army his father had "reluctantly acquiesced" and purchased an ensign's and then a lieutenant's commission for him. These sums, they argued should be seen as having taken the

place of the legacy which was written into the will at a time when Joseph Cookson had been intended for a business career. Their arguments appear to have prevailed. Fortunately the same problem did not arise with the third son John Cookson who, being intended for the law and given in addition to his legacy a £250 annuity, was happy to leave his shares in the hands of his elder brother Isaac. Joseph and John Cookson died in 1800 and 1802 respectively leaving John Cookson's entire business interests in the sole hands of Isaac Cookson. Fortunately for the Cookson family Isaac proved a worthy successor to his father and under his ownership and management the crown and plate works and the bottle works were to see an equally impressive growth.

(iii) The flat glass trade

There seems little doubt that for both the north-east flat glass manufacturers London remained their principal market and the one on which their profitability depended. There also seems little doubt that the demand for glass in the London market steadily increased throughout the eighteenth century; even without statistical evidence for the whole century the increase in building in and around London is self-evident. An increasing demand for glass is also suggested by evidence that a more sophisticated structure of trade was emerging, namely the establishment of specialised window glass merchants in place of the glaziers. In a Directory of 1763 Cookson and Jeffries' warehouse is one of only five glass warehouses (including three bottle warehouses) in London,⁶² but by 1790 this number had risen to thirteen. Some of the window glass merchants were the wealthier members of the Glaziers Company. Others like James Dixon were associated with one manufacturer in particular and were general merchants by origin who because of their connections had been led to specialise in window glass.

The importance of the London market to the north east manufacturers is well illustrated by an analysis made by Preston Pilbin of the shipments in a day book of Cookson and Jeffries covering the period 1744-48. (see Fig. 3)⁶³ There are two slight qualifications to this illustration. Firstly, as Pilbin himself points out, the map is based simply on the number of shipments to each destination and not on the quantity of glass contained in the shipments. Because of the larger size of the shipments sent to the London warehouse Pilbin estimated that the total proportion sent to London was about 60% of the whole. The second qualification is that the shipments included bottles and very occasionally flint glass (from the Bill Quay bottle house or the Dagnias' flint glass house in Newcastle) although flat glass from Cookson and Jeffries constitutes the largest proportion of the cargoes. With these two qualifications in mind the map still gives a useful illustration of the geographical range of Cookson's trade and the predominance of London.

Cookson and Jeffries and the Newcastle company appear to have adopted different methods of distributing their glass in London. The Newcastle company, as we have seen, maintained a close relationship with the London Glaziers' Company supplying uncut glass only to their members. Cookson, by contrast, made use of his own warehouse and supplied glass either cut or uncut. This was in some respects a departure from tradition in that it operated independently of the glaziers and indeed in direct competition with them in their developing roles as glass cutters and merchants. It is not surprising to find evidence of some hostility towards Cookson in the Glaziers' Company court book which in 1751 recorded a complaint that Cookson and Jeffries at Blackfriars was employing cutters who were not members of the Company.⁶⁴ The Glaziers' Company later considered commencing a prosecution against Cookson and Jeffries on the

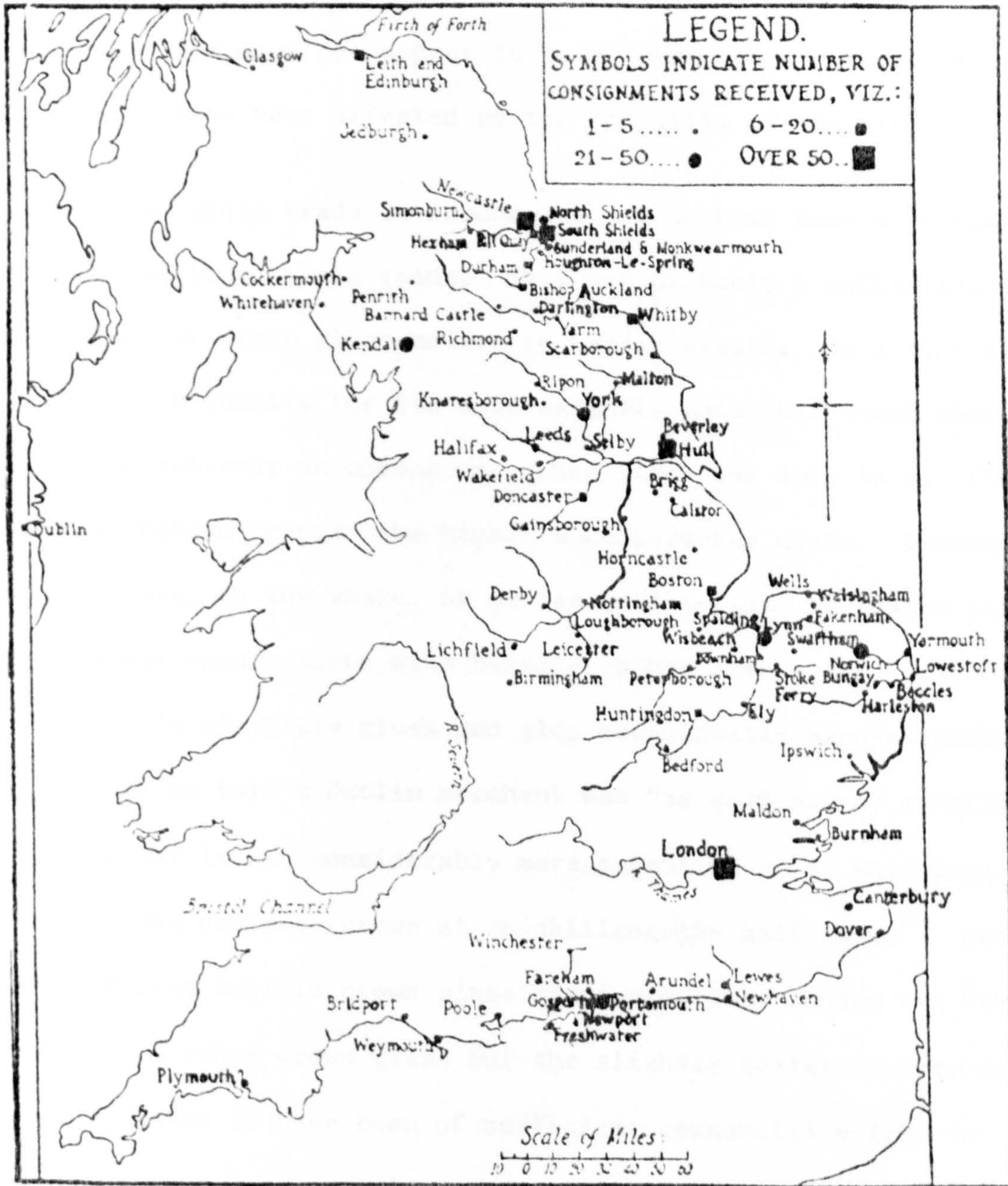


Fig. 3 : Map showing destinations of consignments of glass from Cookson and Jeffries, December 1744 - February 1748.

grounds that the firm contained no freemen of London amongst its partners but this does not appear to have taken place and the firm does not appear to have been affected by the hostility of the glaziers.

The crown glass trade in London appears to have been more competitive than the broad glass trade. This was probably a reflection of the larger number of crown glass houses in London itself. As a flat glass which relied on quality for its sale slightly more than broad glass, which relied entirely on cheapness, crown glass was able to be manufactured in London despite the higher manufacturing costs. London crown glass was, on the whole, of better quality than Newcastle glass because it was manufactured with barilla rather than kelp. Cookson also used barilla in his plate glass and also occasionally manufactured "barilla crown" (which he told a Dublin merchant was "as good as any manufactured in London") but it was considerably more expensive at 45 shillings the half case, than ordinary crown at 26 shillings the half case.⁶⁵ According to Samuel Parkes barilla crown glass manufactured at London was "ever preferred"⁶⁶ to other crown glass but the slightly better quality does not have appeared to have been of sufficient commercial weight to compensate for its higher price. By 1800 not a single crown glass house was left in London and by the 1820s the manufacture of plate glass had also disappeared.

There seems little doubt that it was low manufacturing costs and low selling price that enabled the north-east crown glass to gain full possession of the London market by the end of the eighteenth century. From the evidence of builders' price books (Fig. 4) Newcastle crown glass was consistently cheaper than London glass throughout the century: for example a builders' price book of 1774 quotes:⁶⁷

New green glass per ft. superficial	6d
Newcastle crown glass per ft. superficial	9d
Blackfriars crown glass in squares	1s 2d
Radcliff crown glass measured neat	1s 3d
Second crown glass in squares	11d- 1s
Moulded plate squares	3s 0d
Best crown bent circular for shop windows	3s 6d

The success of north-east crown at the expense of London crown is reflected in the fact that when the Glaziers' Company issued its first printed price list in 1803 (Fig. 5)⁶⁸ only "Newcastle crown" is quoted. The Glaziers' Company's lists continue to quote "Newcastle crown" until 1818 when it becomes just "crown" which in itself probably reflects the increasing amount of crown glass coming from other areas such as the Midlands and Lancashire.

Figure 4: Prices of flat glass charged by glaziers, 1726-1794

	London crown in sashes	Newcastle crown in sashes	Broad glass in lead	Jealous glass	Plate glass
(All prices per foot)					
A. 1726	8d - 9d	-	5d - 6d	18d	4s 0d
B. 1738	11d - 12d	7d - 8d	5d	2s 6d	5s 0d
C. 1746	18d	15d	-	-	-
D. 1757	-	11d	5d	-	-
E. 1774	14d - 15d	9d	6d	3s 0d	-
F. 1777	14d - 16d				
G. 1793		19d	-	-	13s 0d
H. 1794		22½d	-	-	14s 6d

- Key:
- A. R. Neve, The City and Country Purchaser (1726), pp. 145-9.
 - B. W. Salmon, Palladio Londinensis (1738), p.57.
 - C. Norwich Mercury, 5 April 1746, notice by twenty Norwich glaziers of a rise in prices owing to the glass duty. Quoted Buckley(1926).
 - D. Newcastle Journal, 12 March 1746, advertisement by a Newcastle glazier.
 - E. The Builder's Price Book (1774), pp. 93-4.
 - F. W. Pain The Practical Builder or Workman's General Assistant (1777).
 - G. } Glaziers prices quoted in J. Mordaunt Crook and Port, The
 - H. } History of the King's Works, vol VI (1973), pp. 90-1.

Figure 5: Flat glass prices listed by the London Glaziers' Company,
1800 - 1845

	<u>1803</u>	<u>1805</u>	<u>1812</u>	<u>1818</u>	<u>1845</u>
<u>I. In new sashes</u>					
best crown	1s 7d/2s 4d	2s 0d/2s 9d	3s 2d/3s 10d	3s 0d/4s 0d	1s 3d/1s 8d
2nd crown	1s 4d/2s 0d	1s 8d/2s 4d	2s 6d/3s 3d	2s 6d/3s 6d	1s 2d/1s 6d
3rd crown	1s 2d/1s 3d	1s 5d/1s 8d	2s 0d/2s 9d	2s 0d/3s 0d	1s 0d/1s 5d
ground crown	3s/0d	3s 6d/4s 0d	4s 6d/5s 6d	4s 6d/5s 6d	8d per ft. add
green glass	10d	1s 4d	1s 6d	1s 6d	-
<u>II. Lead lights, crown or green glass</u>					
squares or quarries under 10" x 8"					
	1s 2d/1s 6d	1s 3d/1s 7d	1s 6d/2s 0d	1s 8d/2s 0d	1s 2d/1s 4d

NOTE: Four prices for each type of glass are listed but only the highest and lowest are given here. The four prices are based on the size of squares (2 foot, 2½ foot, 3 foot and 3½ foot), In 1812 the largest size of square is discontinued and only three prices are given thereafter.

Builders' price books never distinguish between London plate glass and Cookson's plate glass, however, according to a trade book of 1757, the price of plate glass from Black friars was lower than plate glass from Vauxhall.⁶⁹ Interestingly this did not appear to reflect any difference in manufacturing costs, for both charged the same nominal amount for their glass, but differences in the way the bill was drawn up and in particular the amount the customer was supposed to pay in advance "on account of the duty". As the specimen bills indicate the Blackfriars glass was cheaper because only 40% was charged for the duty and this was calculated before the deduction of the ready money discount:

<u>Size</u>	<u>Vauxhall</u>	<u>Blackfriars</u>
14 x 9	2s 0d	2s 0d
13½ x 11½	2s 8d	2s 8d
25 x 12½	6s 0d	6s 0d
27½ x 16	8s 10d	8s 10d
28 x 26	25s 0d	25s 0d
	<u>£2 4s 6d</u>	<u>£2 4s 6d</u>
Discount (2%)	4s 5d	4s 5d
	<u>£2 0s 1d</u>	<u>£2 0s 1d</u>
Discount for ready money	2s 0d	16s 0d
	<u>£1 18s 1d</u>	<u>£2 16s 1d</u>
50% advance for duty		40% advance for duty discount for ready money 2s 9d
	<u>£2 17s 1½d</u>	<u>£2 13s 4d</u>

The first discount varied according to the quality of the glass. All qualities were charged the same nominal price according to their size but best quality glass received a 2% discount, seconds (marked 'X') received 4%, thirds (marked 'b') received 6%, and fourths (marked 'B') 8%. Although the price difference between Blackfriars and Vauxhall apparently reflected only different commercial procedures, it seems probable that at root it reflected lower manufacturing costs.

What of the markets outside London? As Pilbin's map shows, although London was the major market Cookson also supplied glass to most centres of population on the east and south coasts. From his letter book it is clear that the firm did not maintain warehouses in any of these towns or cities but relied entirely on local merchants for their sales. Glass was usually bought by the merchant and kept as his own stock, Cookson never sent glass anywhere except when it had been ordered. The one exception was Glasgow where Cookson appears to have maintained a stock of unsold glass in the warehouse of one David Nesbit. This connection was a useful one from Cookson's point of view for an account

was kept between the two merchants and used by Cookson to pay other Scottish debts, notably those to the highland kelp suppliers. Despite this the arrangement was not ultimately a satisfactory one; Cookson wrote to Nesbit in 1763:⁷⁰

As to the glass trade I believe Mr. Buchannan intends to decline selling crown glass for me at Glasgow and indeed it is hardly worthwhile anybodies while on either side to engage in it for returns are so slow and your payments so bad. If it could be made to turn out better I would have no objection to engage in it but as it is will not answer the purpose I have no warehouse at Leith nor do I send any glass there but what is ordered. If it could be in any way struck out that we could carry on a correspondence to mutual benefit it would give me great pleasure.

Another important market for Cookson was Dublin. By the 1760s he was supplying a number of merchants there but a letter written in 1751 suggests that at that time he had an agreement with only one, John Orpin. Orpin had complained of the quality of glass sent, to which Cookson replied:⁷¹

I cannot but observe that all these complaints have arrived since you had all the glass. If you have a mind only to have one cargo yearly you may; or leave the trade open, I to sell to everybody as before. I cannot chalk out any method to promote the trade in Dublin. I shall ship you as good a commodity as I have at the price you want them at. I have no intention of overstocking the market nor have I it in my power not having any glass at all by me to spare. If I had had any I would have sent Pollock (The ships captain) but could not altho^g glass was extremely wanted at Glasgow.

By the 1760s Cookson was supplying at least four other merchants besides Orpin. There does not appear to have been any binding agreement between them and Cookson but Cookson obviously felt some obligation not to supply glass to others and thus harm their trade; except in exceptional circumstances as, for instance, in 1761 when Cookson wrote to one of his merchants:⁷²

I was surprised to receive a letter from an unknown person in Dublin enclosing two Bank of England notes for £60 and desiring me to send him glass for it. The affair is so uncommon that I cannot refuse him if you should desire it I can decline him for the future.

The glass trade, in common with most other eighteenth century trades, relied almost entirely on credit thus prepayment was indeed uncommon. As was mentioned in chapter one the Dublin trade was useful for Cookson in that his ships returned via Bristol collecting pot clay from Stourbridge.

Outside the London market it is clear from Cookson's letter book that he relied heavily on other merchants and the same was true of export. He himself was not an exporting merchant and when his glass was sent to overseas markets it was done through the services of other merchants: for instance during the 1740s the Newcastle merchant Ralph Carr (a partner with Cookson in the first Newcastle bank) exported some of Cookson's glass to the Americas. Another merchant who undertook the export of Cookson's glass was Alexander Baxter of Edinburgh who had extensive connections in the Baltic and Russia; during the 1760s he sent a cargo of Cookson's crown glass to St. Petersburg where it was said to have "answered well". On the whole it was not until the late eighteenth century, encouraged by Pitt's generous bounty on the drawback, that crown glass manufacturers began to undertake the export of their own glass.

The general picture of the eighteenth century flat glass trade that emerges from the evidence is of a well ordered and stable trade relying on well established merchants and manufacturers. Like most trades it was one in which personal trust, reputation and credit figured prominently and this must, to a certain degree, have favoured manufacturers in the traditional and well established region of production, the north-east. Between them the two north-east flat glass companies supplied London and the east coast with all varieties of flat glass - broad, crown

and plate - at what was certainly a competitive price and thus they appear to have maintained the importance of the north-east that had first been established under the unnatural conditions of Mansell's monopoly.

3. 1790 - 1830

This was a period of unprecedented activity in the glass industry both locally and nationally. Locally, the major feature of this period was the establishment of new firms alongside, and in competition with, the two older establishments. Within forty years the productive capacity of the north-east flat glass industry more than quadrupled and the number of firms engaged in it increased from two to eight. The first of these new firms was the Northumberland Glass Company which was established in 1791. This was followed in 1796 by the rather shaky beginning of another new company - the Tyne Glass Company, arguably the most interesting of the new firms. Around 1807 these two were joined by a second crown glass firm at South Shields - the South Tyne Glass Company, or Shortridge Russell and Barrass; and two new firms at Sunderland - the Southwick Glass Company of Burn and Brumell and the Sunderland Glass Company of Addison Fenwick. Finally in 1825 a new company erected a crown glass house at St. Peter's Quay in Newcastle and entered into trade as the North Tyne Glass Company. In addition to all these new firms the period saw significant developments for the two older firms and the impressive rate of progress in this period is underlined by the fact that set against all these successful ventures there is no instance of a failure in the glass trade; neither is there any evidence that profits were anything but extremely satisfactory.

What were the conditions that produced and fostered this impressive growth? Was it a direct response to national market demands or was it an expression of increased wealth in the locality? Both local and national conditions were certainly important. On the national level it is certainly right to see the expansion in production of this period

as a direct response to the demand created by domestic and industrial building. The index of brick production during this period clearly shows the major building peaks being followed by a peak in the production of crown glass (Fig. 6)¹ On the local level two aspects of the economic environment were exceptionally favourable to productive investment. Firstly the period saw a greater accumulation of wealth in the area than in any other period. This wealth, from a variety of commercial and industrial ventures, was important not just for creating a pool of capital from which other ventures could be financed but in encouraging local men to put their money into risk taking ventures rather than safer forms of investment. The importance of existing local wealth and existing entrepreneurs is seen in the fact that with one exception all of the new glass firms were founded by local men who had already built up a comfortable capital from other ventures ranging from other ventures in glass to ship building. The second favourable aspect of local conditions was the recent emergence of more sophisticated financial institutions able to sustain firms by meeting their short - term credit needs - namely banks. By 1790 there were five banks in Newcastle and four of these had strong industrial and commercial connections. By 1793 the total note circulation of the Tyne Banks was £230,000 and given that there was a not unsympathetic attitude towards commerce it seems inevitable that such a large mobilisation of capital should have heralded an upsurge in productive investment in industry. A third favourable local condition that perhaps should be mentioned in respect of investment in glass as opposed to any other form of industry was the obvious success and profitability of the two older firms. Their example was almost certainly crucial in providing real evidence that there were large profits to be made from the manufacture of flat glass. They may also have

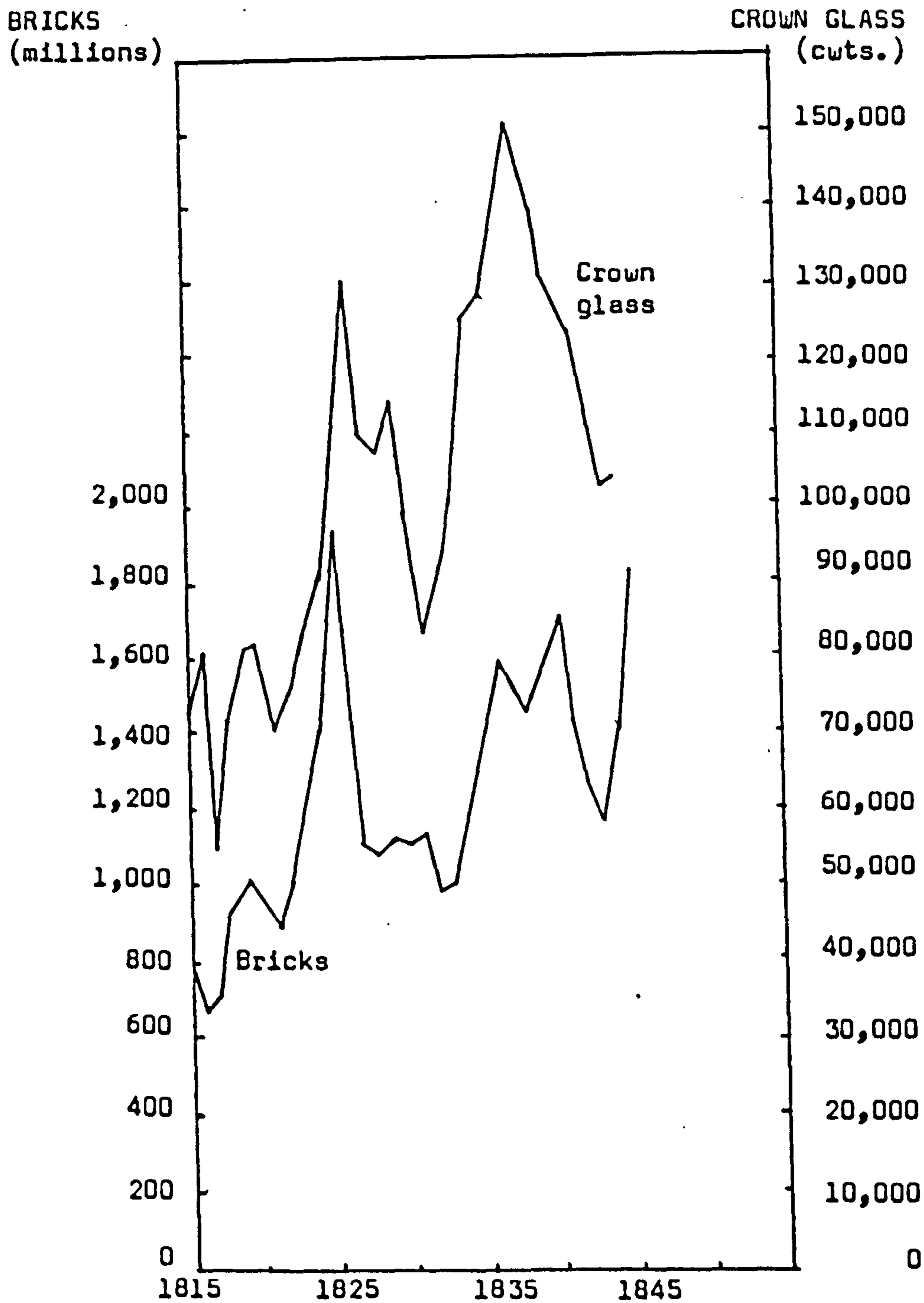


Fig. 6: Bricks charged with duty (England and Wales) 1815-1845

Crown glass charged with duty (England) 1815-1845

been an encouragement in that their existence provided a ready made pool of skilled labour in the area. As we shall see some of the newer firms staffed their new houses by systematically enticing men away from their old employment by the promise of higher wages.

This was the period in which the flat glass industry of the north-east saw its climax in terms of local prestige. It was a recognisably large and productive part of the local economy; it was frequently associated with men of great wealth and social standing in the area; it was acknowledged to be an important local contribution to the national economy. Altogether it gave good cause for local pride, to which its emphasis in contemporary descriptions of Newcastle bears witness. In 1801 the glass works were said to be "next to the coal a chief force of the wealth in this opulent town".² In 1807; "the glass works at Newcastle and on the River Tyne may be considered as the most extensive branch of manufacture we have to boast of".³

(i) The Northumberland Glass Company

The Northumberland Glass Company was the most ambitious of the new crown glass firms. Its ambitious nature was well illustrated by the manner of its establishment. Whereas the other new glass firms began with single glass houses and gradually expanded their resources, the Northumberland Company started life as a fully fledged manufactory consisting of the impressively high number of four glass houses and aptly described (see below) as "the most complete glass manufactory in England".

The company's four crown glass houses were built at Lemington, a little higher up the Tyne from Newcastle. The circumstances of the

company's establishment there were described in 1811 by the local historian Edward Mackenzie:⁴

About that time (1787) a company of enterprising gentlemen entered into the glass trade in Newcastle under the firm of the Northumberland Glass Company but the Jealousy excited by their well known talents for business created an ungenerous opposition and prevented them from procuring ground to build on until at last they applied to the late Duke of Northumberland from whom they acquired convenient scites (sic) for building at this place (Lemington). In a short time there appeared four large glass houses one of which is particularly lofty and beautiful built of bricks of the most excellent workmanship. The warehouse and offices attached to the glass works are very extensive and the whole is allowed by travellers to constitute the most complete glass manufactory in England.

The company we are interested in and almost certainly the one Mackenzie was referring to was in fact established in 1791. There had been some form of Northumberland Glass Company prior to this date for it appeared in the Newcastle Directory of 1787 as owning a flint glass house in Newcastle under their agent John Dyson. The following year Joshua Henzell was described at his death as "the chief agent to the Northumberland Glass Company at Lemington". Whatever the details of this early company were, a more convincing start came in 1791 when a deed of partnership in the Northumberland Glass Company was executed between six partners.⁵

The Northumberland Glass Company

John Graham Clarke	£6,000	Total capital £30,000.
George Waldie	£6,000	
Joseph Lamb	£6,000	
Aubone Surtees	£6,000	
John Dyson	£3,000	
Thomas Maude	£3,000	

These six were almost certainly the enterprising gentlemen of whom Mackenzie wrote. As might be expected with such a large capital (which the partners agreed to advance by £12,000 if necessary) they were men with many existing and profitable interests. John Graham Clarke was

a merchant and ship owner with many connections in the West Indies where he owned sugar plantations. George Waldie was a manufacturer and coal owner and a partner with Joseph Lamb in a soap manufactory, Heddon and Percy Main Collieries and in the Tyne Bank. Joseph Lamb was possibly the most enterprising of all the partners.⁶ He was the youngest son of a Carlisle farmer who had come to Newcastle as a linen draper, from which he had extended his interests and made a considerable fortune. By 1791 he owned collieries around Newcastle, a copperas works at Willington, a calico printing works at Carlisle, a cotton factory at Dalston, a brewery at Brampton besides being a partner with Waldie in a soap manufactory and, perhaps most importantly, the Tyne Bank. His property on his death in 1800 was worth well over £30,000. The remaining large partner, Aubone Surtees was a founder member of the older Exchange Bank or Surtees and Burdon, besides owning a large share of the Tyne Iron Company also at Lemington. He had already, of course, had cause to contemplate the large profits to be made from glass manufacturing in his quarrel with the Newcastle Crown and Broad Glass Company in 1786.

The two smaller partners were not men of such established wealth. Their role in the Company, as set out in the deed, was "to diligently manage the glass houses" for which they were to receive a salary. Dyson was evidently connected with the previous company for he was described as their "agent" at the flint glass house in Newcastle in 1787. He continued to manage the flint glass house until 1802 when he left to become a white lead merchant with his son in York. He re-sold just over half of his shares on this occasion to the partners (one half of one twelfth plus one ninth of one twelfth) for £2,566 13s 4d.⁷ The remainder was apparently sold to Robert Ormston. Thomas Maude

was in a less satisfactory position than Dyson for he did not own the hereditary right to his shares; the deed stated that on his death the other partners were at liberty to appoint a new manager and pass on Maude's shares to him. The money may therefore have been advanced to Maude by the other partners. Maude was the brother in law of Joseph Lamb and also connected to the Tyne Bank.

Although the 1791 deed was one of co-partnership, its terms split the partners into two distinct groups: - the four major partners who were to constitute a "committee", and the two managers. Control was vested almost completely in the committee who were to control the finance and "to inspect and superintend the conduct and management of the said Thomas Maude and John Dyson or other managers". Any disputes among the partners were to be settled by vote in which the two managers were to have only one vote between them. The terms of the deed placed Dyson and Maude in a position only a little higher than salaried employees but the fact that they were share holders emphasises that where, as in this case, the major owners intended taking no active part in the concern there was a positive need for managers with an interest in the firm's profitability. There is no evidence that any of the major partners took an active part in the management of the Northumberland Glass Company. Their role was confined to providing the initial capital and, by virtue of their established connections in the commercial and industrial world, giving the company an important credit worthiness. Unfortunately no details of the financial arrangements enjoyed by the Northumberland Glass Company have survived but it seems fair to assume that the fact of its direct association with local bankers would have made it an eligible recipient of credit.

In 1806 a new partnership deed was drawn up:⁸

John Graham Clarke	19/96 shares
George Waldie	"
Joseph Lamb	"
Robert Ormston	"
William Brown Jr	4/96
Walter Trevelyan	16/96

This deed was almost certainly made necessary by the bankruptcy of Aubone Surtees jr. in 1802 and the subsequent failure of the Exchange Bank. The Glass Company appears to have emerged unscathed from the bankruptcy of a major partner but this, plus the departure of the two previous managers, necessitated the entrance of new partners.

Walter Trevelyan had been offered a share in the partnership in 1791 for the deed of that date stated that he should have been included "but for reasons best known to himself refused to do so". Robert Ormston was a partner with Lamb and Waldie in other manufacturing ventures and the Tyne bank. William Brown was admitted as a managing partner.

The Joseph Lamb of the 1806 deed was not the original partner but his youngest son. By the terms of his will the elder Joseph had divided his interests between his three sons: Humble, the eldest received the most valuable portion of his estate, the coal and banking shares; Warren Maude received the Cumbrian interests including the textile factory and the brewery; Joseph was left with Willington copperas works and the shares in the Northumberland Glass Company. Despite having received the smallest part of his father's estate, Joseph Lamb was to prove the most successful of the three. (a saying of the day held that "Joseph Lamb made money, Humble Lamb kept it and Warren Lamb spent it"). As an entrepreneur he was undoubtedly a success and during his lifetime considerably extended his interests to become, in particular, a major colliery owner of the district. It was however the Northumberland Glass Company that remained the corner stone of his fortune and the

one in which he took the most active part. Unlike his father Joseph Lamb took an active role as the chief managing partner. He supervised the day to day running, was active on the firm's behalf in representing the interests of the glass manufacturers to the Board of Excise, and later was a frequent chairman of the meetings of the Crown Glass Manufacturers' Association.

Joseph Lamb was hard working, astute and well educated - both in business life and, at Edinburgh University, in more academic subjects. He was said to be a generous employer providing good wages, free housing and firing for all his employees. As both manager and major shareholder Lamb also negotiated favourable conditions for himself. In 1818 he was receiving a salary of £200 per annum for management plus the dividend on his own shares and a proportion of 5% charged on the profits of the sleeping partners and distributed to the active partners.⁹ In addition the Company paid the rent and taxes on the Great House at Dissington for him and provided free coals. These conditions were much envied by the then managers of the Newcastle Crown and Broad Glass Company, particularly the charge of 5% on the profits of the sleeping partners.

Starting with such a large initial capital and manufacturing on such an extensive scale when demand for glass was increasing steeply, it was perhaps inevitable that the Northumberland Glass Company should have been a profitable one. In 1832 John Waldie, the son of George, offered his shares to John Buddle, the coal viewer, not as Waldie took pains to point out, because he was dissatisfied with the firm but because he was in debt and needed the money.¹⁰ Waldie claimed that except for the preceeding year the shares had never paid less

than 10% - 12% and his capital in the firm he estimated as £18,000, at least "for the buildings and stock are valued at a very small sum in the above estimated capital." The bad results of the previous year he assured Buddle were only a temporary recession. Although no dividend accounts for the company have survived there is no evidence to suggest that Waldie's claim was an untrue one. The firm was a large one and it had the resources of men of large capital behind it; given this it seems not unreasonable to assume that the firm's profits followed very broadly the pattern of profits seen in the Newcastle Crown and Broad Glass Company's accounts. Both firms were of a similar size and both manufactured crown glass by similar, traditional methods. What is certain is that the partners in the firm became prosperous during the period. Joseph Lamb purchased the estate of Denton in 1822 for £28,000 and in 1830 moved to the grander surroundings of Axwell Park. In 1816 Robert Ormston purchased a country estate at Healey for £22,000.

Despite the profitability of the Northumberland Glass Company, it appears to have been a somewhat unadventurous firm. It did not expand its works in any significant way (the only change seen at the Lemington works was the closure of one of the original four houses, in 1833 it was only running three houses and in 1852 when it was finally put up for sale it consisted of three glass houses); neither did it pioneer any new manufacturing methods such as the use of soda in place of kelp; and neither, judging from the excise returns for 1832(p 161), did it make full use of its productive capacity. In 1832 the three houses at Lemington only produced slightly more in total than the single house of the Tyne Glass Company at Gateshead. The Tyne Glass Company is a useful contrast to the Northumberland Company in this respect

Both began in the same decade yet both followed different routes to success. The success of the Northumberland Company probably reflected its large initial capital and its ease of access to further credit rather than any dazzling display of entrepreneurial skill. By contrast the Tyne Glass Company began with a much lower capital with few of the financial advantages enjoyed by the other company and yet in many ways proved to be the more successful and certainly the more interesting firm. The Northumberland Glass Company was founded in the spirit of a relatively safe investment and it could be said to have maintained this spirit throughout its life.

(ii) The Tyne Glass Company

The Tyne Glass Company differed fundamentally from the other north-east glass firms in that its capital and ownership came from London. The major shareholders in the company until the 1820s were London glaziers and glass cutters. It was thus, although far removed in time, the successor to the attempts made by Tainton and Policott in the mid-seventeenth century to gain control over the material that was their livelihood. It is perhaps surprising that London glaziers had not established a direct interest in the north-east glass firm before the 1790s when the Tyne Glass Company was established. This is probably explained by the fact that glazing in itself was, as described in 1747 (see p.47), "a poor business" and it was only after the transformation of the wealthier members of the London Glaziers' Company into large glass dealers and merchants that they could accumulate the capital to finance manufacturing. The men who were involved in the Tyne Glass Company, although prominent members of the Glaziers' Company, were certainly not working glaziers but glass merchants.

The Tyne Glass Company also differed from its neighbours in that it came dangerously close to failure. Although it ultimately was to prove a highly profitable enterprise, under its first partnership (from 1796 to 1813) it was dogged by a succession of litigations, bankruptcies and cash shortages which prevented any significant growth in the firm or indeed any satisfaction to its partners. The firm kept in production but it was not successful enough to induce the original partners to keep their money in the concern when the first partnership closed in 1813. These original difficulties were probably aggravated by the intrinsic problem of directing the firm from London but the fundamental cause was certainly the extraordinary circumstances of the firm's foundation and the legal tangle that ensued. If Cookson and Jeffries provides an example of the suitability of the small partnership as a vehicle for industrial growth, then the Tyne Glass Company provides a memorable example of its disadvantages and in particular the ambiguity of the law surrounding such matters as the liability of the partnership to a single partners' debts or the right of an ex-partner to the firm's profits. In addition the Tyne Glass Company highlights the disadvantage of a small partnership where the individual partners were not themselves men of great wealth; not only was there no recourse to supplementary funds when needed but regular bankruptcies amongst the partners contributed to the general disorder of the company's progress. It was not until after 1813 when the company was taken over by Charles Attwood and Thomas Oak Smith that the Tyne Glass Company began to realise its potential.

The original promoter of the Tyne Glass Company was a Newcastle attorney named John Barber. He hardly deserves to be called an entrepreneur in the full sense of the word for his activities do not

seem to have extended much beyond persuading others to invest money in his scheme. In August 1793 Barber entered into a partnership with John and Francis Banner to carry on the business of a glass manufactory with the initial capital of £4,000:¹¹

John Barber	£3,000	
John Banner	£ 500	Total capital £4,000
Francis Banner	£ 500	

John Banner and his son were London plumbers who, although not members of the Glaziers' Company of London, practised glazing. In September 1793 John Banner had applied to the Glaziers' Company to be admitted as a freeman but was refused on the grounds that "He did not have the right to carry on the trade not having served an apprenticeship".¹² He was described as "a plumber of Cripplegate". The smallness of the Banners' shares suggest that they were not men of any great wealth.

The site of the project was a patch of land on the south of the Tyne near Gateshead known as the Saltmeadows. A glasshouse was already erected here. It had been built as a bottlehouse c. 1735 by Joseph Liddell, worked briefly by James King in the 1750s, and was at that time in the possession of Isaac Cookson under lease from the descendants of Liddell - Ann Bonner of Callerton, Sarah Bonner of Gateshead and Joseph Liddell of Moorhouse in Cumberland. The use of this glass house was secured by an agreement made in August 1795¹³ whereby the Bonners and Liddell leased the premises to Barber, described as "the agent for a company formed to carry on a glass manufactory", for twenty years at a rent of £180. (The land itself was on lease from Newcastle Corporation.) Considering the low capital the company was intending to start with it was ^{fortunate in being} able to lease an existing glass house and thus economise on initial expenditure.

Despite the original partnership having been drawn up in 1793 the company does not appear to have started in earnest until 1795 when in February of that year, a new partnership with an increased capital was drawn up:

John Barber	£2,500	
John Banner	£1,500	
Francis Banner	£ 500	Total capital £5,000
William Johnson	£ 500	

William Johnson was to act as clerk in the manufactory but he gave up his share in March acknowledging that he was unable to advance his £500 and transferring his shares to John Barber. The firm started production in 1795 and was listed in the 1796 Directory for Newcastle as "Ilderton and Barber". No Ilderton was ever a partner in the firm but the name provides a clue as to where Barber drew his capital from. Charles Ilderton was, like Barber, a Newcastle attorney and had married Barber's daughter Ann. In 1792 he succeeded to the estates and fortune of his distant cousin Robert Ilderton of Ilderton and Westoe but unfortunately did not live long enough to enjoy them for he died in December 1793, his fortune being left to his widow. Ann Ilderton (nee Barber) was evidently understood to have some connection with the glass house for she was named as a defendant in the Banners' first Bill of Supplement against the firm in 1795. In reply she disclaimed all interest in the glass house but it seems highly probable that at least some of her fortune was being used in the company under her father's (John Barber's) name.

The partnership between the Banners and Barber ended in public argument. In September 1795 the Banners inserted notices in the Newcastle papers stating their distrust of Barber and their refusal to pay bills drawn by him. In reply Barber accused them of not paying

up their share of capital for which he refused to execute the deed of partnership.¹⁴ Finally, in November the Banners issued a Chancery Bill against Barber, Ann Ilderton, William Johnson, the Bonners and Liddell for money that they claimed was owed them by the partnership. In reply the Bonners and Liddell, Ann Ilderton and William Johnson disclaimed all interest in the partnership (Johnson adding that he too was owed money for the brief time he had worked there as a clerk.). Barber admitted his interest but denied the debt.

Before the Banners' bill had even been exhibited, Barber had embarked on a new venture. On 2 November 1795 a new partnership deed was drawn up between himself, described as "owner and proprietor of a crown glass house at Saltmeadows", and three new partners:

John Barber	£2,500	
Richard Strutt	£1,000	Total capital £5,000
Thomas Strutt	£1,000	
Thomas Wheeler	£ 500	

The Strutts and Wheeler were all London glass cutters and prominent members of the Glaziers' Company. They were to be admitted into the partnership on the deposit of their shares into an account taken out in the company's name in the Tyne Bank; which money was to be used "to carry on the manufactory until the manufactory can from its own returns do without it ". In other words they were supplying working capital which, in this case, amounted to 50% of the total initial capital. On the same day Barber raised a further £1,000 of working capital by selling two of his five shares to James Crankshaw of Newcastle and this money too was deposited in the Tyne Bank.

Like its predecessor, this partnership was to prove an abortive one for in May 1796, before the deed had been executed, Barber was declared a bankrupt. His new partners came off rather unfortunately

from this; it was discovered that Barber had used the money they had paid into the Tyne Bank to pay off his other debts; and although he had maintained there was sufficient stock at the glass house to manufacture £4,000 worth of crown glass this was found to be untrue and production had to be stopped "for want of kelp and money which occasioned great loss". Finally an extent - in - aid was issued against the company by the crown in order to recover duties of excise owed and the new partners were obliged to discharge it out of their own pockets. Despite these unforeseen expenses the remaining partners agreed to carry on the concern on their own account assuming that as the deed of partnership between them and Barber had never actually been executed they were the sole owners of the glass house. This assumption was shaken in March 1797 when the two Banners issued another Bill of Supplement against them and Barber's assignees for the money still owed them. In reply the Strutts argued that the Banners had no claim on the manufactory and that Barber had forfeited his claim by becoming bankrupt. The case was heard in Chancery but a judgement deferred until a proper account could be taken of the company; this was never done and, to the probable relief of the Strutts, the case became defective on the bankruptcy of Francis Banner in 1797.

The partnership of the Strutts and Wheeler was to carry on the Tyne Glass Company until 1813 without further assistance or capital from the Banners or the Barbers or any of their assignees. They themselves remained in London where they appear in the directories as "glass cutters", "glass merchants", and occasionally and misleadingly "glass manufacturers". Their presence in London created the need for trustworthy managers at Gateshead and thus in 1797 shares were sold to two local men, Joseph Henzell and Robert Turnbull, on condition

that they jointly manage the concern; the price of the shares was the original £500 each. From his name it seems probable that Joseph Henzell had had previous experience in glass houses; Robert Turnbull certainly had, since in the 1790 Newcastle Directory he was listed as the agent to the Newcastle Broad and Crown Glass Company. Further share assignments took place in the early years of the nineteenth century with the entry of other London glass cutters; - Thomas Kent, Samuel Parker, William Parker and Henry Hammond. Of these new partners the most significant was Henry Hammond for it was through him that Thomas Oak Smith and Charles Attwood were to enter the firm. In 1804 when Hammond bought his one tenth share in the Tyne Glass Company he was in partnership with Attwood and Oak Smith as glass cutters and dealers. The shares were bought on behalf of the whole cutters partnership and when in 1810 Hammond retired, the glass house shares passed to these two. Attwood and Smith were to take over the entire Tyne Glass Company in 1813 and it is perhaps slightly ironic that their entry into glass manufacturing, in which they were to prove so able, was so much a matter of chance; a consequence of their primary business as glass dealers.

Charles Attwood (1791 - 1885) was the sixth son of Matthias Attwood, an extremely wealthy Midlands iron master and banker.¹⁵ There seems to be no obvious reason for Charles' entry into the glass trade beyond the fact that it was a promising trade in which a younger son might embark on a commercial career. Charles' three elder brothers had been started off in more distinguished directions: the eldest, George had inherited the Attwood bank, Matthias and Thomas had both gone into Parliament as M.P.s for Whitehaven and Birmingham respectively. The remaining sons followed a more prosaic career in trade; Edward

began as a merchant in Liverpool, James as a Russia merchant in London, and Charles as a glass merchant in London. (Despite beginning in trade, all the younger Attwood brothers ended up in manufacturing; James as a mineral manufacturer and mine owner in Cumberland, Edward as a glass manufacturer at Sunderland and Charles as a glass manufacturer and later an iron master.) From such a wealthy background and with a direct connection to the Attwood Bank, there seems little doubt that Charles was an eligible partner in any business.

Before Attwood and Oak Smith bought up the Tyne Glass Company more legal troubles occurred. In June 1810 John Barber, "late of Newcastle upon Tyne and now of Rolls Building London", and his son Thomas, a jeweller, exhibited a bill of complaint against John Banner, the assignees of Francis Banner, the Strutts and all the other partners claiming that they were owed over £2,000 independent of the partnership account and that this money should be paid to them out of the profits of the glass house. Neither the Barbers nor the Banners had renounced their claims on the concern even though they had taken no active part in it for the last twenty years. In 1809 Francis Banner advertised for sale his "one tenth of the Tyne Glass Company plus the profits made since its commencement in 1794,"¹⁶ and in 1810 Thomas Barber also put his three tenths up for sale.¹⁷ Given this entanglement of claim and counter claim it is perhaps not surprising that the rightful owners should have been led to abandon the business; in 1813 a notice was inserted in the papers to the effect that the partnership had come to an end and the concern was now closed.¹⁸

The Tyne Glass Company did not close in 1813; it had, in fact, been bought up by Charles Attwood and Thomas Oak Smith. By 1813 they had already purchased half of the shares in the hands of the

London glass cutters and in November 1813 they purchased the Strutt's shares, described as "one half" of the concern, for £3.567. There is no doubt that by these purchases Attwood and Smith considered themselves to be the sole owners of the glasshouse and, incredible though it appears, Attwood was evidently ignorant of its complicated legal history; he later claimed that he had never heard of either Banner or Barber until summoned to appear in the Chancery suit of Banner v Barber in the autumn of 1813.¹⁹

Attwood thus "unwittingly became involved in a law suit of long standing and almost interminable complication". He determined to fight it to the end but it was not until 1822 that the case was finally dismissed in Attwood's favour as "the most melancholy case ever to disgrace the Chancery annals". According to Attwood's biographer it had taken its toll on him financially and mentally:

To Mr. Attwood it meant little short of absolute ruin ... Nine years had been frittered away in a vexatious and costly litigation which completely unhinged his prosperity and created a gnawing sense of insecurity. When the trial terminated he found that the parties from whom he should have recovered his costs were mere men of straw. He was thus the poorer by thousands of pounds.

This is perhaps a slightly exaggerated account of the effects of the case on Attwood's prosperity for the Tyne Glass Company appears to have flourished from the takeover of Attwood and Oak Smith in 1813. It is more than probable that the resources of the Attwood bank helped in this recovery. No financial records of the company have survived but we do know that the bank advanced money to the glass cutter's business in London in which Attwood remained a partner. In 1817 Henry Hammond went bankrupt and amongst his debts was his share of £10,000 advanced to him by the bank in 1815 in partnership with Charles Attwood and C.F. Woolcott as glass cutters and dealers.²⁰

It seems not unreasonable to assume that money was also advanced to the manufacturing end of the business especially as there is evidence that the works were considerably improved in 1813.²¹

The favourable financial connections enjoyed by Attwood should not however obscure a more important factor in the company's success after 1813. This was a patent taken out by Attwood in 1817²² which was not merely a crucial element in the success of one particular firm but a significant landmark in the progress of glass chemistry in Britain. Briefly, the patent consisted of the use of pure manufactured soda and lime in place of kelp as the alkali used in the manufacture of crown glass. In the patent's words it consisted of the use of "lixivated ashes (or earthy residue of kelp or barilla) combined with different alkaline or saline matters and lime or calcerous earth in certain very variable proportions", which method "was different from the use of kelp or barilla according to any mode heretofore or at present in use". The use of soda occurred in the addition of the alkaline or saline matter:

And further I do declare that I have found the addition of the crystalised carbonate of soda in proper proportions to the other materials according to the circumstances, a very convenient and effectual mode of administering such additions of alkaline or saline matter as aforesaid.

Attwood's patent was not the complete replacement of kelp by soda; he used soda in combination with the insoluble earthy residue of kelp. Nevertheless the wording of his patent was so general that he appears to have patented the use of soda in any proportions at all and not just his particular mixture, which the patent describes in detail. The patent frequently repeats that no absolute proportions can be laid down as "the manufacturer will be better guided by his own observations and experience and by attention to the variations in the cost and charges in the different articles and modes than by any rate or rule which

may be given for that purpose.". His own particular mixture was therefore to be taken as an illustration and guidance only and not as the substance of the patent.²³ By patenting the use of soda in crown glass Attwood gained an unassailable advantage over his fellow manufacturers. It was not until the fourteen year old patent expired that the use of soda was taken up by other manufacturers - notably Cookson and the Birmingham manufacturer R.L. Chance - who developed improved methods that completely did away with kelp altogether.

The inspiration for Attwood's patent was his conviction that the standard quality of glass was poor and there was much scope for its improvement. His patent must, therefore, be seen as dealing primarily with quality and not with any improvement in the cost or efficiency of its manufacture. The fact that it did pioneer a development that was ultimately to reduce costs was purely fortuitous; at the time soda was not being produced on a commercial scale and was not, therefore, a cheap alternative to kelp. The main improvement resulting from the use of soda was the colour of the glass; it enabled glass "instead of being in colour something like a goose egg to assume the smooth and transparent consistency it now retains".²⁴ Further improvements were included in the same patent for "lessening the arching, crooking or curvature of the table of glass which takes place commonly, if not always, under the modes of operation at present in use while the glass is conveyed to the annealing arch and in the said annealing arch". This consisted of a metal framework designed to keep the glass in a perpendicular position without any lateral pressure before and during annealing.

Attwood's success in both in improving the quality of his glass and, by means of his apparatus, enabling large tables to be manufactured

is clearly apparent from contemporary comments. According to Abraham Rees writing c. 1810²⁵

The large crown glass of Messers Hammond and Smith is superior in quality as well as in size to that of any other manufacturer the glass of Messers Hammond and Smith is 60" in diameter and will admit of being cut into squares of about 33" by 23" and a little more or less. This glass is almost free from those specks, wreaths etc. which discolour other glass and distort the objects seen through it. It now supplies the place of German sheet glass for prints, large sashes and exportation to those foreign markets where that glass was formerly made.

According to Samuel Parkes:²⁶

It was formerly thought to be a great acquisition to be able, by this (crown) process, to make a perfect table of glass 4 feet in diameter but I understand that Messers Attwood and Smith, formerly Hammond and Smith, of Gateshead in the county of Durham are enabled to produce tables of 5 feet which are the more valuable as they yield larger squares than were ever made, except in plate glass, and the quality of it is of the best kind.

In addressing himself to the quality of glass Attwood was typical of others who took out glass patents during this period. Very little attention was paid to efficiency, or cheapness in the manufacturing process for the incentive to introduce new methods of manufacturing was low due to the fact that any alteration of the traditional manufacturing process had to pass the test of acceptance by the Board of Excise. It was not until the 1830s that low manufacturing costs became a significant factor in a manufacturer's success and not until after the repeal of the glass duties that low costs became a necessity for survival. The first quarter of the nineteenth century was a time when competition between manufacturers was becoming keener and customers nicer in their choice. This, plus the fact of price agreements in the trade, tended to channel competition into the area of quality. The importance of good quality in the market may well have been appreciated more fully by Attwood, primarily a London glass dealer, than by his fellow manufacturers in the north-east. In 1817 Attwood was still based in London at the London

warehouse of Attwood and Smith in Bridge St. Blackfriars; he was described in the patent as a "glass manufacturer of Blackfriars".

One of the first to take up the use of soda in crown glass following the expiry of Attwood's patent was the Birmingham manufacturer R.L. Chance. Chance told the 1835 Commissioners, with every justification, "we are one of the most experimental houses in the trade" and it is interesting that like Attwood he should also have come into manufacturing after a successful career as a London glass dealer. It is perhaps no coincidence that two of the most active improvers of crown glass should have shared a background in the London glass trade. It is also probably no coincidence that Chance should have taken into his partnership, in the late 1820s, a man who had previously been the managing partner at Attwood's house - James Hartley. Attwood and Smith had carried on in partnership with William Richardson until January 1817 when they took James Hartley into the concern as a managing partner.²⁷ There seems little doubt that Chances' own experiments with soda would have been helped considerably by Hartley's own experience in Attwood's house. However there is evidence that the transfer of knowledge was not entirely one way. One of the surviving pieces of evidence from the Tyne Glass Company is a notebook devoted to technical matters such as a number of 'recipes' for crown glass amongst which is one marked "by letter from J. Hartley, Smethwick 30 June 1829"²⁸ (the comment attached to this recipe is "colour excellent, works well" and the ingredients listed are: 15 cwt. sand; 6 cwt. 1qr. carbon; 4 cwt. Bristol best ashes; 6 cwt iron crystals). The recipes in the notebook serve as a reminder that what Attwood stated in his patent was true, namely that no absolute fixed proportions could be laid down and that the colour, strength and transparency could be

altered ad infinitum by minute variations in the ingredients. These conditions put a high premium on the services of men such as James Hartley whose progress upwards from salaried employee to managing partner was almost certainly not a reflection on his ability to supply capital but rather on his ability to produce glass of good quality thus giving his firm a significant advantage in the market place. Hartley's progress is matched by another man associated with the Tyne Glass Company, William Richardson who also left in order to become a managing partner with another firm (see below).

Attwood's Tyne Glass Company was one of the most significant of the north-east crown glass firms operating during the first half of the nineteenth century. It set new standards for quality and size and pioneered a major chemical development. It is not surprising that years later Attwood should have been singled out for especial mention in connection with local improvements to glass by R.W. Swinburne.²⁹ Swinburne praised Attwood, not merely for the contribution made by his patent but for many other improvements for which "the manufacturers of glass are much indebted" and which, although Attwood himself had been prevented from pursuing them by his other commitments, had since all been put into practice. Besides being a significant firm the Tyne Glass Company was almost certainly a profitable one. No financial accounts from the company have been found but the house was sufficiently successful to enable Attwood to expand by buying a second house at Southwick, on the Wear, c. 1825; this was the crown house that had previously been occupied by Burns and Brumell (see below). Attwood was also successful enough to be joined in the trade by his two brothers Benjamin and Edward following Thomas Oak Smith's retirement in 1822. Attwood's success is also suggested by the statistics provided by the 1835 Commissioners (see Appendix 1) which show the

original Gateshead house to have had the largest production of any of the north-east crown glass houses in 1832 and the Southwick house to have had the fourth largest production. There is no doubt that both houses were at a considerable advantage in having a secure outlet in London, in the glass cutters and dealers business of Attwood and Smith, but the major factor in the success of both houses was almost certainly the ability and application of Attwood himself, and in particular his concern with improving the quality of the commodity he was producing.

(iii) The North Tyne Glass Company

The North Tyne Glass Company is linked to the Tyne Glass Company by the involvement in both of one man - William Richardson. Richardson's share in the Tyne Glass Company had come through his father, Thomas Richardson, a painter and glazier of Newcastle who in 1803 had bought from Joseph Liddell his share in the land on which the Tyne Glass Company was built. By 1816 William Richardson was in partnership with Attwood and Oak Smith all as subtenants under Thomas Richardson. The presence of Richardson was probably welcomed by the two major partners for whilst they remained in London they had need of an able managing partner in Gateshead.

In 1825 William Richardson left the partnership to take up a presumably larger share of a new company being established at St. Peter's Quay in Newcastle upon Tyne - the North Tyne Glass Company. His partners in this venture were Robert Gothard, a local ship builder and John Ridley (no relation to Sir Matthew White Ridley). Unfortunately nothing is known about the share agreement and capital of this company but its establishment is quite interesting in another respect in that it appears to have involved not just enterprise in glass but enterprise in the

speculative building of glass houses. The promoter of the speculative building was the owner of St. Peter's Quay, William Row. Row's interest in glass was not in the trade itself but as an element in his plan to establish St. Peter's as an important commercial and manufacturing site on the river. His activity was therefore confined to erecting glass houses and offering them for sale or to let to others. Row had already built a bottlehouse on St. Peter's Quay and added to this in 1823 with a broad glass house which advertised that it was producing broad green window glass of a superior quality in August 1823.³⁰ The fact that it was a broad house rather than a crown house probably says something about Row's lack of knowledge or commitment to the glass trade. If his intention was to sell the concern to another party however, then he was successful for in April 1824 George Dunn informed Sir Matthew White Ridley that "A Mr. Gothard has purchased the new broad glass house at St. Peter's of Mr. Row".³¹ This was soon converted into a crown house for in May the Newcastle Courant reported a small fire in the flashing furnace of the "North Tyne Glass Company" at St. Peter's and in June the three partners, Richardson, Gothard and Ridley petitioned the Common Council saying that their manufactory was "nearly completed" and asking for permission to extend the quay to make it sufficiently deep for vessels at neap tides.

Encouraged by the success of this venture, Row appears to have tried to repeat the exercise for in May 1824 Dunn wrote to Matthew White Ridley that "William Row is gone up to London where a connection is to be formed to build another crown house on St. Peter's Quay." (connection in this case meaning agreement with a dealer to buy the glass from the house). Another glass house was soon built and in June 1826 Row offered for sale the "just completed Crown Glass Manufactory at St. Peter's".³²

The advertisement claimed that the house could commence making glass immediately as "a set of Workmen are engaged and pots ready with a connection formed that will take all the glass they can make." It also pointed out the advantage of the depth of water at the quay which could accommodate vessels of 9 or 10 ft. of water thereby saving an expense of £3-4,000 a year. The depth of water at the quays seems to have been an important consideration for both the North Tyne and the Tyne Glass companies and indeed silting of the Tyne in the 1830s and 1840s was certainly one factor in the decline of Newcastle and Gateshead as centres of the industry. Row did not find a ready buyer for his new crown house for it continued to be advertised until 1828. In that year it was almost certainly taken over by the North Tyne Glass Company which by 1833 was working two houses at St. Peter's.

The second interesting aspect of the foundation of the North Tyne Glass Company is that it highlighted the inevitable consequence of an increase in the number of glass houses in the area - a shortage of skilled labour. The recruiting method used by the new company was simply to offer the men in other glass houses far higher wages than they were at present receiving; in April 1824 Dunn wrote to Ridley "the newcomers offer the men at liberty such high wages as throws the rest into confusion". The loss of men who were not bound, and the disturbance caused to those who were, was considerable and in May Dunn wrote that the men were all demanding the wages being offered by both Gothard and Attwood. Attwood's wages were the highest of all for, as he confessed to Dunn, he had felt obliged to cancel all his men's old agreements and give them higher wages than those offered by Gothard "as he was afraid of losing what he had left". The Newcastle Company suffered quite badly from losses of men and in April Dunn reported that they had hardly sufficient to work two

houses. By June the remaining workforce was still "very refractory and quite unreasonable in their demands for upstanding wages" but the immediate crises had been averted for new men had been got from Scotland, others were being quickly instructed in the vacant jobs and the new house was allowing them to keep some of their men until needed:

Those that are hired from us cannot leave before October and as the new concern cannot make any glass this year they won't have any objection to our keeping the men, if we choose, until wanted and these men are doing all in their power to oblige us which makes me submit patiently - altho' very much against nature. But will continue to do so for the interest of the firm.

One interesting small episode in this labour crisis suggests that the Newcastle Company had considered William Richardson himself as a prospective managing partner. In May Dunn wrote to Ridley on this subject:

I note your opinion concerning Mr. Richardson. The day after I heard they had engaged some of our men some thought struck me concerning that you mentioned and having a small bill to pay him on my account called at his house where he observed what a pity it was that we had not such a man as Mr. Brown who manages the outdoor business for Messers Cookson and Cuthbert. I replied, smiling, that such a situation might have answered another person, he took the hint and observed he was very much obliged for the good opinion I had of him but that he was bound fast.

(iv) The South Tyne Glass Company. The Sunderland Glass Company.

The Southwick Glass Company

One notable feature of the development of the local industry in this period was the growth of glass houses beyond the traditional centre of Newcastle. As we have seen flat glass manufacture spread up river to Lemington, across the river to Gateshead and to these examples we must add a second crown house at South Shields and two new crown houses at Sunderland. Unfortunately no detailed information about any of these firms has come to light and therefore it is only possible to sketch in their development making assumptions from the few available facts. The first assumption is that none of these firms was a particularly

large or ambitious venture since none was founded by men of conspicuous wealth. Two of the firms were founded by men who were already in the glass trade as bottle or flint glass manufacturers, Richard Shortridge and Addison Fenwick, which in their cases probably meant that the initial capital requirements were smaller than they would have been had they been entering the glass trade for the first time.

The crown glass house at South Shields was established by Richard Turner Shortridge, a Quaker originally from Stockton, who already occupied a flint glass house in the town. It was presumably the success of his flint glass house that persuaded Shortridge to enter the crown glass trade, taking John Russell and John Barrass as partners.³³ They began manufacturing crown glass c. 1806 as "The South Tyne Glass Company". The company established itself in an existing glass house that had been built by the short lived bottle manufacturing firm of Temple and Blackett at Mill Dam, South Shields c. 1802. In 1805 the bottle house had been offered for sale pointing out that it was suitable for conversion into a crown glass house³⁴ and although still for sale in 1806 it was almost certainly bought by Shortridge in that year. It was certainly in Shortridge's possession in 1807 when it was damaged by fire and in January 1808 Shortridge, Russell and Barrass bought a number of glass house pots from Sir John Delaval.³⁵ Some idea of the size and value of the firm can be gathered from an insurance policy taken out in 1811:

Shortridge, Russell and Barrass, South Shields³⁶

Crown glass house, cutting shop, pot loft,
warehouse, all communicating at the Mill Dam £2,700

Clay house, clay mill, kelp mill, mixing house,
single and double cellar, all brick and tile £ 300

This was an average size and value for a single house firm (see p.140 for a comparison with Cookson's three house firm in 1808).

Shortridge Russell and Barrass continued to manufacture crown glass until 1845. Richard Turner Shortridge died c. 1817 and was succeeded as major partner by his son Richard Shortridge (1792-1884)³⁷ A second crown glass house was built during the boom of 1824 but appears to have been put out during the subsequent depression: by 1833 Shortridge was only working one flint house and one crown house at Shields. The building of the second crown house aggravated the labour crisis of 1824 particularly as Shortridge was evidently not too scrupulous in his methods of recruitment. According to Dunn in April 1824:³⁸

Mr. Shortridge has acted very improperly by sending one of his men up amongst ours a few days after Mr. Head took ill and got one away who Mr. Head had privately agreed with for two years but no articles signed I went to Shortridge's works at Shields on Wednesday last when the man was working and after being examined by Mr. Shortridge's solicitor (himself being in London) I got the man discharged and he came back to his work here next day. He is a very good workman and besides we are not well off for workmen, several having left since Christmas that we cannot work two houses together. But getting this man back will do good.

Although the loss of any workman was a set back to the firm, a good workman had a crucial effect on the firm's profitability since the quality of the glass depended to quite a large degree on the workman's skill. According to G.R. Porter variation between the qualities of firsts, seconds and thirds, was largely caused by the skill of the workmen:³⁹

These variations (firsts, seconds and thirds) arise principally from the want of sufficient care on the part of the attendants in maintaining the necessary degree of heat in the furnace, If this is once suffered to fall, the property of the glass in being a very imperfect conductor of heat renders it difficult to raise it again to the former degree. In the operation of a large glass house it does not happen that beyond one third of the quantity made is of the first quality; seconds and thirds compose the largest proportion of the produce and it seldom occurs that the quality sinks below the latter of these two denominations.

The first crown house at Sunderland was the Southwick crown glass house built by Thomas Burn and George Brumell during the late eighteenth century; the first apparent mention of the Southwick Crown Glass Company is in 1788.⁴⁰ Although broad glass had been manufactured at Southwick

in the early eighteenth century, the crown house was at a quite different site, further up the river. Both Brumell and Burn were local men, Burns being a ship builder and ship owner of some local standing.⁴¹ During the early nineteenth century the house was managed by John Brumell who signed petitions to the Board of Excise on behalf of the company in 1807 and 1813. Burn and Brumell occupied the house until c. 1825 when it was taken over by Charles Attwood. The crown glass house at Bishopwearmouth belonging to George Fenwick & Co. appears to have been erected at a slightly later date; the company did not sign the 1807 petition to the Excise from the crown glass manufacturers of Tyne and Wear but the company was certainly in production by 1812 when both it and the Southwick company complained to the Excise about the conduct of the local excise officers (see p. 431). The Fenwicks were also bottle manufacturers and owned a warehouse in London through which their crown glass was sold.

It is unfortunate that not more is known about these two companies for, although perhaps not particularly important in themselves, they are significant in that they mark the beginning of the development of serious flat glass manufacturing on the Wear; a development that would culminate in the Wear usurping the Tyne's traditional position as the centre of the region's flat glass industry. The most important dates in this development are Attwood's move to Southwick c. 1825 and James Hartley's establishment of the Wear Glass Works in 1836. The two earlier companies are important predecessors however, firstly in proving that the Wear held equal advantages with the Tyne in respect of manufacturing costs, and secondly in establishing a pool of skilled glass workers. Whether Attwood would have moved to the Wear had he been required to start from nothing rather than merely take over the house, plant and workforce of Burn and Brumell is not known but it seems fair to assume that their

existing presence on the river must have been a considerable encouragement to him.

(v) The Newcastle Broad and Crown Glass Company

This period was also one of considerable change for the oldest crown glass company in the region. Broadly speaking this change was an attempt to transform the company into a type of business organisation more appropriate to the nineteenth century: firstly, by shifting the company's resources from broad glass to crown, and secondly, by reorganising the partnership in favour of the minority of active partners. Both these changes were largely effected around 1825 and were completed by 1827 when the company became in effect a completely new firm, no different in essence from any other crown glass firm on the Tyne, headed by a small partnership of six and concentrating on the manufacture of crown glass alone.

There is no doubt that the incentive to rationalise the company was considerable. Both dividends (fig. 7) and a single stock account of 1812 indicate that, despite a comparatively small amount of fixed capital, the concern was a highly valuable one, and furthermore that value lay largely in their production of crown glass rather than the outdated broad glass:

Crown Glass Stock, taken 31 December, 1812⁴⁴

Debts to sundries	£10,934 6s 0d	Amount of buildings	£7,915 15s 10d
Duty to government	£14,333 7s 1d	Glass on hand	£3,949 5s 6d
<u>Balance of stock</u>	<u>£49,333 16s 9d</u>	Debts due	£45,516 7s 11d
		Raw materials	<u>£17,219 19s 7d</u>
	£74,601 9s 10d		£74,601 9s 10d

Fig. 7: Dividends on the Newcastle Broad and Crown Glass Company

1785 - 1825⁴⁵

	<u>Crown Glass</u>		<u>Broad Glass</u>	
1785	£ 480*	£20**	-	-
1786	-	-	-	-
1787	456	19	-	-
1788	-	-	-	-
1789	-	-	-	-
1790	-	-	-	-
1791	420	18½	-	-
1792	-	-	-	-
1793	500	21	-	-
1794	500	21	-	-
1795	320	15	£326***	£14**
1796	400	17	-	-
1797	720	30	-	-
1798	600	25	-	-
1799	480	20	-	-
1800	600	25	-	-
1801	840	35	-	-
1802	-	-	-	-
1803	1,440	60	312	13
1804	1,200	50	240	10
1805	1,200	50	360	15
1806	1,680	70	336	14
1807	1,200	50	288	12
1808	1,200	50	144	6
1809	1,320	55	240	10
1810	1,440	60	288	12
1811	1,440	60	312	13
1812	1,680	70	336	14
1813	1,200	50	312	17
1814	1,520	65	336	10
1815	2,400	100	400	10
1816	1,200	50	240	10
1817	600	25	240	10
1818	960	40	288	12
1819	1,440	80	288	12
1820	1,200	50	288	12
1821	1,080	45	288	12
1822	1,080	45	288	12
1823	2,515	115	240	10
1824	2,515	115	-	-
1825	-	-	-	-

Notes: - = Figures not available
 * = Dividend received by Matthew White Ridley on 24/114 of the crown company
 ** = Dividend per share
 *** = Dividend received by Matthew White Ridley on 8/24 of the western broad house and 16/24 of the eastern and middle broad houses.

Although the dividends suggest that the production of crown was substantially increased in 1802 it was not until the 1820s that the eastern and middle glass houses were given over completely to crown along with the existing western crown glass house. As had already been mentioned, labour shortages meant that the company was hard pressed to keep even two houses fully manned and the excise statistics for 1832 provided in the 1835 Commission show the company working two crown glass houses and one broad house (the middle bottle house had been sold off to Robert Todd, a bottle manufacturer in 1823⁴²). According to Thomas Dunn, the company's managing partner, in his evidence to the 1835 commission, demand for broad glass was negligible and not ^{sufficient to keep} even one house in work the whole year, nevertheless broad glass continued to be manufactured until 1842 when the company advertised the St. Lawrence house, "a building recently used as a broad glass house", to let.⁴³ The manufacture of broad glass was not, therefore, completely abandoned but from the late 1820s onwards there is no doubt that the company was primarily a manufacturer of crown glass.

The initiators of the shift towards crown glass were, as might be expected, those active partners at Newcastle who managed the firm and were familiar with the changing demands of the market. Their motives in this change were almost entirely self-interested ones for at the same time as they were rationalising the company's productive resources they were also attempting to rationalise its ownership by buying out all of the sleeping partners. This was to be a deliberate and artificial change in the ownership of the company but, in itself, it was the result of a more natural change, namely the entry into the partnership of men with more ambitious ideas than their predecessors. The four architects of the scheme to buy up the sleeping partners were Sir Matthew White Ridley

(the third baronet), Robert Hedley, John Head and George Dunn. Ridley had succeeded to his shares in the company on the death of his father in 1813; from whose legacy duty papers comes an interesting account of the value of the glass company compared to the family's other interests:⁴⁶

Account of the Personal Property of the late Sir Matthew White Ridley, 1813

Province of York

Cowpen Colliery	£20,000	
Broad and Crown Glass Company	£ 9,049	
St. Lawrence Bottle house	£ 4,181	
The High Bottle house	£ 3,718	
Heaton stock (hay etc.)	£ 500	
Blagdon stock	£ 500	
Bank	£15,000	
Tithes	£37,000 £89,948

Province of Canterbury

3% consols	£ 8,000	
Navy 5% ^s	£ 2,000	
Globe insurance shares	£ 2,000	
House in Portland Place	£ 5,500	
Furniture in above	£ 2,000 £19,500

The glass shares represented his 24/114 and 24/120 in the crown company and broad glass houses respectively, which can be roughly estimated as one fifth of the whole. He owned one half of the St. Lawrence bottle house and one third of the High Bottle house. The second active partner, Robert Hedley had succeeded to the 14 crown glass shares of George Lake having been left them in Lake's will⁴⁷ as an investment until he should reach his majority. John Head had managed the crown glass houses since 1791 and although only possessing 4½ shares himself, was keen to acquire more. George Dunn had succeeded to his shares from his father John, a merchant of Tonnichside near Glasgow, who in 1777 had brought shares in the St. Lawrence broad house and crown house from Meg Tyseman of North Shields, the daughter of Peregrine Henzell.⁴⁸ George Dunn managed the St. Lawrence house until 1818 when he became the second manager of the crown houses.

On the expiry of the crown partnership in 1809 the active partners at Newcastle took legal advice on the possibility of excluding from a new partnership those partners "who have become such as personal representatives of deceased partners whom the majority know little of and who, residing at great distance from the manufactory, cannot conveniently be consulted or give assistance to the co-partnership business"⁴⁹. A list of shareholders in 1812 confirms that the proportion of non-resident or sleeping partners was indeed large:⁵⁰

	Shares	
Matthew White Ridley	24	
R. Hedley	14	
F. Hall Staindish	12 x	
Alexander Adams	8	
William Hargreaves	12 x	x = non resident partners
Mary Wilton	14 x	
Thomas Shadforth	8	
Elizabeth Rawlinson	8 x	
Elinor Hays	4 x	
James Hamilton	3 $\frac{1}{2}$ x	
John Head	4 $\frac{3}{4}$	
Henry French	2	

The non resident partners included a minor, F. Hall Staindish, the heir of Anthony Hall of Wombwell in Yorkshire. With him in mind the active partners had also taken advice on the possibility of excluding minors from the partnership but had been told that although minors could not carry on trade, their trustees could. Hall Staindish's trustee was George Baker of Elemore Hall in Durham. The other non-resident partners included a variety of people. William Hargreaves was the High Sheriff of Northumberland and lived on his estate at Shawdon in the north of the county. He had come by his shares by being the assignee of Catherine Henzell, the sister of Thomas and daughter of Peregrine Henzell. Mary Wilton was the daughter of Paul Henzell who had been chief managing partner to the company until his death in 1790. Mary Wilton lived in London as did Elizabeth Rawlinson, the grand-daughter of Peregrine Tyzack. James Hamilton was a merchant of Tonnichside near Glasgow and Eleanor Hays, the

widow of John Hays of Durham who had held shares in the company during the 1780s. All of these people contributed nothing to the partnership and yet received the profits on $51\frac{1}{4}$ of the 114 shares. Following the increase in crown production at the beginning of the century the profits thus being dispersed were quite substantial ones; in 1815 the dividend had reached £100 per share which meant a total of £51,000 being paid out to the sleeping partners. It is easy to see how this could be termed a "loss" by the active partners; either a loss to the firm itself which had need of re-invested profits to further increase the production of crown, or a loss to their own pockets. Either way, it was evidently not seen as a satisfactory state of affairs by the active partners and by 1818 there was written mention of a plan to buy out the sleeping partners.

Besides draining profits from the firm, the high proportion of partners living at a distance from Newcastle produced another problem. For the first time in its history the company found itself with a shortage of suitable managing partners. In the early years of the century the managers had been John Head and Henry French but French's death in 1815 and Head's increasing age led Matthew White Ridley in 1818 to offer the management to someone outside the partnership - William Lorraine.⁵¹ Lorraine was offered a salary of £200 per annum plus the profits on two shares which he would be permitted to buy at a low price. Fierce objections to this offer were raised by John Head on the grounds that to admit a new partner would harm their "plan", under which he hoped to receive $14\frac{3}{4}$ shares, which would now have to be revised. His objections proved unnecessary for Lorraine declined the offer saying that two shares were not enough and neither was the salary considering the age and infirmity of Head. The management

was eventually given to George Dunn who was already the manager of St. Lawrence broad house. Dunn appears to have bought the eight shares of Alexander Adams who died in 1817. Head himself died in 1824 and his intestate death added in a small way to the problems of the active partners; George Dunn wrote to Ridley in 1824 expressing his concern that "should Head's trustees agree to continue with the glass house trade the owners may one day be very numerous and am afraid this may damage our plan."

The plan to purchase the sleeping partners' shares was not put into operation until 1824. Why the active partners delayed their moves until 1824 is not known but it may have been a consequence of the depression in trade of 1817 - 1818 and the lack of sufficient profits on their own shares to finance the purchases. In retrospect their timing was badly judged for to delay until the boom conditions of 1824-5 meant purchasing the shares when their value was at its highest and this meant a not inconsiderable expense which could possibly have been avoided had they acted earlier. Approaches were made to all the sleeping partners by Sir Matthew White Ridley's solicitor, Armorer Donkin, and an early success was the purchase of Mary Wilton's shares in March 1824.⁵² This was followed in April by the purchase of Miss Rawlinson's eight crown and broad shares for £5,371 cash and in that month Donkin was able to inform Ridley that he had provisionally agreed for the purchase of Mrs. Hay's shares and had high hopes of getting those in Scotland (by this time in the possession of James Hamilton and Ralph Ironside, both of Tonnichside). By June negotiations were going well with all parties bar two - George Pawson of York, the assignee of William Hargreaves, and Frank Hall Staindish. Staindish's shares were still in the trust of George Baker who, being in the locality, was in

a good position to judge the value of the concern. Staindish had in fact considered selling his shares in 1820 which Baker firmly recommended against - "the glasshouses are a very valuable property and sold would not bring in one quarter of their value."⁵³ It was probably on Baker's advice that Staindish rejected Donkin's initial offers in 1824 and the active partners were certainly aware of Baker's influence in this matter; in June 1824 Dunn reported to Ridley that when Baker had come to collect Staindish's dividend he had asked about the new firm at St. Peter's Quay and whether this would mean a reduction in their profits, which Dunn had heartily assured him would most certainly be the case from henceforth. Dunn also told Donkin to press this point with both Staindish and Pawson; to emphasise that "so many new manufactures are beginning in the same branch both here and in other places" and that this would reduce their own future profits.

In December 1824 Pawson took the initiative in the negotiations by setting his price at £750 per share. Donkin replied by offering £725 which represented the purchase price paid to Mrs. Wilton plus the profits for 1824. This offer was not accepted but in March 1825 Pawson did agree to sell for the slightly reduced price of £710 per share. This slight reduction was said to be due to a "reduction in value" but this may have been deliberately engineered by Donkin; in March he told Ridley that although the crown profits for 1823 and 1824 stood at £115 per share "actually the profits are more but in the book stand as cash in hand". Staindish was not long in following Pawson's example and in May 1825 he sold his twelve shares to the remaining partners for a total price of £10,000 which represented his twelve shares valued at £710 plus the profits for 1823-5.

The purchase of Staindish's shares completed the major stage of the plan. It left the final, and in many ways equally difficult, stage of deciding how the shares should be re-allocated among the remaining partners. Following some argument, a proposal was drawn up by Donkin and put to the partners in August 1825 for their approval:

Shares purchased of the non-resident Partners59½
 Shares divided among the old partners.....54¾

Matthew White Ridley	24	existing	shares	plus	16	=	40
Mr. Hedley	14	"	"	"	10	=	24
George Shadforth	8¾	"	"	"	9¼	=	18
George Dunn	8	"	"	"	14	=	22
Joseph Sewell	<u>—</u>	"	"	"	<u>10</u>	=	<u>10</u>
	54¾				59¼		114

George Shadforth was an old partner who, although not taking as active a part in the firm as Ridley or Hedley, lived in Newcastle, was a man of considerable wealth and influence, and thus was a useful partner (his shares had been inherited from his father, Thomas, who had married Elizabeth Orde to whom shares in the glasshouses had been left by Jane Roddam). Joseph Sewell was a new partner. He was to be admitted as a managing partner and this proposal resurrected the old argument over whether a new manager should be offered shares. In the same way as Head had objected to Lorraine in 1818 so, in 1825, did George Dunn - the existing manager - to Sewell. Following Head's death in 1824 Dunn had written to Ridley assuring him of his loyalty but insisting that he should continue as the sole manager:

It is impossible that more than I can have the sole management ...
 ... From this year's experience if there had been another manager with myself the business would not have been got done as it has, altho' not as well as I could have wished for. When clerks and men have two men to apply to daily no command can be had over them the reverse would be the case. But when a manager satisfies himself and makes up his mind to act firmly they pause before they complain again.

In Dunn's opinion all that was wanted was an "outdoor manager" who would

be salaried and subservient to Dunn. The company employed three clerks (on salaries of £150, £100 and £50) and in the event of the manager's indisposition one of the partners could step in to supervise with the help of the outdoor manager and the three clerks.

Dunn's protestations were in fact a prelude to his suggestion that his son Thomas succeed him as the sole manager; a suggestion that the other partners did not take kindly to and they continued in their search for another managing partner. The first man they considered was Robert Todd who owned the nearby bottle house. Dunn objected and they turned to another candidate, Joseph Sewell. Sewell, like Todd, was already in manufacturing on his own account and owned the St. Anthony's pottery in partnership with Armorer Donkin. It was Donkin who had first put Sewell's name forward vouching for his character and pointing out the many useful qualities he would bring to the company, including an extensive foreign connection. Donkin's espousal of Sewell's cause was not entirely disinterested for, as he confided to Ridley, "Entre nous, if Sewell were to be engaged in any way we would avail ourselves of the first opportunity of getting rid of the pottery. It has paid us well but I only entered into it to save Sewell and would be glad to be out of commerce altogether.". It was considered quite in order for Sewell to divide his time between the two concerns and it was suggested that he spend three mornings a week at the glass house "which would be ample for all the purposes of general supervision and check". Despite continued objections from Dunn, Sewell was eventually admitted into the partnership and Donkin's proposals of August 1825 were accepted with the proviso that should Sewell quit the pottery four of Ridley's shares should be transferred to him.

The establishment of a new and smaller partnership did not result in the immediate large profits that the new partners hoped for. The boom of 1824-6 was followed by a severe depression in trade and in consequence the reduction of the firms profits to, at its lowest point in 1831, nil. The total profit for 1832 was only £914 4s 5d which, as Dunn wrote to Ridley, "is certainly an improvement as compared to 1831 but is a miserable profit for so large a capital". The dividend was an equally miserable £10 per share, "which is the most we can do because of the long credit we are obliged to give ". The fact that the profit was so low for so large a capital was certainly the most miserable aspect of the whole situation. Altogether the partners had spent at least £20,000 and possibly as much as £40,000 merely in purchasing shares. This money was money invested in the company and yet it was entirely unproductive for it represented nothing more than the paper value of the shares when their value was at its highest. As has already been described, at the same time as the capital was being increased, the fixed resources of the firm and its productive capacity were being contracted. The result was a company whose large capital was not fully matched by its productive capacity and therefore a company that afforded little satisfaction to its partners in times of bad trade.

The bad trade of the early 1830s resurrected the problem of management. In 1833 George Dunn wished to retire but as trade was so unprofitable could find no one to purchase his shares from him at their proper price. His anxiety either to sell his shares or have a new manager appointed contrasted sharply with his hostility to a second manager in 1824-5; so keen were both he and Sewell to give up some of their duties of management that they offered to give up part of their salaries to an outside manager if a new managing partner could not be found. This

outside manager would live in and supervise early and late whilst Dunn would keep the books and Sewell supervise the mixing department. They suggested for this post a Mr. Brown who had been employed at Cooksons but who was leaving "because he cannot effect a great improvement in the glass". Dunn was eventually replaced by a new managing partner Anthony Nichol. Nichol, like Sewell, was a protege of Armorer Donkin. He had left Newcastle to try his hand at farming and trade in London but "distance having made a God of him among his few personal friends in the town he was through their agency promoted to a situation in an extensive glassworks".⁵⁴

The disappointments of the bad trade immediately after the boom of the mid twenties should not obscure the good performance of the Newcastle Crown and Broad Glass Company during most of this period. The dividend accounts clearly show that profits for the first quarter of the century were high and far exceeded anything realised in the eighteenth century. The down swing in trade after 1825 was not something that could have been avoided and the fact that the company had by this time been transformed into a more typical nineteenth century crown glass company meant that at least it was able to survive this depression; had the company remained as a broad glass firm with a high proportion of sleeping partners then it almost certainly would not. The only qualification to the achievements of this period is the considerable expense involved in purchasing the sleeping partners' shares which was a direct consequence of not acting until 1824 and could perhaps have been avoided. Why the partners did delay until 1824 remains something of a mystery; as we have seen the "problem" of the sleeping partners was seen as such as early as 1812 and a plan to buy them out was certainly in existence by 1818.

(iv) Isaac Cookson & Co.

In such a prosperous period for the glass trade it was perhaps inevitable that the Cookson company should share in the general good fortune and experience a period of high profits and expansion. What was not inevitable was the spectacular degree to which the company exploited these favourable conditions for its dramatic growth in this period: far exceeded anything achieved by any other company. The major factor behind this spectacular growth was, arguably, the skill and dedication of the company's proprietors, and in particular the Cooksons. This company was most fortunate in its family for the Cooksons provided four generations of almost faultless entrepreneurial skill from which the firm benefited. The major Cookson of this period was Isaac Cookson (1745-1831) who had taken over the management of the firm on his father's death in 1783. To him must go most of the credit for the achievements of this period although his sons John and Isaac took active parts in the glass companies from at least 1802.

1802 marked a major re-organisation in the Cookson glass companies, which was brought about by the death of Isaac's brother John Cookson whose interests in the bottle house on the river Tyne were advertised for sale in August of that year.⁵⁵ His death put the glass interests entirely into Isaac Cookson's hands and he appears to have used this opportunity to re-organise the various partnerships in order to bring his two sons, John and Isaac, into the trade. The bottle house at Bill Quay was given to a partnership headed by his eldest son John and including Jane Deer, the daughter of Evan Deer, and Samuel Wilson, a one time manager of the crown house at South Shields. The company traded under the name Cookson, Deer and Wilson, or just John Cookson & Co. Isaac Cookson jr., the third son, was given a half share in the two bottle houses at Newcastle which became known as Isaac Cookson & Son. In addition both Isaac and John were given a share in the crown and plate company at Shields which became known as Isaac Cookson & Co. This company included one outsider William Cuthbert (1778-1815) a wealthy Newcastle attorney and a founder of the Tyne Bank. Cuthbert does not appear to have had any previous formal connection with the Cooksons and it is possible that he merely bought the shares of the late John Cookson. In 1802 the bottle company at Shields became known as Cookson and Cuthbert instead of its previous name of Cookson, Deer and Blakett.

The exact composition of Isaac Cookson and Co. is not known but there is no evidence to suggest that the partners included anyone apart from the three Cooksons and William Cuthbert. A third house had been built at the site c. 1807 and an insurance policy taken out in 1808 gives a good indication of the size and value of the firm at that time:⁵⁶

Isaac Cookson & Co. of Newcastle upon Tyne; glass manufacturers

1.	Kelp mills, pot lofts and cellars, warehouse, all under one roof at Milldam, S. Shields	£1,500
2.	Stock and utensils there	£1,000
3.	Glasshouse, adjacent but not communicating	£ 300
4.	Building called "The Calkers"	£ 100
5.	Cutting house, warehouse, clay cellar and mill	£2,000
6.	Stock and utensils therein	£3,000
7.	Middle glass house, only near	£ 600
8.	Round glass house, only adjacent	£ 500
9.	Joiners shop and fret rooms underneath	£ 400
10.	New houses under one roof at Milldam	£ 500
11.	Old houses in tenure of T. Johnson and others	£ 100

All brick or tiled as aforesaid

Total £11,000

Additional policy covering houses near the market place, S. Shields. In tenure of Isaac Cookson, Samuel Wilson, T. Dixon glassmaker, C. Maddison glassmaker, Thomas Lee victualler and Isaac Cookson Jr.

£2,000

The comparatively low valuation of the actual glass houses is interesting and underlines that the fixed capital demands for the industry were not large; production methods had not, after all, materially altered since the adoption of coal fired furnaces in the seventeenth century.

Although under excise regulations, plate glass was permitted to be made in a crown house, it seems likely that two of these houses were crown houses and the remaining one devoted to blown plate.

The major expansion seen by Isaac Cookson & Co. in this period was not a further expansion of their existing capability in crown and blown plate glass, but an entirely new departure; the introduction of cast plate glass. Cast plate, as its name suggests, was plate glass made by casting or founding the metal on a large iron table. The advantage of this method as compared to blowing it in cylinders was that plates of a larger size could be obtained. Until the entry of Isaac Cookson & Co. there was only one other cast plate firm in England; the British Plate Glass Company at Ravenhead, which had been founded in 1773 with an incorporated joint stock of £70,000.⁵⁷ The large capital of this company and its unfortunate history of financial loss in its initial years had perhaps dissuaded others from following its example and it enjoyed a complete monopoly in the plate glass trade until Cookson's entry in 1815. It was said that a London firm, Quintin and Windle, attempted to establish cast plate in the early years of the nineteenth century but this attempt was not a successful one and the credit for breaking the Ravenhead Company's monopoly must go to Isaac Cookson. Cookson's entry into cast plate must then be seen as a move of considerable significance not just in the history of one firm but in the national development of the flat glass trade. It had very real effects on the trade for by breaking the monopoly Cookson was ^{partly} responsible for reducing the price of plate glass by about 50% (this figure was mentioned in the 1835 Report as an example of the beneficial effects of free competition, but it should be pointed out that price reductions in this period were also the result of the reduction in duty of 1819).

These reductions in the price of plate glass around 1826 were of great importance in encouraging the wider use of plate glass for ordinary glazing purposes. There is no doubt that polished plate glass had occasionally been used in windows throughout the eighteenth century but that its price successfully prohibited its potential as a glazing glass being fully realised. It was not until the 1850s that plate glass came into its own as a cheap glazing glass but the movement towards this end was significantly accelerated by the expansion of production and the reduction of prices around 1820.

Information about the establishment of cast plate glass is to be found in a series of cash books belonging to the Newcastle offices of Isaac Cookson.⁵⁸ Although the actual manufactory was at South Shields, the crown and plate glass company was known as Isaac Cookson & Co. "of Newcastle upon Tyne" and in practice the finances were managed from the Newcastle office. In fact the Newcastle office appears to have acted as a general office for all the Cookson glass concerns, - the bottle houses at Newcastle, the Bill Quay house and, later, the Jarrow Alkali Company - receiving large remittances and paying out bills on their accounts, receiving export debentures and transferring money to and from the Newcastle Bank of Ridley Bigge & Co. Thus the cash books, whilst not being able to give a complete picture in day to day detail of any one of these concerns, provide an invaluable overall view of the finances of the Cookson industrial interests.

Two aspects of the transition to cast plate are immediately obvious from the cash books. Firstly, the transition was spread out over a decade for although the actual casting of the plate at the South Shields house appears to have been successfully accomplished by

1815 it took until 1826 for the plate glass works at Forth Banks in Newcastle to be brought to completion. The Newcastle works housed the polishing and grinding stages of the manufacture which in some respects were the most important parts of the whole process in that it was on the polishing that the value of the commodity depended. Unpolished or rough plate glass was comparatively worthless and for a cast plate glass concern, with its large initial capital, to yield a satisfactory return on the capital invested it had to be able to sell the glass completely finished and ready to use as polished plate glass. The works at Forth Banks were begun in 1815 on land leased from Major Anderson.

The second aspect of the venture revealed by the cash books is that in terms of investment in fixed capital and labour saving machinery the polishing works at Forth Banks was far more significant than the plate glass house at South Shields; indeed it seems fair to say that the Newcastle plate glass works was the nearest the early nineteenth century north east glass industry ever got to the mechanisation of its manufacturing methods. The difference between the two sites is well illustrated by their respective amounts of insurance; by 1826 the cast plate house at South Shields was insured for £3,000 in the County Fire Office whereas the Forth Banks works was insured on two policies; one of £5,100 for the grinding sheds and steam mill and one of £8,200 for the "high plate works" or polishing house. It is true that the insurance on the high plate works included a stock of polished plate glass but even so the difference in the policies reflects a difference in the amount of machinery particularly steam powered machinery, at each site.

Before describing in more detail the two sites, something should be said about the moving of the polishing works to Newcastle which physically separated the different stages of the manufacturing process. Basically the move seems to be a simple reflection of the predominance of Newcastle as the main commercial centre on the Tyne during this period, and in particular of the fact that Newcastle had a customs house. There were more opportunities for shipping plate glass, both within the British Isles and abroad, at Newcastle than at South Shields and thus by moving the polishing works to Newcastle Cookson avoided the risk of transporting the polished plate glass up the river for shipment. The risk involved in transporting the rough plate was small since the plates were not fragile (rough plate was manufactured twice as thick as it would eventually be after polishing) and neither was the cost of transporting it large; at the end of every year Cookson deducted a sum from the accounts for "bringing the rough plate from Shields, boat hire, unloading the boxes and labourage" which never amounted to more than £70. The company's acceptance of the redominance of Newcastle is well illustrated by a comment made by William Cuthbert to the 1835 Commissioners. As^a manufacturer whose factory was in South Shields, he might have been expected to support the movement for a customs house at South Shields but Cuthbert declared himself uninterested and predicted that "a customs house at Shields will have little to do, all the export business will remain at Newcastle".

The length of time taken for the full perfection of the plate glass works at Newcastle suggests that the operation was financed from the internal resources of the existing company and indeed there are no indications in the cash books of any external source of capital; there are no payments of interest on loans or mortgages until 1826 when

the site of the plate works and the whole Westgate estate was bought from Major Anderson on a mortgage of £10,000. Although internal capital was undoubtedly the most important source for the company, Cookson also received an unexpected cash boost from the government in the shape of the drawback on exported rough plate. As Cookson himself told the 1835 Commissioners, when the firm began to manufacture cast plate the workmen's efforts were so poor that he exported the plates rough merely for the sake of claiming the drawback. By doing so he unintentionally profited from the badly drawn up legislation which made no distinction between polished and rough plate (see pp. 377-378); the drawback was calculated per square foot of glass making an allowance for a loss of 50% of the glass during polishing. Cookson made the matter known to the Excise as soon as he realised he was claiming back about three times what he had paid in duty, but it was claimed that he had pocketed nearly £70,000 from the whole affair, which indeed the excise statistics would seem to confirm (see Fig. 20).

The site at Forth Banks comprised a large grinding house, a steam mill and a polishing house. The steam mill, or "Knox's Mill", was used for grinding the plaster of paris in which the plates of glass were secured during grinding and polishing. All the buildings had been erected by the company c. 1816-1818 and the first insurance policy was taken out on the site in 1818. In 1819 the high plate works was insured separately from the steam mill and grinding shed and both policies were gradually increased to reach their eventual levels of £8,200 for the high plate works and £5,100 for the grinding shed in 1826. The cash books show a steady increase of machinery and steam power at both sites. Machinery components usually came from the iron and steel foundry of

I. & T. Cookson and in the cash books were usually itemised in general terms as, for instance, "Cast Metal for the steam mill"; occasionally an item was described more completely, as, for instance, in August 1818 when as "iron curtain for the emery machine" was purchased. Purchases of and repairs to boilers and pistons occur from 1816 onwards, which indicates that steam power was being used right from the beginning, but the two original engines were replaced by larger ones in 1822 and 1823. In 1822 Robert Wilson, an engine builder and whitesmith whose works was also at Forth Banks, was paid for "a new engine at Knox's Mill" and in 1823 payments began to be made to Robert Hawthorn, whose works was nearly adjacent to the plate glass works, for a new 50 h.p. engine. Hawthorn's total bill came to £2,480 including £1,500 for the new engine, £352 for additional power to Knox's engine and £441 for an engine and a new inclined coal way at the crown house at Shields. This 50 h.p. engine was still doing sterling work in 1863 and was mentioned with pride at the British Association meeting as an example of Tyneside engineering skills.⁵⁹ Hawthorn built another 25 h.p. engine for the plate works in 1831 at a cost of £700.

The grinding and polishing of the glass were both well suited for adaptation to steam power. Essentially the process was the same as that described by Campbell in 1747 ; a plate of glass was held horizontally in a frame and moved backwards and forwards on a surface on which sand and running water constantly played. The only requirement for the job in Campbell's time was strength and therefore it was an obvious candidate for the substitution of steam power for muscle power; the Ravenhead Company had used a Boulton and Watt engine since 1789. Cookson's works and the employment of steam power is well described in The Penny Magazine

of June 1844.⁶⁰ The first stage of the process was the grinding which was done "in an immense room filled with machinery in a constant state of rotation". The plates of glass were cemented into flat frames with plaster of paris and inverted, one over the other, the top one being attached to the engine which kept it constantly moving in a rotary motion. Sand and water were fed between the plates by small boys. After grinding the plates were roughly polished in a similar fashion and finally the plates were polished, again assisted by steam, by a system of wooden polishers covered with felt and a polishing paste of red oxide, emery and putty. The cash books include regular and large purchases of all these raw materials; emery and plaster of paris were usually purchased from other Newcastle merchants, felts from hatters and leather straps from coach makers.

The brief description of the works given in 'The Penny Magazine' is amplified by the evidence given to the Children's Employment Commission of 1842,⁶¹ this evidence creates a rather depressing picture of the nature of the labour demanded by the use of steam powered machinery. Glass grinding had never been a skilled job but by abolishing the requirement of strength the use of machinery had put the task within the capacity of women and boys. In 1842 the plate glass works employed 109 women, 91 men and 30 boys and of these it was the women and boys who attended the machinery. The women were largely employed in the polishing house and the boys in the grinding shed where they stood or sat on benches beside the machine and fed sand and water on to the glass whilst trying to avoid being hit by the "runners" constantly moving back and forth. Many of the boys had in fact been injured by the machinery and the Commission inspector, John Roby Leifchild, noted that he had frequently pressed the case for fencing off the machinery to the manager but had

been told it was impossible due to the necessity of constantly inspecting the glass. Not only was the work hazardous it was also unhealthy for the windows were not permitted to be opened as "outside dust would be injurious to the polishing process"; as a result the air was thick with dust from the sand, the emery and the ground glass. The machines were kept going all day from six in the morning until six at night or occasionally later if demand was strong and the boys were expected to work these hours and to eat their meals in snatches whilst standing at the machinery. The picture of the glass works that emerges from the Commissioners' Report is of a place of unrewarding and unpleasant labour being performed by unskilled boys from poor families.

The writer of The Penny Magazine also visited the plate glass house at South Shields which provided a striking contrast to the noisy labour-saving machinery at Newcastle; "here everything is changed, the men are different, the buildings, the processes, the materials, the machines - all are so totally distinct as to appear like a different subject of manufacture altogether ". The South Shields glass house was a large, gloomy and silent place and the actual casting of the glass was a most impressive sight; the intense light from the molten glass produced dramatic effects of light and shade and the temporary oxidisation caused when the glass was rolled out produced a swirl of brilliant-colours on the surface of the glass.

The cash books begin in 1816, after casting had begun, and therefore there is no information about the initial expense of the new method. However it seems fair to assume that it was not too large since most of the necessary iron equipment - the casting table, cuvettes, rollers chains, etc. - could have been supplied by the Cookson foundry. There

was not the expense of building a new casting house for the first castings were performed in the old blown plate house and it was not until 1820 that a new casting house was built. This new house was first insured in 1820 for £2,000 with an addition of £600 in 1821 for a new loft and stock of pots. In 1824 a fire destroyed the roof and the insurance was renewed at £3,000. This new plate house was said to have been built for Cookson by the Newcastle architect and builder John Dobson, which seems perfectly plausible in view of Isaac Cookson jr.'s later employment of Dobson at the Westgate estate and in designing Cookson's country house at Meldon Park.⁶²

Although the polishing works at Newcastle was a significant step towards more efficient production it still depended completely on the cast plate house at Shields which continued to produce cast plate by the only known method which although practicable was somewhat lengthy and wasteful. ^{large scale} production of plate, using cheaper and more efficient methods, did not become a reality until the actual casting of the plate had been improved and this problem was not tackled with any great success until the late 1830s and 1840s when the lifting of the excise regulations permitted greater scope for experiment and improvement. Cookson's cast plate did not pioneer any new methods or equipment and it therefore was important only in that it substantially increased the amount of cast plate in the market thereby encouraging a reduction of prices and the use of plate glass for glazing.

As previously mentioned, the claim made in the 1835 Commission that Cookson's entry into plate glass reduced prices by 50% was probably confused with the effects of the reduction of duty in 1819, however there is no doubt the competition Cookson provided did have an effect

on the prices of the British Plate Glass Company. Some idea of the effect can be seen in the many advertisements taken out by the British Company in the Newcastle papers during the early 1820s advertising their reductions in prices and firmly pointing out that "it is acknowledged that the Company's plates are far superior to any others manufactured in England".⁶³ Their first price reduction of 2s 9d per sq. ft. occurred in 1819 which was of course merely an effect of the reduction of duty but in 1820 they advertised a further reduction in price of 2½ - 20% depending on the size; this was almost certainly a response to Cookson.

It is difficult to draw a direct price comparison between the British Plate Glass Company's glass and Cookson's as the glass quoted in the Company's advertisements is invariably silvered whereas Cookson appears only to have marketed unsilvered glass, and the only comprehensive price list that has been found for his glass consists entirely of unsilvered glass.⁶⁴ One direct comparison can be made, but it is in the Irish market. The evidence given to the 1825 Commission into the Revenue included price lists supplied by two plate glass dealers in Dublin. One of these dealers, Mr. Donovan, was the agent for the British Plate Glass Company, the other, Mr. Kearney, did not name his supplier but as Cookson was the only other cast plate manufacturer in England at the time it seems fair to assume that it was him. The price comparison is interesting for it shows Cookson with a price advantage in the smaller squares of plate but the Company providing cheaper glass of large sizes:⁶⁵

<u>Size</u>	<u>Mr. Donovan</u>	<u>Mr. Kearney</u>
12 x 10"	3s 7d	3s 4d
15 x 11	6s 11d	6s 0d
18 x 14	-	10s 6d
20 x 16	17s 8d	19s 4d
19 x 18	18s 3d	20s 0d

24 x 18	23s 5d	26s 0d
35 x 22	49s 1d	53s 2d
48 x 22	92s 0d	94s 3d
56 x 30	192s 3d	200s 0d
62 x 47	487s 7d	-

The fact that Cookson marketed only unsilvered glass and that he was cheapest in the smaller sized panes suggests that he was aiming at the market for glazing rather than for mirrors. This is also suggested by one of his major complaints to the 1835 Commission which was that the wastage allowance was inadequate for the manufacture of small panes of glass; Cookson claimed that the duty per ft. on a plate 144" x 80" was 30% of the price but that on a smaller plate 14" x 10" it was 60 - 70%.

Cookson's concern with producing a glazing glass is also suggested by the fact that his glass appears to have been of a slightly lower quality than that produced by the British Plate Glass Company; mirror glass had to be virtually perfect with no distortions whatsoever, window glass had lower standards. The quality of Cookson's glass did in fact create some difficulties with the Board of Excise in 1819 when Cookson was forced to petition the Treasury complaining that the export officers at London had been rejecting his glass as "not perfect" with the result that "the whole of the respectable part of the trade in London have given your memorialist notice that they decline further transactions until the matter is settled with the Board of Excise".⁶⁶ The difficulty had arisen as a result of the 1816 legislation closing the loophole allowing the export of rough plate which had directed that all exported plate glass should be "free from stains and blisters and be perfect and fit for immediate use as and for ground and polished plate glass". The export officers had taken to interpreting this definition to the letter which Cookson pleaded was quite unreasonable as there was

no such thing as a completely "perfect" plate and so long as the glass was polished and fit for immediate use it should be allowed to be exported.

The Excise's report to the Treasury on the subject sympathised with Cookson and a new definition was drawn up and inserted into the plate glass act of July 1819. This act made Cookson's position worse in several respects for its main purpose was to reduce the duty on plate glass from £4 18s per cwt. to £3 per cwt. which left Cookson with a large unsold stock of plate glass on which the higher duty had been paid but which he was not now able to pass on to the customer. He approached the Excise solicitor, Mr. Carr, who agreed to allow the firm a discount of duty of 1s 9d per ft. on its complete stock of glass as taken on July 5th 1819. The stock amounted to 742 ft. at the Newcastle warehouse and 13,821 ft. at London, plus a few cwt. of rough plate glass and the total discount amounted to £2,175 4s 4d. This sum was eventually paid to the firm but not without some reluctance on the Board's part on account of the informality of the agreement made between Carr and Cookson. The affair underlines the tendency of the Excise to bend according to the standing of the glass manufacturer it was dealing with; Cookson enjoyed the advantage of being on good terms with the Board, and in particular Mr. Carr. Cookson & Co. was the only glass house to receive this rebate of duty: according to Carr "the stock of that house was the only one on which it was agreed to be allowed and they alone claimed it."

Most of Cookson's cast plate went to the London warehouse but the cash books disclose a regular trade to local customers and a certain amount exported by the company from Newcastle. The export entries

illustrate well the considerable benefits to be gained by being able to export direct and claim the immediate cash payment of the drawback: from the manufacturer's point of view the drawback almost amounted to the government advancing money on behalf of the foreign customer, since a large proportion of the home value of the glass could be in the manufacturer's pocket before it had even reached its destination. In April 1817, for instance, a cargo of 680 ft. of plate glass was sent to Antwerp; the drawback was £222 but the remittance from Vanderhoeven Bros. of Antwerp for 678 ft, and received four months later in August, was only £76 14s 5d. The following year Vanderhoevens were sent 999 ft the drawback of which was £321 and the remittance only £108 7s 2d. The most frequent destinations for crown and plate glass were, as might be expected, North America and the Baltic. To the 1835 Commission Cookson and Cuthbert declared their principal export markets to be Canada and the East Indies with themselves sending direct to Canada but using the medium of the London East Indies merchants for exports to India; there is one instance of the Company sending direct to India in the cash books. The drawbacks noted in the cash books were neither regular nor particularly frequent, occurring for the most part in the spring months. In all they usually amounted to about 30 shipments per year, including cargoes of bottles, but the amounts were occasionally quite large claiming drawbacks of up to £700.

Remittances from English customers were collected by travellers who were sent out regularly on journeys to the South, the North and Ireland. London customers paid the warehouse and local customers paid the Newcastle office directly. Not surprisingly among these local customers are found the builders of some of the more notable buildings of the time. Richard Grainger ordered £368 worth of plate glass in

February and June 1833 at which time he was engaged on his projects at Eldon Square and Leazes Terrace.

It is unfortunate that not more is known about the structure of the partnership of Isaac Cookson & Co., and in particular who was the moving spirit behind the move into cast plate. Whilst there is no doubt that Isaac Cookson snr. continued to hold the major proportion of shares in the company the fact that he was approaching 70 in 1815 suggests that the move was perhaps planned and executed by his children Isaac and John, 39 and 43 respectively in that year. Isaac certainly appears to have been controlling the Newcastle offices from at least 1816 since the cash books are clearly his and contain some of his personal financial transactions. It is especially unfortunate that the exact shares in the partnership are not known for it is thus impossible to deduce the exact value of the whole concern from an account of the estate of Isaac Cookson snr. on his death in 1831 (see Fig. 8). The stock in trade of the crown and plate glass company is certainly a proportion of the whole (the leasehold estate perhaps remained his own personal property) but it seems safe to assume that it was a large one. The only known share holding of any of the partners is that of Isaac Cookson jr. who held $3/32$ shares. One interesting point from this account is that Isaac Cookson snr. had no interest in the Jarrow Alkali Company despite the fact it had grown out of the soda works in the plate glass works. The Jarrow Alkali Company was entirely the concern of Isaac Cookson jr. and William Cuthbert jr.

Figure 8: Account of the Personal Estate of Isaac Cookson snr. 1831⁶⁷

		£
1.	Cash - in house and banks (Ridley & Co. & Roberts & Co.)	16,187
2.	Furniture etc.	1,600
3.	Farming stock	250
4.	Stocks in trade, viz;	
	Wrought iron and steel	£5,264
	Cast Iron Foundry	3,930
	Crown window & plate glass works	35,506
	South Shields bottle works	1,718
	Newcastle bottle works	3,272
	Paper mill	177
	 49,868
5.	Leasehold estates, viz.	
	Iron and steel tenements	£200
	Cast iron foundry	650
	Crown & plate works, premises & tenements	18,212
	South Shields bottle works	2,785
	Crow Hill tenements	158
	Westwood farm	598
	"The Tygar" public house	1,200
	 23,804
6.	Rents due at death	560
7.	Bonds, Bills, notes and interest	6,167
8.	Canal shares viz. Grand Junction Canal + dividend	930
9.	Book and other debts, viz.	
	Wrought iron and steel	6,762
	cast iron foundry	7,420
	Crown & plate works	24,927
	South Shields bottle works	1,196
	Newcastle bottle works	10,479
	Burroden Quarry	187
	Corporation of Newcastle(ballast)	709
	Johnston and Brandling	82
	 51,765
10.	Bank stock, consols	232,391
11.	Dividends on above	4,301
	<u>Total of Property</u>	<u>£387,829</u>

PAYMENTS

1.	Administration and funeral expenses	
2.	Rents and taxes due at death	15,814
3.	Debts, various	2,086
	<u>Net amount of Property</u>	<u>£369,928</u>

Altogether the growth of Isaac Cookson & Co. during this period was extremely impressive. The works at South Shields had doubled in size, crown glass production had increased and cast plate had been successfully introduced. Perhaps most important of all the foundation of low cost production had been laid with the adoption of soda in crown glass and the mechanisation of half of the plate glass process. The Cooksons had shown great technical and commercial initiative and their activities had affected not merely their own firm but the whole glass trade in England, in particular the plate glass trade. By the 1830s the use of plate glass as a glazing glass was well established; in 1835 Charles Babbage pointed to its increased consumption and the fact that all the better class shop fronts were glazed with plate.⁶⁸ By this time the use of plate glass for glazing had been further encouraged by the establishment of several new, large cast plate firms such as the Thames Plate Glass Company and the Liverpool and Manchester Plate Glass Company which began in 1836 with a joint stock of £100,00 (and advertised for a manager in the Newcastle papers in February 1836).

4. 1830 - 1850

The changes experienced by the north-east flat glass industry during the 1830s and 1840s were if anything more dramatic than the spectacular growth of the preceding four decades. According to the statistics appended to the 1835 Excise Report, the north-east possessed, at that time, a remarkably healthy flat glass industry; in 1832 eight flat glass companies were in operation in the region producing between them a substantial portion of the national production of crown, plate and broad glass. By 1850 none of these eight companies were still in existence, the number of companies had dwindled to four, all of which were comparatively newly established concerns or partnerships:

R.W. Swinburne & Co. had been formed in 1845 to take over the Cooksons' works: James Hartley had established his glass firm in 1836: the Wearmouth Crown Glass Company had taken over Attwood's Southwick works c. 1838: the Tyne Tees Glass Company had taken over Shortridge's old crown house in 1846. By 1850 only three of the old works were occupied by flat glass firms, the remaining five being either vacant demolished or converted to some other purpose: Attwood's Tyne Glass Company had closed in 1840; the North Tyne Glass Company in 1845: Addison Fenwick's Crown Glass Works at Sunderland had been demolished in 1846 in order to make way for a ship building yard; the Northumberland Company's Lemington works had been taken over by a bottle manufacturer and the Newcastle Broad and Crown Glass Company, which had been put up for sale in 1848, was being sold off to small manufacturers such as an artificial manure manufacturer. The north-east flat glass industry of the 1850s bore little resemblance, at least on the surface, to the industry of 1830. How can these changes, and in particular

the disappearance of the older established crown glass companies, be accounted for?

The period in which most of these changes were concentrated was the 1840s, and in particular the five years following the repeal of the glass duties in 1845. To contemporary commentators there was no doubt that repeal was the root cause of these changes, although they were at a loss to explain exactly how repeal had had such an injurious effect: as the Newcastle Guardian reported "The cause of the present depressed state of the trade is attributed to various causes, none of which appears to us satisfactory".⁶⁹ Later commentators have provided a more detailed explanation by pointing out that the repeal of the duties removed the fiscal advantages which had favoured crown glass and handicapped sheet glass, and therefore that the older firms who manufactured crown glass alone were suddenly placed in a vulnerable and unprofitable position.⁷⁰

There seems no doubt at all that repeal did play a crucial role in the collapse of the old crown glass firms in the region but what precisely was this role? Did repeal itself initiate sudden and dramatic change in the industry by creating conditions in which the old crown glass firms were suddenly unable to function? Or did repeal merely bring an existing trend to its inevitable conclusion; were north-east flat glass firms already weak beyond the point of recovery and did repeal merely accelerate a decline that was already irreversible? Before looking at repeal and its effects in the period that immediately followed it, it is to the period leading up to repeal that we must first look.

(i) The 1830s

The major factors affecting the progress, or lack of progress, of the north-east flat glass industry during the 1830s were rational rather

than local. On the whole the decade appears to have been one of severe difficulties for the national flat glass industry as a whole, thanks to a number of factors in combination: firstly considerably increased competition within the flat glass trade, secondly the deterioration of trade during the last half of the decade, and thirdly the government's prolonged uncertainty over whether the glass duties were to be repealed. Individually none of these factors could be said to have been encouraging but in combination they created a positively discouraging economic environment, in sharp contrast to the favourable conditions that the industry had enjoyed during the building boom of the 1820s.

Perhaps the most important factor from the north-east's point of view was the increased competition within the trade. The boom in crown glass production of the first quarter of the nineteenth century was not confined solely to the north-east. The period saw the establishment of many new firms in other parts of the country and, given the improvements in transport facilities, the inevitable result was competition between manufacturers greater than had ever been seen before.

The most important new area of growth was in South Lancashire⁷¹ particularly around St. Helens. The area had long enjoyed many of the natural advantages possessed by the north-east, most importantly coal, and this was confirmed by its choice as the home of the British Plate Glass Company in 1773. The major disadvantage of the area when compared to the north-east was the difficulty of transport to London but this was remedied with the opening of a direct canal link to London in 1805. The first crown glass house in the area, Mackay West & Co., had been established in 1792 but it was not until the 1820s that the area began to realise its full potential for glass manufacturing. With hindsight the most

important of the houses that were established in the 1820s was that of Greenall & Pilkington which began production in 1826. The other large rival to the north-east was the large Spon Lane Works of R.L. Chance. Like Pilkingtons, this too dated from the mid 1820s although Chance had previously had connections with the crown glass works at Bristol. Chance had begun, like Charles Attwood, as a London glass merchant and therefore the distribution of his glass in the capital was well assured; he had a warehouse at St. Paul's wharf.

London Trade Directories give clear evidence of an expansion and an increasing sophistication in the trade during the 1820s, partly no doubt a direct result of the increasing amount of glass coming into London from a variety of sources. Window glass dealers, who took larger amounts of glass than the ordinary glaziers began to usurp the position of the glaziers/glass cutters in the trade (a distinction made between dealers and glaziers in 1835 defined dealers as those who took above 20 crates at any one time). By 1826 there were fourteen windowglass dealers in London of whom two - Attwood and Smith, and R.L. Chance - were also described as manufacturers. By 1833 there were 21 and in addition to the previous two manufacturers, Thomas Choll of Liverpool and Joshua Bower of Leeds also owned their own warehouses. Broadly speaking, the 1820s saw a significant increase in the number of firms engaged in the flat glass industry and a shift in the trade towards dealers, who were prepared to accumulate large amounts of glass, rather than working glaziers.

The excise statistics for 1832 illustrate the degree to which these new firms had grown and competition had increased since the early years of the century(Fig. 9) but also that the north-east still apparently

Figure 9: The amount of duty paid by crown glass houses in England for the year ending 5 January 1833.

Durham and Northumberland

		£
Charles Attwood	Gateshead	20,241
"	Southwick	17,680
Sir M.W. Ridley	Newcastle	19,124
"	"	18,275
W. Richardson	St. Peters	17,230
"	"	16,708
Isaac Cookson	South Shields	13,602
"	"	12,704
"	"	11,848
R.T. Shortridge	"	14,946
Joseph Lamb	Lemington	11,366
"	"	9,091
"	"	3,796
Addison Fenwick	Sunderland	9,507

Lancashire

Greenall & Pilkingtons	St. Helens	19,227
Thomas Choll	Old Swan	17,845
John Clare	Warrington	24,482
William West	Thatto Heath	14,394
Abraham Akers	Newton	2,421(built in 1832)

Other regions

William Chance	Birmingham	24,302
"	"	25,635
"	"	4,644
Coathupe & Co.	Bristol(Nailsea)	20,398
"	"	18,792
Joshua Bower	Leeds(Hunslet)	10,106

retained its lead in terms of quantity of glass produced. The lead that was still apparent in the 1832 was to diminish rapidly throughout the remainder of the decade when the younger and more vigorous firms such as Pilkingtons and Chances steadily expanded their works and increased their production whilst, as we shall see, the majority of the older crown glass firms experienced little or no growth at all.

Increased competition was reflected in the formation of the Crown Glass Manufacturers' Association in the mid twenties. The first recorded meeting of the Association occurred in 1826 and although it cannot be certain that the Association did not exist before this date it seems unlikely; if manufacturers' agreements had existed before the 1820s they were almost certainly informal and, perhaps, regional. The traditional regional base of the national glass trade was reflected in the first price list drawn up by the Association which effectively divided up the country into spheres of trade each with a separate price list. The major purpose of the Manufacturers' Association appears to have been to maintain a kind of order in the trade by reducing the opportunities for undercutting prices and minimising the effects of the new competition within the trade. Some more detail about the Association has been given elsewhere,⁷² but it is worth saying here that its activities bear witness to the increasing authority of the new younger firms in the trade at the expense of the old established north-east firms. At its conception the Association appears to have been designed to maintain the status quo within the trade and in particular to preserve the traditional predominance of the north-east in the London market. It was largely due to the efforts of the younger Birmingham and Lancashire firms who wished to expand their sales on a national basis that the original

principle of separate regional price lists was replaced with a single national price list in 1836. In the same way the restriction of make proposed by the north-east manufacturers in 1838 was designed to preserve the status quo by basing the restriction on each firm's production for the last four years. As William Pilkington, correctly, saw it "their object is to keep us out of the market and to prevent us upstarts from growing greater". In this instance the younger firms again were successful in not allowing the north-east firms to use the Association as a protective device and when the restriction of make was finally accepted in 1841 it was on terms that were far more favourable to the younger firms.

The effects of increased competition within the trade were compounded by the severe deterioration of trade during the last half of the 1830s culminating in the severe depression of 1840 - 2. The bad conditions in the flat glass trade were certainly not unconnected with the effects of the government's indecision about whether and when the glass duties were to be repealed. This was a crucial factor underlying the whole period between 1831 and 1845 and indeed it could be argued that the actual repeal of the duties in 1845 had less impact on the trade than the prolonged and damaging uncertainty about repeal that preceded it. As will be seen in the chapter on the excise, the repeal of the glass duties had actually been introduced into the 1831 budget by the *Whig* administration but had been hastily dropped in order to placate opposition to other proposals. Understandably, this was seen as evidence of the government's commitment to repeal at the earliest possible moment and expectation that the glass duties would soon disappear ran high throughout the early 1830s; it was said that R.L. Chance had commenced manufacturing sheet glass in 1832 in anticipation of the imminent repeal of the glass duties

(see p. 174): in 1832 a petition from the Edinburgh and Leith Glass Company to the Treasury pleaded that since it became known that the abolition of these duties was intended it was impossible to effect sales in proportion to make: according to evidence given (in 1833) to the 1835 commission "Trade has not recovered since 1831 when Lord Althorp proposed taking off the duty on glass glass immediately fell 25-30% and the trade is still in that uncertain state" (see p 405 for more details on this point). Even as late as 1838 the Crown Glass Manufacturers' Association felt compelled to send a memorandum to the Treasury complaining of "the vexatious and embarrassing uncertainty as to the views of the government with regard to repeal" which had lost to the trade "many thousands of pounds per annum for several years".⁷³

The hiatus between the abortive attempt at repeal in 1831 and the eventual repeal in 1845 affected the whole character of the industry and not merely trade and prices. In many ways the government's indecision could be said to have paralysed the industry in that the uncertainty of the situation almost certainly discouraged new entrants to the trade and hence made it difficult for the older manufacturers to leave: anyone considering purchasing a share in a glass house during the 1830s would almost certainly have been advised to wait until the duties were repealed as it was believed they soon would be, and this must have been particularly true of the period after the publication of the 1835 Commissioners' Report which gave wide publicity to the enormous difficulties of the industry under the excise. One example of the effects of this uncertainty is perhaps the crown glass house at Dumbarton which, following the death of its proprietor in 1831, was put up for sale and continually advertised without success until 1838 when it was finally restarted.⁷⁴ The works

appears to have been a profitable one and there seems to be no reason for its unattractiveness apart from the uncertainty over repeal.

In the north-east this prolonged period of uncertainty was particularly inconvenient in that it made it more difficult for older manufacturers, many of whom had entered the trade in the early 1800s and were reaching the period when day to day devotion to their manufacturing interests was no longer necessary nor rewarding, to quit. Men such as Richard Shortridge, William Richardson and Joseph Lamb were men who had shot their entrepreneurial bolts and appear to have been looking forward to repeal not for the boost to the glass trade that would result but for the opportunity it would give them to sell up and retire. When Shortridge put his glass works up for sale in 1845 he was said to have been "retiring" after 40 years in the business.⁷⁵ When The Broad and Crown Glass Works was put up for sale in 1848 it was "in consequence of the partners intending to retire from the business".⁷⁶ Some indeed did not survive to repeal; the North Tyne Glass Company had been put up for sale in 1840 following the death of Robert Gothard (aged 74) in 1838 but lack of purchasers forced the remaining partners to carry on with it until their deaths, John Ridley died in 1843 aged 69 and William Richardson died in 1845 aged 53.

In the difficult and unpromising conditions of the 1830s it is clear that the key to a flat glass firm's survival was astute entrepreneurship. It was no longer sufficient for a crown glass manufacturer to rely on an automatic demand for his product, and, in the case of north-east crown glass manufacturers, to rely on the region's traditional advantages and predominance in the trade. Several manufactures did in fact meet the severe conditions in a positive and imaginative way.

Younger manufacturers such as the Pilkingtons and Chances looked forward to a more favourable future after repeal and, despite their immediate difficulties, increased the size of their works and explored new production techniques such as sheet glass in anticipation: Pilkingtons built two additional glass houses in 1836. Unfortunately this imaginative response to the depression was sadly lacking in many of the north-east crown glass firms and it was this lack of initiative and lack of preparation for the post repeal conditions that left many of the region's firms ill equipped to take the opportunities that repeal certainly provided when it eventually came. None of the old north-east firms appear to have extended their works and only Cooksons thought it worthwhile enough to introduce the manufacture of sheet glass alongside crown. A useful contrast illustrating the consequence of this lack of initiative can be found in the respective sizes of the Newcastle Broad and Crown Glass Works and Pilkingtons. According to the Children's Employment Commission, in 1842 the Newcastle Company employed a workforce of 77 men, 27 male apprentices and roughly 60 boys. Pilkingtons, however, employed a workforce of 500 in 1845.⁷⁷

The north-east was not completely lacking in entrepreneurial initiative. In contrast to the older firms, two firms in the region showed evidence of the same positive and foresighted attitude that the Lancashire and Midland firms possessed. The most impressive example of growth in the region was that experienced by the Wear Glass Works established in 1836 at Bishop Wearmouth near Sunderland by James and John Hartley. The Cookson firm, alone among the older establishments, also showed an interest in improving and extending its production. This was largely due to the fact that during this period the initiative behind the firm passed into the hands of its able manager R.W. Swinburne who, like Hartley, was a man

of considerable technical skill. Swinburne and Hartley will be discussed in more detail in the following section, for the moment they serve as the two exceptions to the overall response of north-east manufacturers to the difficulties of the 1830s which was to hold on to their works without investing any further capital in the hope that repeal would once more make glass works an attractive investment. Perhaps typical was Sir Matthew White Ridley, the fourth baronet, who had inherited his father's estate in 1836. Unlike his father he proved distinctly uninterested in the industrial and commercial activities that his father had done so much to promote and by 1840 had leased out the workings of the Ridley owned collieries and sold the family interest in the Newcastle Bank. The Glass Company was not offered for sale until 1848 but in view of the fourth baronet's previous departure from more profitable commercial interests it seems fair to assume that he was only waiting for repeal in the hope that the glassworks would then realise a reasonable price on being sold. During the 1830s the management of the company had been given over entirely to Anthony Nichol and Joseph Sewell but unfortunately neither proved as creative in their management as R.W. Swinburne at Cooksons.

One exception amongst the older crown glass manufacturers was Charles Attwood who had the good fortune, or perhaps the foresight, to quit the trade before the depression of the late 1830s: there is no doubt that this was in part a consequence of his new found enthusiasm for iron as much as any dissatisfaction with glass. His Sunderland house was taken over by his brother Edward Attwood under the title the Wearmouth Crown Glass Company. The Gateshead glass house was sold to a Mr. Banks but Attwood retained a share in the new manufacturing company in partnership with Banks and Edward Hart. The Sunderland glass house survived Charles Attwood's departure and became one of the two works from the

excise period which survived well into the second half of the century. The Gateshead house however closed in 1840 and, typically for the house, the immediate cause of its closure was a legal dispute over the partnership.⁷⁸ When the new partnership took over the works in 1836 a new partnership agreement was drawn up and a new capital of £12,000 was advanced. In 1839 Attwood wished to retire completely from the concern and in April an agreement was signed exonerating him completely from the company's debts which included a credit of £33,000 from Ridley's bank. Unfortunately disputes arose over some sums of money, including £800 owed to a Mrs. Hartley, and over who exactly owned the land on which the glass works was built. Eventually the remaining partners decided to make Attwood a bankrupt and persuaded Ridley's bank to file an information against him for the large sum owed to them.. Attwood claimed that the 1839 agreement had cleared him personally from this debt, which plea was upheld, with the result that in June 1840 Edward Hart was made a bankrupt and the Tyne Glass Company was put up for sale. Another suit had in the meantime been brought against Attwood by the owners of West Townley Colliery, Humble Lamb and John Buddle, for £550 owed them for coal but this too was dismissed. From the list of stock put up for sale in 1840, it is clear that the house was manufacturing only crown glass and had not attempted to introduce sheet glass. The stock included a condensing steam engine, a stone mill with an engine and fast sailing wherry.

If the older crown glass manufacturers were hoping that repeal would transform their works into attractive and saleable properties then they were to be disappointed. Although repeal did attract new capital to the flat glass industry many of the speculators appear to have preferred

to erect new glass works on a large scale rather than take over old works with small furnaces and workforces unskilled in the production of sheet glass: all the new houses that were erected immediately following repeal were said to be sheet glass houses.⁷⁹ Only one of the old crown glass houses advertised for sale during the late 1840s was bought with the intention of continuing the manufacture of flat glass. This was Shortridge's South Tyne Glass Works which was taken over by the Tyne and Tees Glass Company headed by the Stockton Quaker, James Bowron. The company's main glass manufacturing interest was bottles and it owned several bottle houses at Stockton, however there is no doubt that the Shields works was intended for flat glass and the manufacture of sheet glass was soon introduced. The venture was short lived and the company closed in 1855, a victim of the powerful alliance of Chances, Pilkingtons, and Hartley and their policy of buying up smaller firms in order to close them down. It was reported in July 1855 that the works had been bought by Hartley who intended to restart them in the near future but this never happened.⁸⁰

(ii) James Hartley, Cookson & Cuthbert

Perhaps the most important event in the north-east flat glass industry during the 1830s was the establishment of a new glass works, the Wear Glass Works, at Bishopwearmouth near Sunderland by James Hartley in 1836. Hartley's firm was to dominate the local industry in the second half of the century. James Hartley (1811-1886) was the son of the James Hartley who, after a period as managing partner for Attwood's Tyne Glass Company, had gone into partnership with R.L. Chance at Birmingham. Like his father, James Hartley's business career was to rest on his practical abilities and his thorough understanding of glass

making.⁸¹ He was given a practical education by his father in all aspects of the manufacture and was thus enabled to become a junior partner in the firm on the death of his father c. 1832. Hartley's skills were clearly in evidence during the time he spent at Chances. He was said to have been the first to make use of commercial sulphate of soda (instead of carbonate of soda) in the manufacture of crown glass. In 1834 he and his brother John took out a patent⁸² which introduced a significant economy into the crown glass process; instead of the "bullion bar" which was traditionally used to hold the table of glass whilst it was being finished, the Hartleys introduced a smaller tube or "thimble" which had the advantage of reducing the size of the central bullion and hence the wastage per table. James Hartley was also a crucial figure in the introduction of sheet glass into the country in 1832 and this was probably the most important event of his early career. Sheet glass was flat glass produced by the cylinder process whereby a cylinder of glass was opened out and flattened. Its manufacture was well established on the Continent and in order to introduce the manufacture to England, William Chance sent James Hartley to the French glass works of George Bontemps for the purpose of learning the method. Hartley's understanding of the cylinder process was thus unrivalled by any other English glass manufacturer and this was almost certainly a significant encouragement to him to leave Chances and set up on his own at Sunderland.

The introduction of the manufacture of sheet glass to England in 1832 by Chance with the aid of Hartley has, rightly, been recognised as an event of great significance in the development of the country's flat glass industry.⁸³ Sheet glass was eventually to usurp crown glass's position as the country's leading glazing glass, partly because of the large panes able to be produced, partly because the cylinder process was

a more economical way of producing flat glass and was therefore better suited to the industry's needs during the last half of the century. This was not to occur, however, until after the repeal of the glass duties in 1845. During the 1830s sheet glass's position in the market was very different and something needs to be said about this, and about the position of the two manufacturers who pioneered it, Chance and Hartley.

Most importantly, the extent of both Hartley's and Chance's resourcefulness in persevering with the new process had not perhaps been fully appreciated. Both manufacturers of sheet found themselves faced with considerable difficulties during the 1830s and it is to both manufacturers' credit that they overcame these difficulties in an imaginative and resourceful way. It was later said of the Sunderland manufacturer that "Mr. Hartley's active brain was ever fertile in expedients for the removal of obstacles to success"⁸⁴ and this is certainly borne out by his continued faith in sheet glass during the 1830s. The difficulties all stemmed from the excise which affected all aspects of the introduction of sheet glass and its subsequent development. Indeed the excise was largely responsible for the fact that although it had been experimented with during the eighteenth century, sheet glass had not been attempted in England earlier in the nineteenth century. It has already been pointed out that because of the thickness, under the conditions created by the excise, sheet glass was unprofitable to manufacture compared with crown glass and it was this which prevented its introduction into England at an earlier date. This was certainly true but a more fundamental reason for its late appearance was that from 1809 (the glass act 49 G3 c.63) the regulations governing the manufacture of flat window glass specifically stated that the annealing arch for annealing crown or German sheet glass

should only have one mouth or entrance. German sheet glass, which was flattened in a separate flattening kiln, needed an annealing arch with two mouths and before embarking on his experiment R. L. Chance was forced to petition the Treasury for permission to construct an annealing arch with two mouths.⁸⁵ This was granted and a suitable clause was inserted into the flint glass act of 1832:⁸⁶

It shall be lawful for the Commissioners of Excise to permit and allow any annealing arch or oven intended to be used for annealing German sheet glass to be made and constructed with two mouths or entrances to the same, provided such arch be built, constructed and made in other respects in conformity with the directions and regulations of the Act of 49 G3.

When seen in the context of the excise regulations in operation in the early 1830s Chance's introduction of sheet is puzzling. From the evidence given to the 1835 Commission it is clear that whilst it remained unpolished sheet glass was only a slight improvement on broad glass and certainly not a competitor to crown glass: according to Sir Francis Doyle, the Chairman of the Board of Excise, "it is an inferior article, fit for the cottages of the poor"; Isaac Cookson agreed that it was inferior and described it as "cockled" and "more like horn". Their comments are confirmed by a builders handbook⁸⁷

German sheet glass is of an excellent quality, particularly as respects colour; but from the manner in which it is manufactured, one side - which of course is placed outermost in the sash - has an uneven and consequently unpleasant appearance. It was formerly, however, much in use; but latterly in consequence of the improvements which have been made in the manufacture and flattening of crown glass together with the reduction that has been made in the price of plate glass, it is not much in request in this country.

Polished, of course, sheet glass would be more attractive but under the excise regulations then in operation Chance was forbidden to manufacture sheet thicker than one ninth of an inch which effectively prohibited it being manufactured thick enough to stand polishing. This regulation had been introduced as a protection against a type of cylinder glass

that was already manufactured in England but which paid a higher rate of duty, namely blown plate glass. Although often classed with broad glass, and indeed in its unpolished state sheet glass did resemble broad in appearance, in respect of manufacturing method sheet had more in common with blown plate than broad glass. Whereas broad glass was made of poor quality materials, split whilst hot (traditionally by holding the elliptical bulb of glass up to the furnace, which caused the air inside to expand and split the glass, and dropping cold water onto the split), and was spread on sand in a triangular shape, both blown plate and sheet glass were blown in a cylinder and split with a tool once the glass had slightly cooled. There were differences between the two methods of manufacture but when the 1835 Commissioners questioned Chance closely about the similarities between his German sheet and plate glass he admitted that they were more or less identical: both were produced by blowing the glass ^{into the form of} a cylinder and splitting it, the materials used were exactly the same, the only difference as Chance saw it was that "they go to more expense to make the article more perfect" ie. to polish it. The restriction on the thickness of crown and sheet glass was seen as a necessary protection to the plate glass manufacturers, and a protection that the only manufacturer of blown plate at the time, Isaac Cookson, evidently valued highly for according to Chance "the restriction would have been removed some years ago if it were not for the objection of Mr. Cookson who was appraised that the window glass be polished and used as plate". Chance maintained that his fears on this ground were without foundation which was certainly true as regards crown glass whose glossy surface needs no further treatment, but was certainly not true in the case of sheet. Whilst sheet remained unpolished it threatened neither crown glass nor plate in the market, but it must have been very

clear to Cookson in 1835 that should sheet be polished it would provide an effective competition to plate glass when used as a glazing glass.

Why then did Chance and Hartley go to the expense of introducing a type of manufacture that, under the excise regulations, was no improvement on crown glass? One comment on Chance's action noted that he had embarked on the manufacture at a period when he was fully aware that the government had expressed its intention to repeal the glass duties altogether,⁸⁸ in other words that he was anticipating the immediate repeal of the duties. This seems a highly probable explanation. As we shall see in Chapter 5 the duties had indeed been on the brink of being repealed in 1831 and that expectation continued to run high throughout the early 1830s. From Chance's evidence to the 1835 Commission, it is clear that he was convinced that what had happened on the Continent, the replacement of crown glass by sheet, "must" happen in England once the duties were repealed. The introduction of sheet glass in 1832 was then an attempt by Chance to prepare for what he saw as an inevitable and imminent development in the flat glass industry. When repeal eventually came in 1845 Chance's view that the development was inevitable was proved correct but it was not as imminent as he had hoped in 1832; it seems more than likely that neither Chance nor Hartley had envisaged the long delay between their expensive preparations for repeal in 1832 and actual repeal in 1845.

The other question that must be asked about the introduction of sheet glass is why did Chance not call his cylinder glass blown plate, which would have enabled it to be polished? The fact that the only manufacturer of blown glass in Britain by the early 1830s was Isaac Cookson bears witness to the fact that plate glass was an unattractive branch

of the industry for the manufacturer. Although the high plate duty had been reduced in 1819 it was still sufficiently high to discourage the use of plate glass as a common glazing glass, although the Cookson firm had certainly made some progress in this market. Furthermore plate glass was the only branch of the glass industry still to pay duty on the gauge rather than on the manufactured goods, which system had been greatly disliked by glass manufacturers for its inconvenience and unfairness (see Chapter 5). After voicing his dislike of the "extremely objectionable" gauge to the 1835 Commissioners, Chance clearly implied that the plate glass duty was really a higher net duty than the crown and sheet duty even though ostensibly sheet paid £3 13s 6d per cwt. and polished plate only £3 per cwt.⁸⁹ It thus seems probable that the difficulties surrounding the manufacture of plate under the excise were sufficiently strong to have persuaded Chance to name his glass in such a way as to avoid the plate glass duty and in particular the gauge.

Unfortunately for both Chance and Hartley the duties were not repealed during the 1830s leaving them with the manufacture of a rough surfaced glass of limited use. Fortunately, and probably unexpectedly, it proved profitable on being exported but whilst it remained unpolished it was no challenge in the home market to either crown or polished plate. Both manufacturers were therefore forced to adapt the manufacture of cylinder glass to the excise conditions and both displayed great resourcefulness in doing so. With his patent of 1838 Chance successfully developed a way of polishing sheet glass without breaking the excise regulations on thickness. He thus produced what was in essence polished plate under the excise definition of crown and sheet and, as it was cheaper than plate, it was an immediate commercial success. Significantly Chance named his polished sheet glass "patent plate". Hartley went even

further by attempting to produce a cylinder glass under the excise definition of broad glass and thus pay an even lower duty. He patented his new improved "broad glass" in 1838 but its manufacture came to an abrupt end in 1840 when the Board of Excise, with the support of the other flat glass manufacturers, raised the duty on broad glass. Since it involved legislation, the details of this episode will be looked at in the chapter on the excise (see pp. 397-402). Here, the episode underlines Hartley's entrepreneurial flair both in his ability to exploit the situation created by the excise regulations and in his practical skills. The 1838 patent included improvements to the flattening furnace and Hartley was later to develop improvements to the flattening of crown and sheet glass by means of a perforated flattening stone.

The Wear Glass Works was established in 1836 and experienced a rapid growth during its early years. By 1839, despite a fire in which £2,000 worth of damage was done to the warehouses and packing sheds, two houses were fully operational and three more were under construction.⁹⁰ The works also included a small alkali works and, in common with most alkali manufacturers in the neighbourhood, Hartley was prosecuted for supposed damage to nearby crops in 1838.⁹¹ Compared to the older crown glass manufacturers on the Tyne Hartley certainly met the depression and the difficult conditions of the 1830s in an energetic and imaginative way. By the 1840s the Wear Glass Works had eclipsed the older firms in size and was, until joined by Cooksons, the only firm in the region to manufacture sheet glass which put it in a good position to make use of the opportunities that repeal eventually brought. Hartley brought over Frenchmen to manufacture his sheet although it was said that he himself frequently took a spell of work alongside them in the sheet glass house. There is no doubt that the success of the firm was largely

due to Hartley's own energies and skills, he was said to spend up to fifteen hours a day at the glass house supervising every aspect of the manufacture. John Hartley quit the firm c. 1840 to pursue a successful career in the Staffordshire iron trade and during the decade the firm was joined by J.J. Kayll who was to manage the firm most ably until the 1860s.

The second example of entrepreneurial initiative in the north-east flat glass industry during the 1830s was the Cookson firm which, thanks to the activities of R.W. Swinburne, also succeeded in adapting to the changing circumstances of the industry.

The death of Isaac Cookson snr. in 1831 was a crucial event in the development of the Cookson firm. Firstly, it altered the composition of the partnership that owned it: a new firm of Cookson & Cuthbert was created with equal shares being divided up amongst five partners - Isaac Cookson, John Cookson and William Cuthbert (the three other partners), Isaac Cookson's son John Cookson jr., and William Cuthbert's son William Cuthbert jr., Perhaps more important than this however was the effect the death of Isaac Cookson and the dispersal of his fortune had on the interests and ambitions of his sons. Curiously for an 89 year old man, Isaac Cookson snr. died intestate and his fortune was therefore divided up amongst his sons and daughters. His manufacturing interests remained intact with the glass company going to John and Isaac and the iron and steel interests to Thomas Cookson but the apparent consequence to the sons, both of the immediate realisation of their father's other capital plus their access to the profits of his estate, was to emancipate them from the Cookson manufacturing interests and to enable them to turn to the safer and more prestigious investment of land. The death of

Isaac Cookson was followed by a rush of Cooksons to country estates. The most spectacular example of this was Isaac Cookson jnr. who in April 1832 purchased the 2,070 acre estate of Meldon in Northumberland from Greenwich Hospital for 56,900 guineas. The estate included 171 acres of plantation and rents worth £2,119 per annum. It had recently been improved by the Hospital at a cost of £7,000 and was said to be a most valuable property.⁹² In July, John Dobson was commissioned to design and erect a house which he did at the reasonable cost of £7,188.⁹³ Dobson also built a house in 1834 for Colonel James Cookson, the second son, at Newsham in Durham. Thomas Cookson moved to The Hermitage near Chester-le-Street at about the same time and Cookson's partner William Cuthbert followed the trend by purchasing the estate of Beaufront near Hexham in 1836 and also commissioning a new house from Dobson. John Cookson, as the eldest son, inherited the family house and estate at Whitehill.

The movement to country estates was perhaps to be expected given that Isaac Cookson snr.'s long life had prevented his sons from enjoying the benefits of their inheritance until they were well into middle age: John and Isaac Cookson were 59 and 56 respectively on their father's death in 1831. Both had already devoted many years to the Cookson manufacturing interests and it is probable that both felt more than entitled to the well earned reward of a life of a country gentleman. There seems no doubt that by this time both the crown and plate company and the Jarrow Alkali Company were large and profitable enough to sustain the diversion of a comparatively small amount of their profits into the estates and life style of their owners but what was more potentially dangerous to the firms was the loss of interest and initiative in manufacturing that this shift in circumstances inevitably entailed. Although

the Cooksons and Cuthbert did appear before the 1835 Commission and did frequently represent the company at the meetings of the Crown Glass Manufacturers Association the day to day work of the firm appears, to have been increasingly left to the manager R.W. Swinburne.

Fortunately for the Cooksons, Swinburne proved an exceptionally able manager and fully capable of looking after the firm's interests without direction from above. He was a trained chemist and, from the evidence of the cash books, appears to have been employed first at the Jarrow Alkali Works. Around 1834 he moved to the plate glass works as the metal mixer, a crucial position in the firm. Swinburne's first important contribution to the firm was a patent taken out in his name in 1836.⁹⁴ This attempted to solve a problem that Cookson himself had complained about to the 1835 Commissioners - the wastage and expense in the manufacture of small plates of glass. Swinburne's patent reduced wastage by cutting out the smaller plates whilst the glass was still hot by means of metal bars, knives and shears. The small plates were then annealed in an upright position which, in addition, made a considerable saving on space (the larger plates were usually annealed in a horizontal position). This patent underlines the concern of the South Shields firm with small plates for glazing rather than large plates for silvering.

The second important contribution made by R.W. Swinburne was the introduction of sheet glass in 1837 which appears to have been done largely through his own initiative. Following Hartley's example, Swinburne himself went to France in order to learn the method but was unsuccessful: a slightly more devious approach however yielded results,⁹⁵

On his return to England, a foreman mason in his employ volunteered

to obtain the information if his expenses were paid. He went to France, obtained employment as a mason's labourer at one of the glass works and remained until he had mastered all the details of the construction of the furnace used in sheet glass making. He returned to Shields with the plans he had prepared, erected a furnace and again journeying to France was able to induce several expert workmen to return to this country with him, and sheet glass making commenced at Cookson's works in 1837.

As manufacturers of blown plate glass the firm ^{was} already manufacturing a type of cylinder glass but there were evidently advantages in using the continental methods. Chief among these was the greater efficiency and speed of the continental process in which the blown cylinders were smaller, thinner, easier to manipulate and were formed by the help of a wooden mould and by swinging the cylinder downwards in a cleft in the floor to elongate it. It was said of blown plate that only one large plate could be produced per hour whereas it was specifically remarked, by one visitor to Cookson's sheet house in 1844 that the quickness with which the cylinders were produced was one of the most remarkable features of the process. In 1844 the sheet glass at Cooksons was still being produced by foreign glass men (whom the writer of The Penny Magazine article commended for their tidiness of person and dress) and not on a very large scale. Cooksons had been given a quota of sheet glass under the restriction of make adopted by the Manufacturers' Association in 1839 but in 1842 they had exchanged some of this for an increase in their quota of crown glass. Despite the apparent lack of enthusiasm for sheet glass the techniques had been introduced and would stand the firm in good stead after the repeal of the glass duties.

The 1836 patent and the introduction of sheet glass in 1837 can certainly be taken as evidence that Cookson and Cuthbert as a firm were meeting the challenge of the new changes in the industry and continuing their tradition of experiment and improvement. This is underlined by other, smaller changes seen by the firm in this decade

In the early 1830s a railway, part of which was underground, was constructed from the glass works to the beach for depositing ballast and bringing sand for the use of the glassworks. The wharf and quay were improved at a cost of £10,000 and in 1832, under the Durham University Act, the whole premises was enfranchised from the Dean and Chapter of Durham, which, it was said, gave rise to many further small improvements to the premises.⁹⁶ Access to the works was improved both by road and rail and the Company sold some of its land to the Brandling Junction Railway ^{in addition to giving} them way leave, and permission to erect a coal drop on their quay.

(iii) The repeal of the glass duties

What effect did repeal have on the north-east flat glass industry? Did it initiate sudden and dramatic change in that it suddenly removed the fiscal advantages of crown glass and made it an uneconomic product or did it merely enable the decline of the north-east crown glass houses, a decline that had been suspended by the uncertainty in the trade of the 1830s, to reach its conclusion. Both aspects of repeal seem to be true but possibly the latter was the more significant: repeal, rather than initiating sudden change in itself, rapidly brought existing trends to their conclusion.

Repeal did of course have a sudden and dramatic effect on the flat glass industry as a whole, including those firms such as Swinburnes and Hartleys which had in some measure prepared for it. Repeal suddenly reduced manufacturing costs, liberated manufacturers from tiresome regulations such as the restriction on the thickness of sheet glass, and above all, by enabling prices to fall, created an unprecedented demand for glass. Repeal also attracted a number of speculators to the trade.

and it was said that the number of flat glass firms increased from 14 in 1845 to 24 in 1846-7 only to fall just as rapidly.⁹⁷ These sudden changes inevitably caused a degree of disruption in the trade and, at least in the north-east, created a temporary but severe depression. Even Hartley was forced to dismiss 300 of his work force⁹⁸ and he was said to have commented later that all the money had had made out of his sheet and crown works in the 1830s was "melted down in the crucible of the hard times that succeeded the repeal of the glass duties".⁹⁹ The main cause of this depression appears to have been the increase in the number of producers plus unrealistically low prices; as the Newcastle Guardian noted in 1846 "with glass of a fair quality at 20d a table, even to continue the manufacture is in question".¹⁰⁰ These low prices appear to have been established by the new firms with large capitals who were able for a time to sustain their losses.

This depression was, however, a temporary one. Once trade had settled down and most of the new firms had disappeared with the same speed with which they had appeared, the nature of the effects of repeal was more apparent. Most striking was the reduction in the number of producers: in 1845 fourteen firms were engaged in the trade, by 1855 there were only seven dominated by the three largest firms, Pilkingtons, Chances and Hartley, who together claimed 75% of the national production. It is ironic that one of the political economists' main complaints against the glass duties was that they encouraged the concentration of the manufacture in a few hands. Repeal revealed that the opposite was the case, under the conditions created by the duties comparatively small manufacturing units based on one or two houses were able to survive. Repeal heralded the rise of a new type of flat glass firm meeting the demands of a mass market by producing on a unprecedentedly large scale.

The significance of repeal was not merely that the duties had protected crown glass but also that they had protected the small firm. The collapse of the crown glass houses was not merely the collapse of crown glass but the collapse of the small scale firm producing glass in the traditional costly way. What the post repeal market demanded was a cheap selling price and this was impossible for crown glass manufactured on a small scale by a one or two house firm. The new conditions were summed up by William Pilkington who, in speaking of a rival crown and sheet glass manufacturer, noted that his danger was that he understood the crucial fact "the more he makes the cheaper he gets it".¹⁰¹ The new conditions demanded largerscale, low cost production, largercapital investment and a greater degree of technical skill and scientific knowledge than was previously necessary. As we shall see technological innovation and the introduction of new scientifically based manufacturing processes, was a significant factor in the success of the three leading flat glass firms during the 1850s and 1860s.

It should also be said that crown glass itself did not suddenly disappear after repeal with the disappearance of the crown glass firm. It remained an economically realistic product for firms who produced other more profitable types of flat glass as well as crown. Swinburnes continued to manufacture crown until 1857, Pilkingtons until 1872 and it was not until 1854, ten years after repeal, that the firm's production of sheet overtook that of crown. The evidence of building specifications for the 1850s clearly shows that glazing buildings with a variety of glass continued to be common practice and crown glass became, as broad glass had once been, a second class glass for use where appearance was not particularly important.¹⁰² For instance the glass used in a dwelling house in Cavendish Square in 1856 included best British plate for the first

floor and front room windows, best crown for the back windows to the entrance and back windows of the first floor, and crown seconds for the back second and third floor windows. John Dobson's specifications of 1847 for Newcastle Central station also included a mixture of glass. Polished plate was to be used for the hotel doors and best staircase windows, best crown for the windows and fanlights, rough plate $\frac{3}{8}$ " thick for the top of the arcades, and obscured crown glass for the kitchen skylights. The repeal of the glass duties had resulted in a greater variety of glass at competitive prices being put on the market but it had certainly not driven crown completely from this market.

Once the temporary disruption caused by repeal had subsided it was clear that repeal had indeed brought unprecedented benefits to the British glass industry. According to R.W. Swinburne writing in 1863:¹⁰³

The abolition of the excise duty on glass together with the numerous and most obstructive regulations which that impost involved has had an effect beyond all anticipation in improving the glass trade in general (especially the crown, sheet and plate) both in its manufacturing and commercial character.

It is perhaps understandable that what Swinburne saw in the 1860s as improvements, namely the establishment of a modern flat glass industry based on the low cost production of sheet and plate in place of the old fashioned industry based on the labour intensive crown glass process, should have been interpreted in the 1840s as a disastrous collapse. The pessimistic contemporary comments on the collapse of the north-east crown glass industry must be qualified with hindsight since, with hindsight, the collapse of crown glass was in many respects a healthy sign indicating that the British glass industry was at long last discarding its old fashioned methods and adopting processes that were far more suitable for the glass industry of the mid nineteenth century and for the emerging mass market. Looking at the changes of the 1830s and 1840s in the north-east flat glass

industry it is clear that there was indeed a collapse of what was traditionally the major branch of the industry, crown glass, but that this was one part of the industry's adaption to new economic conditions. A useful summing up of the changes, useful because it brings together both the positive and negative aspects, was made in 1863 by

J. Collingwood Bruce:¹⁰⁴

Probably no section of the manufactures of the Tyne and Wear has experienced more marked changes during the last 25 years than that of glass, during which period there has been witnessed a decadence of one branch and entire extinction of another. Nor is this all; for out of this partial wreck has sprung a state of activity which surpasses all that of the previous history of the trade.

The unprecedented activity is borne out by the statistics provided by both Bruce and R.W. Swinburne in the same year. Whereas the previous productive capacity of the six crown glass houses on the Tyne had been 7,000,000 sq. ft. of window glass per year, Hartleys alone now produced 8,000,000 sq. ft. of sheet glass and 1,000,000 sq. ft. of patent rolled plate. The previous capacity of Cookson's plate glass works had been 312,000 sq. ft. and this, under Swinburne, had almost quadrupled to 1,240,000 sq. ft. per annum. Thus in terms of quantity the north-east flat glass industry could certainly not be said to have collapsed during the late 1840s even though the traditional staples of the industry, crown and broad glass, did indeed disappear from the region during that decade, and even though the region's industry now rested almost entirely with two firms rather than the eight that had made up the north-east flat glass industry during the first half of the century.

CHAPTER THREE: THE MANUFACTURE OF BOTTLES

1. 1700 - 1800

Unlike the flat glass industry, history gave no especial advantage to bottle manufacturing in the north-east; bottle manufacturing enjoyed nothing of Mansell's heritage that had so favoured the development of the flat glass industry in the region. Although the emergence of the manufacture of dark bottles in the mid-seventeenth century was almost certainly a consequence of the coal firing process pioneered by Mansell, in every other respect the dark bottle industry developed quite independently from Mansell's regime. The dark bottle did not emerge as a distinct type of manufacture until the 1650s, well after the decline of Mansell's influence and owing nothing to the industry he had established in Newcastle and London.

The invention of the dark bottle is usually credited to Sir Kenelm Digby, the courtier and amateur scientist.¹ Digby was named as the inventor in a petition to Parliament in 1662 which also claimed that his invention had been put to public use at several glass houses in England for many years. Although other contemporary claims were made for the invention, what all of them were agreed on was that there had indeed been an invention, and that the new dark bottle was quite distinct from the type of bottle that had been manufactured previously. Previously bottles had been manufactured out of ordinary green window glass. The dark bottle was a considerable improvement in that it was stronger, thicker and, therefore, more practical. It has been suggested that Digby established a glass bottle house at Newnham on Severn and this is quite plausible in view of the fact that bottle manufacturing first appears to have become established in the Severn basin with bottle houses being

recorded at Gloucester and Bristol at quite early dates. John Houghton's table of 1696 suggests that by the late seventeenth century at least Bristol and its environs had emerged as the major provincial centre of the industry and the city appears to have maintained this position throughout the eighteenth century; in the same way that Stourbridge was constantly referred to by the north-east manufacturers in connection with broad glass, so Bristol was always mentioned in connection with bottles:²

	<u>Bottle houses</u>
London district	9
Topsham	1
Oddam, Somerset	1
Bristol district	5
Gloucester	3
Newnham on Severn	2
Swansea	1
Stourbridge	5
Nottingham	1
Custom More, Notts.	1
Newcastle upon Tyne	4
Kings Lynn	1
Yarmouth	1
Silkstone, Yorks	2

The four bottle houses listed at Newcastle must have included two at Sunderland.

Although at the beginning of the eighteenth century the north-east could not claim any major importance as a centre of bottle manufacturing, by the end of the eighteenth century it could. The industry experienced a rapid growth with the result that by 1800 the region included thirteen working bottle houses and eight bottle manufacturing companies. This growth reflected certain aspects of bottle manufacturing that made it, in some respects, a more attractive investment for north-east merchants and industrialists than flat glass manufacturing; bottle manufacturing enjoyed a more integral role in the local economy as a whole than flat glass. Firstly, as has been mentioned in the initial chapter, bottle

manufacturing appears to have been the most suitable form of subsidiary investment for a coal owner who wished to find a profitable means of consuming his small coals. Secondly, bottles were a more accessible branch of the glass industry than either flat glass or flint glass: the necessary equipment of a bottle house was simple; the coarse materials were cheap and easily available; the workmen, although constantly in demand, were less skilled than flat or flint glass makers and consequently in greater supply (see appendix 4 for a description of the process of manufacture in 1799). Bottles, when compared to flat glass and to a lesser degree flint glass, made modest demands on capital and was therefore accessible to a wider range of entrepreneurs.

Thirdly, bottles had considerable potential as a trading commodity and therefore was doubly attractive to men like John Cookson who, although concerned in manufacturing, were primarily merchants. The market for bottles was far wider in range than the market for flat glass since it extended to private and commercial customers in more or less every part of the country; anywhere, in fact, where wine or spirits were imported or consumed. In 1764 the bottle trade was described by John Cookson as "very nigh a ready money trade" which is understandable in view of the quantities of wine and spirits imported into the country and the favourable legislation which, by encouraging the bottling of wine after it had been imported, gave the full benefits of these imports to the English and Scottish bottle manufacturers. Most important in this respect was an act of 1728 which, in an attempt to prevent smuggling, had prohibited the importation of wine in bottles. In practice the act was imposed loosely and, after moves to repeal it in the 1760s, was relaxed in 1784 when French wine was permitted to be imported in bottles via the Channel Islands. By this time however English bottles enjoyed the

added protection of heavy customs duties which had been considerably increased in order to offset the excise duties on home manufactured glass; in 1777 for instance the excise duty on English bottles was 2s 4d per cwt. (5¹/₂d per dozen) whilst the customs duty on imported bottles was 2 shillings per dozen. Immediately after the act of 1784 permitting the import of French wine in bottles further penalties were added to the importation of foreign bottles by subjecting them to an excise duty in addition to the customs duty.

Bottles were then an attractive and marketable commodity and bottle manufacturing increased the attractiveness of Newcastle as a trading centre. Bottles were also a commodity that was highly suitable for export since the strong dark bottle was a distinctively English product and not manufactured in countries whose glass industry retained wood burning furnaces. A good illustration of the usefulness of bottles as a commodity for export can be seen in the activity of the Newcastle merchant William Row who, during the 1780s, took regular quantities of bottles from the bottle works at Hartley which he shipped to the Baltic as part of a trade whose main purpose was the import of timber. Row later built his own bottle house at St. Peter's quay. It is quite interesting that the combination of bottle manufacturer and timber merchant also occurred in one of the most successful of the early nineteenth century bottle manufacturers - Robert Todd. Perhaps surprisingly there is no example in Newcastle of a wine, spirit or porter merchant becoming directly involved with bottle manufacturing but there is no doubt that they, plus the importers of Geneva and Dantzic black beer, benefited from the locally produced bottles. The obvious connection between bottle manufacturing and brewing should also be mentioned. Although

there is only one example of a direct personal link between the two activities - the Fenwick family were bottle manufacturers at Sunderland and also owned the Sunderland and Chester-le-Street breweries - again it seems fair to assume that local brewers made use of local bottles and, with the growing trend towards bottled beer, benefited from the presence of the manufacture in the area.

Bottle manufacturing was a quite different type of industrial and commercial undertaking to the manufacture of flat glass. Its accessibility and attractiveness resulted, on the one hand, in the rapid growth of the industry, on the other, in a trade that was potentially more volatile than the flat glass trade since the greater number of producers in the market made trade agreements on prices less easily enforceable. The commercial side of the bottle manufacturing, the relationships between the individual manufacturers in the bottle trade, has emerged as one of the most interesting aspects of the industry's development; in particular the replacement of a well ordered trade in which most manufacturers considered their interests best served by a high degree of mutual cooperation with a more individually competitive one. Before looking at the bottle trade in more detail, the histories of the individual bottle firms in the area must be sketched in.

(i) The Closegate, Bill Quay and South Shields bottle houses

These three bottle houses fall naturally into one group for two reasons. Firstly, they were the earliest bottle houses in the region; the Closegate house was established in 1684, Bill Quay c. 1690 and the house at South Shields c. 1710. Secondly, they were all associated with two families of entrepreneurs - the Cooksons and the Dagnias - and all eventually came under the control of John Cookson. Although

the Cooksons are certainly the more important of the two families the role of the Dagnias as pioneers was crucial to the development of bottle manufacturing in the area. It was the Dagnias who first introduced the manufacture of different types of glass ^{such} as bottles and flint to the area alongside the traditional broad glass. It was also the Dagnias who first established glass manufacturing beyond the boundaries of Newcastle at South Shields. In many ways the Cooksons could be said to have followed in the Dagnias' footsteps both ^{by} entering the bottle trade and by siting their first flat glass house at South Shields, and it is apt that all the Dagnia glass houses should eventually have been absorbed by the Cooksons.

Who were these pioneering Dagnias who introduced bottle manufacturing to the north-east in 1684 when John and Onesiphorus Dagnia leased a parcel of land at the Closegate in Newcastle on which to erect a glass house? Not surprisingly, in view of the early development of bottle manufacturing, they were from a family of glass makers last recorded at Bristol: Edward Dagney "ingeneous glassmaker from Bristol" is mentioned in "Metallum Martis" (1660) as attempting unsuccessfully to smelt iron in furnaces made from glass house clay³. John and Onesiphorus are presumed to be the sons of this Edward Dagney and their peculiar surname suggests that they were descendants of Italian Altarist glass workers encouraged into England by Mansell in the early sixteenth century to staff his crystal glass house in London (see appendix 3c for a family tree).

The Dagnia brothers' first glass house was erected on land on the south side of the Closegate leased from Nehmiah Blaignon in 1684 to the two Dagnias, Benezer Durant (almost certainly another glassmaker descended from the Altarists) and Richard Wall.⁴ This original glass

house was a bottle house. Although the Dagnias are often associated solely with the introduction of flint glass to the region, and although they certainly established a flint glass house on the north side of the Close c. 1690, there is no evidence of flint glass being manufactured systematically or in large quantities as early as the 1680s. The few contemporary references that are available all mention bottles: in 1697 Onesiphorus Dagnia was fined £200 for fraudulently concealing over 2,679 dozen bottles from the excise;⁵ John Dagnia described the brothers' first glass house specifically as being "for making and vending green glass bottles".⁶ It is possible that small amounts of flint glass were manufactured at the original house but its main production was almost certainly bottles.

Disputes between the two brothers caused the temporary closure of their two original houses in Newcastle. A new start was made c. 1704 at a new bottle house erected by Onesiphorus Dagnia at South Shields but this too came to a temporary halt when John Dagnia brought a Chancery suit against his brother accusing him of not honouring their partnership agreements and stocking his Shields house with the stock of the two dormant Newcastle houses. The outcome of this suit is not known but both the South Shields house and the two Newcastle houses appear to have resumed production well before 1720. The Common Council lists of glass houses on the Tyne in 1732 and 1742 both list the Dagnias' broad and bottle house at South Shields, one bottle house at the Closegate, and one flint glass house at the Closegate.⁷ Throughout the 1730s all three houses appear to have been managed by John Dagnia of South Shields, the son of Onesiphorus Dagnia. The South Shields house, to which he added a second bottle house c. 1740, was his own property but the two Newcastle houses remained the joint property of the Newcastle and South Shields

branches of the family. John Dagnia: had been requested to manage the Newcastle house on behalf of the widow of Onesiphorus Dagnia (son of John) by the terms of his will. There seems little doubt that the bottle houses at Newcastle and Shields flourished under John Dagnia's evidently able management. On his death in 1746 his glass interests passed to his four sons and from them his Shields bottle houses passed to John Cookson and his share in the bottle and flint houses at Newcastle to John Williams (see below).

The second bottle house to appear in the area was at Bill Quay. Its early history is obscure. It was mentioned in the Common Council Minutes in 1694 and it seems unlikely that it dated from very much earlier. The names of its founders are not, unfortunately, known but it is possible that it was connected with Isaac Cookson. Cookson was certainly a partner by 1722 when it was described in the Common Council books as "Mr. Cookson's and Atkinson's glass house".⁸ The Bill Quay bottle house thus perhaps has the distinction of being the first of the Cookson family's glass interests. For most of the eighteenth century the Bill Quay house was run under the name "Airey and Co". Joseph Airey was an associate of Isaac Cookson and the merchant to whom Isaac's son, John, was apprenticed. Cookson's share in the Bill Quay bottle house at his death amounted to one quarter which was divided between his sons John and Isaac. Following the death of Isaac Cookson jr. in 1762 John Cookson purchased his late brother's shares after a law suit which yields a few minor details about the concern; for instance in both 1762 and 1763 Isaac Cookson's three sixteenth share received a profit of £252 10s.⁹ There were evidently close connections between John Cookson's flat glass house at Shields and the Bill Quay bottle house. Cookson's day book of the 1740s shows that Bill Quay bottles were frequently shipped at

Shields and that materials such as kelp or crown cullet were frequently sold to the owners of Bill Quay.

John Cookson's interest in bottles was given a new impetus in 1753 when he purchased a half share in the broad and bottle houses at South Shields owned by James Dagnia. James Dagnia was the son of John Dagnia who had died in 1746. Cookson's letter book bears witness to a considerable increase in his dealings in bottles both by taking over the accounts of some of Dagnia's existing customers and by soliciting new outlets for trade amongst his existing contacts. For instance in 1753 he wrote to David Nesbit, a Glasgow merchant who already took flat glass from him:¹⁰

Since you were at Newcastle last I've engaged in the bottle and broad house carried on by Mr. Dagnia and would be glad to know if a good quantity of bottles is consumed with you, and what would be the charges at your port. If they would answer I would send a parcel along with the glass.

Cookson's half share in the houses was almost certainly accounted for by Dagnia mortgaging both the glass houses to him for £3,182 11s 7d. In 1756 James Dagnia died and his half share was advertised for sale¹¹, noting that the property was heavily mortgaged to John Cookson. It was purchased by Evan Deer to create the partnership of Cookson and Deer. Evan Deer was the existing manager of the Dagnia houses who had married Sarah Dagnia the daughter of John in 1748 (see appendix 3c). He had previous connections with Bristol.

The partnership between Cookson and Deer was a profitable one for both sides. From Deer's point of view there was the advantage of Cookson's access to working capital and his commercial connections. Through Cookson Deer was able to enter alum manufacturing and was enabled to buy a small estate and some salt pans in South Shields

that had previously belonged to Isaac Cookson of Sherbourne, and which were also under mortgage to John Cookson.¹² From Cookson's point of view the partnership gave him the benefit of Deer's technical and managerial skills. Particularly important in this respect was the patent taken out in Deer's name in 1764 for manufacturing bottle glass and soap with alum slam, (see chapter one).

The partnership of Cookson and Deer came to an end with Deer's death in 1790 leaving as his only heir his daughter Jane. Another managing partner, Francis Blackett, was admitted to the firm which from 1790 to 1801 became Cookson, Deer and Blackett.

By the 1760s John Cookson's interest in bottle manufacturing was extensive. Besides his shares in the two houses at South Shields (under Cookson and Deer both the Dagnia houses were turned over to bottles), the Bill Quay house, and possibly the Closegate house (see below), since 1758 he had been a partner in a bottle house at Glasgow.¹³ Cookson's Glasgow bottle house should certainly be mentioned for although not a particularly long lived venture it is an interesting one in several respects, not least as evidence of Cookson's interest in the American trade. A major figure in the Glasgow firm was James King who managed the works besides acting as go-between for the partners on the Tyne and those at Glasgow. (This James King is almost certainly not the same James King who was the chief clerk of the Newcastle Broad and Crown Glass Company and who was connected with the bottle houses at St. Lawrence and the South Shore). The Glasgow bottle house appears to have developed out of a bottle house at Ellenfoot (Maryport) in which both King and Cookson were concerned. It is possible that the Ellenfoot house had been established with the aim of supplying the Glasgow market and by

transferring their operations to Glasgow the partners were merely moving their manufactory . . . nearer to the market. When the Glasgow house was about to be opened King was instructed by Cookson to dispose of the existing stock (some at a warehouse in Glasgow) as best he could by travelling in Lancashire:

Go as low as you can to save ourselves but if you do not succeed we give you discretionary powers to open a warehouse in Liverpool and the Isle of Man to sell bottles upon commission upon the easiest and best terms. You can inform yourself at what freight the Ellenfoot bottle house carry their bottles to those markets and also the freight from Glasgow.

The connection between the Ellenfoot house and the new Glasgow house is also clearly suggested by the apparent transfer of the Ellenfoot workers en masse to Glasgow. Cookson instructed King that he was to make the partners at Glasgow pay a yearly premium for the bottle makers and they would then have "half the property in them according to their articles".

Among the Glasgow partners in this venture were George Murdoch, the wealthy tobacco merchant William Cunningham, and the Brewery Company which was admitted to a quarter share in the bottle house in 1763 on condition that they took 2,400, dozen bottles a year "at stipulated prices". The entry of the Brewery Company¹⁴ as partners is one of the particularly interesting aspects of the venture for there is no evidence of any English brewery taking a direct interest in bottle manufacturing at this early date, well before the full development of the market for bottled beer. In 1767 the Brewery Company made a take-over bid for the whole concern by proposing to limit each partner's interest in the house to his lifetime. Cookson wrote to George Murdoch on this occasion urging him to oppose the proposal; "it is plain the whole glass house must in a few years become the sole property of the Brewery Company which can never die." Besides Cookson, another Newcastle merchant was also involved in the

partnership. This was Ralph Carr, a merchant with extensive interests in the American trade. His presence in the partnership underlines the suspicion that the reason behind north-east men establishing manufacturing concerns on the west coast was trade with America. From Cookson's day book of the 1740s it is clear that Ralph Carr was supplied with glass and bottles for America shipped directly from the Tyne however there would have been many more opportunities for shipping from both Glasgow and Ellenfoot. Interestingly enough, the American trade is mentioned in a letter from Cookson to his partner in the bottle house, William Cunningham, assuring him that if necessary he could supply him with extra bottles from Shields:¹⁵

I carry on a considerable bottle manufactory at Shields and can supply you with any quantity. The export price of commons is 16d per dozen 5% discount ready money on bottles, none on salt. If your ships are intended for New York I think a larger quantity of bottles would do as we have some we could afford cheaper being seconds. We have sent none there since the stop and there is nothing they'll stow better on than salt.

Cookson does not appear to have continued in this partnership into the 1770s. It is possible that the whole venture came to an end in 1770 for in that year James King left to establish a new bottle house at Dumbarton,¹⁶ and Cookson and Deer established a new venture at Glasgow "Verreville", this time for the manufacture of flint glass (see Chapter 4).

Cookson's bottle interests on the Tyne were consolidated with his absorption of the Bill Quay house and finally the Dagnias' Closegate house. In 1771 the Bill Quay house "recently occupied by Airey & Co" was advertised to let¹⁷ as a going concern with a full set of workmen under a manager, Jacob Wilson. By the 1790s the firm was being run as Cookson, Deer and Wilson and as this particular name is first recorded in 1779¹⁸ it seems likely that it dated from 1771 with Cookson and Deer taking over the whole house and admitting Wilson as the managing partner.

From the 1740s to the 1760s the Closegate bottle house had been leased out by the Dagnia family to a company headed by John Williams.¹⁹ Williams had come into glass manufacturing by marrying the widow of Onesiphorus Dagnia in 1738 and thus becoming an eligible lessee of the family's glass houses. Williams had business connections with the Cooksons and indeed appears to have settled in Newcastle only as a consequence of a partnership with Isaac Cookson in iron foundries in Cumberland and Durham. At the time of his partnership in 1729 Williams was described as a "gentleman" from Stourbride.²⁰ In view of this business connection with Cookson it seems quite possible that Cookson had a share in the firm of Williams and Co., but this is not known. John Cookson did however have a share in the successors to Williams & Co. an entity called "The Owners of the Closegate Bottle and Flint Glass House" which appears to have been composed of the sons of John Williams running the flint glass house and John Cookson running the bottle house. When this association was dissolved in 1785 (following the destruction of William's flint glass house in 1782 by fire and the death of John Cookson in 1783) a notice in the paper informed the customers of the bottle house that it was henceforth to be carried on by Isaac Cookson alone.²¹

By the time of John Cookson's death in 1783 he was the major shareholder and controlling influence in all three of the early bottle houses. They were to remain in the Cookson family until the middle of the nineteenth century, but because of the number of eligible sons the family constantly provided were never again to be under the control of one Cookson. John Cookson set the pattern when his will divided his bottle houses between his sons: Isaac the eldest took the Closegate house, John the South Shields house and possibly Joseph the Bill Quay house. With the death of Joseph in 1800 and John in 1802 the shares passed to

Isaac to be divided in turn amongst his sons.

(ii) The St. Lawrence, Ouseburn and South Shore bottle houses

These three bottle houses mark a second wave of activity in the bottle industry of the north-east, and one that occurred in the second and third decades of the eighteenth century: the High Bottle House was built c. 1720. St. Lawrence c. 1721 and the South Shore c. 1735. The first two of these houses are further connected by their links with the Newcastle Company of Broad and Crown Glass owners at the Ouseburn. The High Bottle House was established by the owners of the middle broad glass house and therefore marks an extension of the activities of the broad glass owners. In 1720, when the corporation's lease of the middle glass house was renewed by Matthew White, Peregrine Henzell and Jane Roddam, permission was asked, and granted, to build a new bottle house on the site immediately adjacent to the middle glass house.²² Like the existing broad glass houses the bottle house was to all intents and purposes a part of the Broad and Crown Glass Company yet it remained at least nominally under the separate ownership of the owners of the middle glass house. Thus the house was sometimes described as belonging to Matthew White and Co. or Thomas Henzell and Co., and from the 1780s was most usually described as the house of Catherine Henzell and Co.

The bottle house at St. Lawrence, although sharing a site with the St. Lawrence broad glass house belonging to the larger company, was an even more distinct enterprise in terms of nominal ownership. Until 1811 the house remained the property of two Quaker families, the Middletons and the Hewitsons and thus has the distinction of being the only wholly Quaker owned glass house in the region. The partners taken

by the Quakers to carry on the glass house were members of the larger Broad and Crown Glass Company, notably James King and Sir Matthew White Ridley, but the house never became a part of the company. The land at St. Lawrence had originally been leased by the corporation to Joshua Middleton the Quaker in whom the Tyzack's shares in the broad glass had temporarily been vested. The lease was renewed in 1721²³ by his son John who was granted liberty to build on the site. A glass house had certainly been erected by the time of John Middleton's death in 1730 for in that year his widow, Isabella, admitted Richard Ridley to a partnership in order to carry on the bottle house.²⁴ The price paid by Ridley was a yearly "rent" of £45 plus his share of repairs and expenses. Richard Ridley was a prominent local figure, an alderman, coal fitter and the owner of the nearby Byker and Heaton coleries. Ridley's entrance certainly involved the supply of coal to the bottle house for a later partnership agreement mentions that his yearly rent (by 1760 this had risen to £60) was to be part paid in coal. Ridley's involvement also benefited the house by giving it the protection of an influential local figure and one who could use his influence in the house's favour. For instance in 1743 his son Matthew Ridley attempted to negotiate a favourable lease from the Corporation:²⁵

The Corporation will only renew the lease on such higher terms than the former. I used my utmost endeavour to obtain a lowering on the yearly rent and fine and did get abated £6 from the former and £5 from the latter.

Both Isabella Middleton and her heirs, her daughters Jane Gomeldon and Ann Hewitson, were happy to leave the running of the glass house to agents. From 1739 to 1755 the house was under the agency of a fellow Quaker Joseph King, and from 1755 to 1780 under the agency of Middleton Hewitson, Ann Hewitson's husband. The partnership agreements with Matthew Ridley were renewed in 1760 and 1767 but judging from the few

references to the house in Matthew Ridley's letter books, he too was happy to leave much of the business to agents. In 1780 Jane Gomeldon died intestate and this gave rise to some confusion over the actual ownership of the bottle house. Jane Gomeldon left no obvious heirs or assignees and so, according to a later account, James King (the chief agent of the Broad and Crown Glass Company and probably the brother of Joseph King) volunteered himself as administrator of her effects. Whilst ostensibly sorting out the books at the bottle house King conveniently destroyed all references to the previous partnership agreements with the result that from 1780 the house was treated as the joint property of Middleton Hewitson and Sir Matthew White Ridley. King's deception was not discovered until 1806 when an independent enquiry found that the bottle house was the sole property of Middleton Hewitson (the son of the previous Middleton Hewitson) and that he was owed £1,659 by Sir Matthew White Ridley for arrears of rent and repairs since 1780; charging only the last agreed rent of £60 a year even though the glass house had been much extended since 1767 when the sum had last been fixed.

James King was also involved in the third bottle house in this group, The South Shore or Saltmeadows bottle house. This was built some time before 1735 by a partnership headed by Joseph Liddell, a Newcastle merchant and owner of collieries on Gateshead Fell; a man with no obvious previous connections with glass manufacturing. In 1735 Liddell, John Stephenson and Thomas Hodgson petitioned the Common Council for a lease of land in the Saltmeadows previously leased to Thomas Turnbull claiming that they had recently erected a glass house there.²⁶ The lease was renewed in 1752 by Grace Liddell, the widow of Joseph, and John Liddell, his brother. At this time Grace Liddell owned three quarters of the house and John Liddell the remaining quarter. In 1775 the lease

was renewed again by John Andrews, the executor of Grace Liddell in trust for Sarah and Ann Bonner, and Joseph Liddell of Moorhouse in Cumberland.

Neither Grace Liddell nor her heirs took an active part in the bottle house which therefore was leased out to others. In 1752 it was advertised to let²⁷ and in November 1753 passed to James King for a period of nineteen years. King's occupation of the South Shore bottle house proved a rather negative episode in its history for in 1756 King signed an agreement with the six other bottle manufacturers on the Tyne whereby in return for an annuity of £60 per annum he agreed not to work the bottle house and to sell the others his stock of materials and bottles.²⁸ Whether King took on the lease of the bottle house with the intention of closing it down is not known but in view of his evident partiality for schemes it is certainly possible.

What happened to the house immediately after King's lease expired in 1772 is not known. The next recorded sub-letting by the Bonners and Liddell is in 1792 when the house was leased to John Barber of the newly formed Tyne Glass Company. In the deed between the Bonners and Barber the house is described as being "at present in the occupation of Isaac Cookson" but it is not known for how many years previously Cookson had occupied it. In a letter to Sir Matthew White Ridley in 1781²⁹ Joshua Henzell notes that a meeting is to be fixed "about the business of the South Shore bottle house" which suggests that the matter had not at that date been settled.

(iii) Sunderland

The development of the bottle industry at Sunderland during the eighteenth century was on a far smaller scale than at Newcastle. In fact it could be argued that there was no development at all. Bottle manufacturing was established at Sunderland in the late seventeenth century with the erection of a bottle house at Ayres Quay and one at Bishopwearmouth. During the eighteenth century there was little change; the two houses continued in production without competition from rival firms. They themselves were linked through their common owners, "The Company of Glass Owners at Sunderland", who also owned a broad glass house at Ayres Quay (which appears to have manufactured bottles more often than broad glass). Until 1741 both bottle houses were managed by the Company of Glass Owners but in that year the houses were advertised to let.³⁰ In 1743 the Company of Glass Owners called in its debts and declared itself dissolved as a trading company. The leasing of the glass house in 1741 established a pattern that was to continue for the next half century. The houses were let by the owners to smaller partnerships for periods of fourteen years and advertised as going concerns at the end of each period. The advertisements, in 1754, 1768, 1781 and 1795, all describe the houses as having full sets of workmen and, as the 1768 advertisement makes clear, quite capable of being carried on by the existing occupiers: "whosoever chooses to apply for those works are desired to be speedy in their application, otherwise the owners will agree to carry them on themselves". In practice the lessees of the glass houses appear to have frequently been members of the company of owners. This was certainly the case in 1768 when, two weeks after the advertisement of the glass houses, a notice was put in the papers that the two Ayres Quay houses had already been let to one of the proprietors and that "seven out of the ten proprietors

of the said glass houses executed a lease thereof to the lessee named in the said agreement".

Exactly who the proprietors of the Sunderland glass houses were is not known but they appear to have included members of many powerful Sunderland families:- the Pembertons, Fenwicks, Featherstonhaughs, Carrs, Donnisons and Wilsons; men who were River Wear Commissioners, coal fitters and land owners. The proprietor to whom the Ayres Quay houses were let in 1768 was Thomas Wilson who had occupied them since at least the 1740s and as early as 1723 had appeared in a list of River Wear Commissioners as "Thomas Wilson of Ayres Quay, Bottle Manufacturer". Cookson's letter book of the 1750s occasionally mentions Wilson and on one occasion described him to a London bottle merchant as "Mr. Wilson who works two houses at Sunderland".³¹ From 1768 the Ayres Quay houses were run under the name "Wilson and Russell". William Russell was a wealthy man who had inherited large fortunes from both his father and his uncle Matthew Russell a Sunderland ship builder and timber merchant. On Thomas Wilson's death in 1776 Russell carried on the houses as Russell and Co. until 1783 when he quit Sunderland to take up the proprietorship of Wallsend colliery. Russell was an energetic proprietor who in 1780, as we have seen, unsuccessfully attempted to revive the production of broad glass at Ayres Quay. He was occasionally mentioned by the bottle agents at Hartley: for instance in 1781 Joseph Oxley wrote to Sir John Delaval from Colchester saying that he could not make any bottles sales there because three days previously Russell of Sunderland had landed 3,000 dozen, but that he "made them pay 2d per dozen over the Newcastle prices so eventually they might come to you".³²

When the Ayres Quay houses were next advertised to let, in 1795, they were "now" in the occupation of certain persons under the firm of "The Proprietors of Ayres Quay Glass Works", a modern version of the Company of Glass Owners. Amongst these proprietors were William Carr who took an active part in the bottle manufacturers' campaign against the Excise over moiles, and William Featherstonhaugh who signed a memorial to the Treasury on behalf of Ayres Quay in 1795.³³ After 1795 the houses were taken over by Richard Pemberton who was almost certainly also a proprietor. The Bishopwearmouth house was not advertised to let after 1768 and it is possible that it fell idle as the broad glass house at Ayres Quay was given over to bottles. It was restarted around 1794 under the firm of George Fenwick and Co. whose name first appears in 1794 as being prosecuted by the Board of Excise.³⁴ The firm also signed a petition to the Treasury in 1795 asking to use firestone in their furnaces free of duty.³⁵ George Fenwick of Lambton is thought to have been the son of John Fenwick of East Heddon and it is probable that he too was one of the proprietors of the Sunderland glass houses.

(iv) The Hartley bottle works

In any account of the north-east bottle industry the Royal Northumberland Bottle Works at Hartley must take a central position. Firstly for the simple fact that the records from the manufactory are extraordinarily complete. Despite the destruction of some of the bottle houses papers in the nineteenth century, more detailed information about the Hartley works survived than about all the other north-east bottle houses put together. The second reason for the importance of Hartley is that it is quite unique and provides information about areas of economic history, such as the industrial development of landed estates,

that could not have been provided by other bottle houses even had their records been as complete. Although sharing the same trade as the bottle houses on the Tyne and the Wear the Hartley works was, in many respects, quite different. It operated within a different economic environment and was subject to different constraints and influences upon its growth. The difference between the Hartley works and the other bottle houses in the area is very simply seen by looking at the size. Most bottle firms began their existence with a single bottle house. The Hartley works began in 1762 with two houses, and with the erection of a third in 1788 laid claim to being not only the largest bottle manufactory in the north-east but the largest in Britain. This claim was possibly correct. Hartley's three houses do not appear to have been matched by any firm until the 1800s when the Edinburgh and Leith Bottle Company at Leith and Cookson and Cuthbert at South Shields both worked three houses.

The size and growth of Hartley reflected its immediate economic environment which was altogether far more favourable than that enjoyed by other bottle houses. Broadly speaking the Hartley bottle works flourished because of the considerable benefits of being directly associated with a titled and landed family. The works was erected on the Northumberland estate of the Delaval family and until 1812 was run directly by the Delavals; first Thomas Delaval and from 1771 Sir John Delaval. Perhaps the most beneficial aspect of this situation was the support provided by other parts of the estate. The "mutual and inseparable" relationship between the colliery and the bottle works has already been mentioned but it seems fair to say that nearly all features of the estates, particularly the industrial features, enjoyed a mutual and inseparable relationship with every other feature. The bottle works for instance was supplied with mineral alkali from the salt pans, the bottle workers were supplied

with an allowance of ale from the brewery at Hartley and provided with accommodation, services and a community by the village at Hartley which had grown up primarily to serve the colliery and manufactories. All the industries at Hartley relied on the harbour at nearby Seaton Sluice which in turn had been improved to meet the needs of the industrial undertakings. Most of the bottle sloops that were employed in transporting bottles to London were owned by local men and were employed solely in the Delavals' trade. Even the agricultural parts of the estate could supply materials, such as timber, forage and even food, to the manufactories at Hartley and Seaton Sluice. Altogether the Delaval estates were remarkably self sufficient and interdependent. This was particularly true of the industrial undertakings and is reflected in the fact that profit and loss accounts were frequently taken on Hartley as a whole, including the colliery, bottle works, brewery and salt pans, rather than on one enterprise alone.

A second beneficial aspect of the bottle works' situation lay in having as the proprietor a man of considerable capital resources. John Delaval, although by no means possessed of surplus cash, owned sufficient land to make him an eligible recipient of capital from others whether by mortgage or short term credit. Immediately after he took on the Delaval estates in 1756³⁶ they were mortgaged for a total of £43,000 which money was used to rescue, develop and improve them. The sum was one of the largest granted by the Sun Insurance Company to a private person in the eighteenth century and was only exceeded by the £50,000 mortgage granted to the Duke of Leeds.³⁷ In addition the glass houses were mortgaged c. 1788 for £4,000. The income from rents and agricultural activities on the estates was considerable; in 1756 it was estimated to be £6,000 per year. Because of this assured income Delaval was able

to raise short term loans should his industrial enterprises require it. The Newcastle bank of Surtees and Burdon received Delaval's agricultural rents and remitted them to London, and in return favoured him with a short term credit account. In 1788 Delaval took out a bond for a credit of up to £3,000 which was extended to £4,000 in 1796. In extending credit Surtees and Burdon pointed out that in this respect Delaval was unique:³⁸

No colliery either on the Tyne and Wear have any credit account with us and in granting to your Lordship the indulgence of a credit account we depart from our rule.

Despite the close ties with the rest of the Delaval estates, the bottle works began with at least the appearance of being a separate and distinct enterprise. The bottle works was established and originally owned by Thomas Delaval quite independently from the rest of the estate which was entrusted to his brother John; the works in fact represented the efforts of a younger son to find himself a profitable career. Thomas Delaval had been intended for a commercial career and for that purpose had been apprenticed to a merchant house in Hamburg where he was said to have developed a passion for trade and returned to England determined to channel his energies into manufacturing and trade. Considering that a coal mine was already in operation on his family's estates this was the obvious site for his manufacturing project. John Delaval was evidently content both to help his younger brother and have him add value to the estates; he later commented to Thomas "You say it was my idea to start the glass works but I was ready to accommodate you with an advantageous situation".³⁹ Thomas Delaval's improvements to the estate were considerable. Not only did he erect the two square ^{glass houses} but he established a copperas works and improved the harbour by cutting a new entrance to the sluice. He must also be credited ^{helping to} with introducing steam powered winding engines at the colliery and inventing the mineral

alkali for use in bottle manufacturing which he patented in 1766.

The separation of Thomas Delaval's concerns from the rest of the estate was underlined by a private Act of Parliament passed in 1771 which gave Thomas freehold possession of the glasshouses and granted a 99 year lease to Thomas and John Delaval of the colliery.⁴⁰ According to the Act Thomas Delaval wished for freehold possession of his glass works after "having invested much larger sums than were at first intended in the said manufactory" and intended to invest still much larger sums if the property could be secured to him. The Act was ultimately of no benefit to Thomas. He had first suggested it in 1768 but because of some disputation with John Delaval the Act was not passed until 1771 by which time Thomas's financial position had deteriorated to such a degree that in May 1771 he offered the glassworks to John Delaval in return for a life annuity. John Delaval was at first reluctant to take on such a risk bearing enterprise but was eventually persuaded to. This, plus the death of his elder brother Francis in August 1771, reunited the glassworks with the rest of the estate under a single owner.

The purchase of the glass works in 1771 provides us with some indication of the value and potential of Thomas Delaval's enterprise. According to Thomas £10,000 had already been invested in the Hartley estate and £15,000 was needed to carry on the works. The whole estate produced a yearly income of £3,700 (made up of £2,500 from the glasshouse, £150 from the brew house, £1,000 from rent on the "overplus of land" and £50 from the "Dissington Annuity"). Minus interest on capital and an annuity of £1,200 to be paid to him, this left an income of £1,750: "therefore the undertaker will be a gainer of £25,000 capital invested producing a net income to himself of £1,750 per annum".⁴¹

This was almost certainly a highly optimistic valuation as was his elaboration of the yearly income of £2,500 from the glass houses:

With ease the factory can produce annually 100,000 dozen bottles Both calculations and experience prove that we can fabricate them for 12d per dozen. Our contracts are made for 18d per dozen which upon the above mentioned quantity is £2,500 per annum. There is no more risk attending this than the coal, nor indeed so much these works being not subject to any of the subterranean accidents. The agents are Sir John's people and the difficulty never lay in the management nor in the establishment which is most perfectly complete.

Even allowing for Thomas Delaval's optimism it is clear that the bottle works at Hartley was an ambitious venture, involving large sums of capital. The claim that £10,000 had already been invested in it does not appear to be unreasonable in view of a further point made by Thomas Delaval; that the £15,000 needed to carry on the works was easily guaranteed by the existing stock and property belonging to the factory including items such as his share in the London warehouse "doubled in value since the building of the bridge".

Thomas Delaval was quite adamant that his brother's apprehensions were ill founded; "there cannot be a more plain or simple undertaking and as I leave so large a capital in the works there can be nothing easier to be carried on". In retrospect his prediction was apt; the subsequent history of Hartley leaves the impression that success was well assured. This was not entirely due to the lavish establishment left by Thomas and a large part of the credit for Hartley's success must go to the conscientiousness and ability of Sir John Delaval. The mass of letters from the agents on the estate to Sir John during his seasonal residence at London bears witness to the depth of his involvement in the works. He was kept informed not just of extraordinary events but of the smallest detail of routine. He was notified of every shipment of bottles to London, including the number and type of wares sent, he was sent fortnightly pay bills,

weekly production figures and near daily letters informing him of the general state of the works. The running of the estate from day to day was left to his salaried agents⁴² but Sir John Delaval was consulted on even the most minor of decisions and was kept intimately informed of their activities.

The bottle works flourished under the proprietorship of Sir John. In 1771 the productive capacity was 100,000 dozen bottles a year. By 1800 this had doubled to 200,000 dozen. The major cause of this increase was the replacement of the two square houses with three round, or cone, bottle houses erected in 1778, 1782 and 1788. Cone bottle houses were more efficient than the older square houses in that the cone created a more powerful draught and a more efficient furnace. It is perhaps worth looking at the erection of the round house in some detail for the advent of the cone glass house is generally acknowledged to be an important and uniquely English development in glass technology yet one about which little detail is known.

A plan of a round bottle house was included in Diderot's Encyclopaedia of 1751 - 1770 and specifically described as an English bottle house. The cone bottle house is generally understood to have developed in England because of its particular suitability for coal fired furnaces. Despite the evidence of Diderot it has been suggested that by 1750 the round cone house was not typical of English glass houses since England was a part of the northern European tradition of furnace building constructing square glass houses as opposed to the southern European tradition of round bee-hive furnaces.⁴³ The Hartley evidence tends to support this theory. First, as confirmation of the link to a north European tradition of furnace building; Thomas Delaval almost certainly

constructed his square houses in imitation of glass houses he had seen at Hamburg (it has been suggested that he originally staffed his glass houses with German workers but there is no evidence for this). Second, as evidence that square glass houses continued to be used in England until the 1780s at least; and third, as evidence that when in the 1770s and 1780s round houses were introduced, their construction was sufficiently novel to cause much argument and uncertainty.

This final point is best illustrated by the building of the first round glass house at Hartley in 1778.⁴⁴ A first attempt to build it miscarried and the builder, "Mr. Grey the master builder of Newcastle", was forced to abandon it. It was eventually completed by a new builder, William Blacklock of Tynemouth, at a considerably advanced price to compensate, he claimed, for the disadvantage of not doing the work from the beginning. The eventual cost of building a new round bottle house was entered in the accounts as £928 18s 7d noting that this allowed nothing for the miscarriage in building it. During its construction it is clear that the glassmen had some say in altering the plans in order to make the house more practical.

Despite the difficulties of building it the new glass house was generally agreed to be an improvement. In 1782 when the square glass house stood in need of considerable repairs it was suggested that it be replaced with a second round house on the pattern of the first since "nothing can be made so safe or permanent".⁴⁵ It was hoped that the cost of this would be less than the first house and John Crooks estimated it at £640 allowing for using the stone in the existing house and using bricks made on the estate costing 5 shillings per thousand instead of the 10 shillings per thousand charged for the first house. This house

too was the subject of some argument. One of the main complaints against the old square house was that the roof timbers were in constant danger of catching fire from the furnace. Joseph Oxley suggested that this could be remedied without the expense of constructing a completely new round house by building a small round house of brick within the square one just to circumscribe the furnace and ash arches.⁴⁶ One argument against this was that the round house would leave too little room in the house to set the new pots, besides which the timber roof of the square house would still be in danger from the pot arch fires. A round house was eventually agreed on and constructed but it was by no means as satisfactory as the first house largely because of ventilation problems. In July 1783 the main chimney was raised by 6' - 8' in an attempt to clear the house of sulphur⁴⁷ but even as late as 1793 the house was still causing trouble and, on one occasion, the men stopped work in it because of the heat "and want of cold water to drink".

In January 1788 the remaining old square house was pulled down and the foundations laid for a new round house.⁴⁸ This house took some time to construct; by April only the foundations had been completed, in June work stopped for three weeks for want of burnt bricks for the main wall. It started work in October and was 130 foot high. This house appears to have been a considerable improvement on both the previous houses to which alterations were made in the light of the experience of the third house:⁴⁹

Some improvements have been made in the two old houses by heating the bottle arches quicker and making the ash arches of stone instead of brick as the new house was done. The workmen wished much for them to be done so and it was found to be a great saving of coals in heating the arches and also of bricks in the ash arches which, from their circular forms, were very weak and often fell by the weights of the tops pressing out the bottoms.

In addition the porches in one of the old houses were renewed with pantiles instead of timber which was also considered an improvement.

One aspect of the erection of round glass houses that emerges quite strongly is that they were considered desirable not just because they were more efficient but because they were durable and fireproof; Crook's comment that "nothing can be made more safe and permanent" is a useful one to remember. The old square houses with their roofs of timber were acute fire risks and demanded constant working capital to repair and even rebuild them. Although the cone bottle house could not be said to have been completely permanent in that the furnaces needed replacing every three months or so, they were considerably more permanent than their predecessors. At Hartley, the three cones - named in the early 1800s Charlotte, Antigallican and Success - lasted nearly a century until they were pulled down when the works closed in 1872. In 1801 they were valued at £231, £83, and £214 respectively; the valuation being made on the cost of the furnace 40) and the number of fire bricks in the cone.

Other improvements were made to the bottle works during the proprietorship of Sir John Delaval. In 1784 a carriage way was laid from the warehouse to the crane on the quay "with sleepers and rails in form of the coal wagon ways and the carriages run upon small metal wheels which answers very well and ^{is} much safer for the bottles than the old way was".⁵⁰ In 1788 another wagon way was planned in order to lead coals and bricks to the glass houses.⁵¹ An important improvement was the mechanisation of the delivery of water to the glasshouses. In the 1770s John Crooks fixed a horse pump for use of the glass house which was capable of delivering 70 gallons per hour; the expense of fixing it was £42 5 shillings.⁵² This was replaced by a steam engine in 1801 after John Bryers had visited the

glass houses at Lemington to look at their machine which was used for grinding clay for the pots and grinding kelp. At Hartley all these operations were done by horse power:⁵³

It more and more appears to us to be a saving and a considerable one to have a machine instead of horses for the three mills which can at little expense be made to sift the ashes, colours, or at least to give motion to the sieves or screens for that purpose; to lift the salt water should the flux pans be brought over; and also to fill the ponds with fresh water out of the burn or the other pond for the use of the glass houses in summer when the ponds now used are dry.

As the work grew in size so various subsidiary departments were added. An inventory of stock taken in 1801 (see figure 10)⁵⁴ lists, in addition to the basic bottle making equipment, a joiner's shop, smith's shop, cooper's shop and various equipment for making bricks and grinding kelp. A smith had been employed by the glass works since the 1770s and a pay list of 1775 indicates that at 17 shillings per week he was one of the highest paid employess. In addition various improvements and additions were made to the village of Seaton Sluice. By 1790 the village included 43 cottage houses, of which 12 were occupied by glass men, 31 houses one storey high, 12 houses two stories high and four larger dwelling houses occupied by the agents and Mr. Ridley of the brewery. There were also three shops, a school, a windmill, the brewery and malting, a public house and a stables.⁵⁵

In terms of the size of production and the size of the establishment, the Hartley works certainly experienced a steady growth. Whether this growth was matched by a parallel growth in profits is by no means as certain. The major problem in looking at profits is that there appear to be very few profit and loss accounts for the glass houses alone and what few exist are estimates rather than actual accounts. If Thomas Delaval's 1771 estimate of £2,500 yearly profit on two houses is to be believed then the profits per house declined since an estimate of

Figure 10

<u>Inventory of Stock at the Royal Northumberland Bottle Works, 4 July 1801</u>			
	£	s	d
-In the warehouse yard and shades			
Bottles @ 1s 1d per dozen			
Inferior bottles @ 1s 8d per dozen			
Packing and carriages	881	1	0
-In the Warehouse			
Bottle carriages, weights etc.	45	1	6
-In the coopers shop in the warehouse	13	9	4
-Blue and Brown ashes			
600 tons blue @ 12s			
30 tons brown @ 12s	378	0	0
-Cullet			
12 tons @ 35s	21	0	0
-Coals 100 tons @ 5s	25	0	0
-Cellar at glass houses			
18 tons kelp @ 90s			
Other materials	92	10	0
-Pots and clay			
Pots @ £6 each			
Pot clay @ £4 5s per ton	2,307	10	0
-Mineral alkali @ £2 per ton	40	18	0
-Warehouse office			
Excise notices, bottle marks etc	31	13	11
-Cellar beneath	1	12	0
-Staithe and straw	65	2	0
-Glasshouse pay office			
The Great Clock £40	44	0	0
-Joiners shop			
Carriages, wheels and frames	33	15	4
-The Calkers	7	4	6
-"Charlotte" the first glass house	231	19	8
-"Success" the second glass house	283	14	8
-"Antigallican" the third glass house	214	5	5
-In the South Mill	15	9	6
-In the North Mill	14	3	0
-In the east or pot clay mill	39	1	0
-Furnace stones	105	0	0
-Stables	35	0	0
-Mason's cottage	6	9	0
-Brick making equipment, sundrie gears	5	0	0
-Kelp making equipment, sundrie gears	4	10	0
-First colour room	12	13	0
-Second colour room	12	13	0
-Third colour room	12	15	0
-Five bottle vessel platforms			
For 'The Polly', 'The Speedwell',			
'The Hartley', 'The Delaval', 'The			
William'	75	0	0
-Clay lying at Gainsborough			
54 tons @ £4 6s per ton	233	14	1
-The Smith's shop			
Shears, old pipes, shovels etc.	228	1	2
	<u>5,680</u>	<u>13</u>	<u>1</u>

profits in 1790 judged £800 per house to be the average yearly income⁵⁶ however Thomas Delaval's claim was certainly exaggerated. The 1790 claim seems far more realistic, especially in view of another bottle manufacturer's comment that he considered £1,000 per house to be a proper return (see p.254). The only reliable real profit and loss account for Hartley is for the year 1796-7 and in fact shows an actual profit considerably beneath the estimates.⁵⁷ On a production of nearly 230,000 dozen the net profit was £1,772 4s 6³/₄d or roughly £600 per house. Delaval was never concerned however with comparing profits with what had been; rather he constantly compared his profits with what he believed the other Tyne houses to be making at the present time. In 1784 for instance he calculated that on a production of 100,000 the Tyne houses made almost £1,000 more selling on their terms⁵⁸ (this was quite a false calculation and based on a misunderstanding of their expenses). In 1800 Delaval calculated that he received a net profit of 3¹/₂d per dozen and was thus mortified to hear in 1803⁵⁹ that Cookson's three houses at Shields were clearing a profit of 4¹/₂d per dozen. All that can be said with certainty on the subject of profits is simply that Delaval's bottle works did make a profit and that with three houses in work this was likely to be within the range of £2,000 - £3,000 which was not an unreasonable sum. The few available figures for payments of excise duty certainly indicate that by the end of the century the bottle work's average production was large:⁶⁰

	<u>Eight Weekly Payments (in £)</u>					
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>	<u>6th</u>
1793	-	953	975	1,027	993	1,049
1794	-	-	-	-	-	-
1795	942	931	1,121	923	1,167	1,152
1796	873	1,033	948	977	928	1,104
1797	-	822	-	-	918	-
1798	-	-	644	592	664	683
1799	-	567	-	-	-	-
1800	-	-	-	-	-	-
1801	-	970	881	-	-	983
1802	-	804	870	-	899	931
1803	824	923	-	881	-	-

The total payments for 1795 and 1796, the only two years for which full figures are available, show that the works paid £6,236 and £4,763 or 13% and 10% of the total bottle duty in those years.

(v) The Bottle Trade

(a) London

The entry of bottles from Hartley into the London market during the early 1760s had a startling effect on the established trade; so startling that it forced a reduction of up to 2d per dozen from the previous retail price of 28d - 30d per dozen. The size of this reduction makes some comment on the state of the London bottle trade previous to this date. The London bottle trade appears to have ^{been} one in which goods were priced with little reference to the actual cost of manufacture but according to what was agreed by the trade. The lower prices of the bottles from Hartley was essentially not a reflection of lower manufacturing costs

but of Delaval's whole method of supplying the London market which was quite independently of the established trade. Delaval by-passed the trade in that his bottles were sold through his own warehouse rather than through the warehouses of the bottle merchants used by the other bottle manufacturers. Delaval's "Royal Northumberland Glass and Bottle Warehouse" was first established at Southwark but later moved to Blackfriars.⁶¹ It was not altogether novel for a manufacturer to establish his own warehouse in London, John Cookson for instance sold his flat glass through his own warehouse in Fleet Street, but it was a novel development in the bottle trade.

It is interesting that, although some of Cookson's bottles were sold through his Fleet Street warehouse, Cookson made use of, and indeed preferred, the bottle merchants who served most of the other north-east bottle manufacturers, namely John Webb whose warehouse was at the Steelyard and Thomas Farmer whose warehouse was at the Three Cranes. Cookson had started to send bottles to Webb in 1753 after agreeing with the other Tyne manufacturers that he should be permitted to do so.⁶² After ten years he found the connection so satisfactory that he was forced to reconsider his arrangement for bottles at his own Fleet St. warehouse. In 1764 he wrote to James Dixon at the warehouse complaining that his remittances for bottles sold were so slow that the amount stood out as three times the value of what was sold through Webb and Farmer although the return per month was considerably short of either. In order to remedy this he proposed to bring the Fleet St. warehouse on to the same footing as the other two; which proposal gives us a useful picture of the business arrangement between the bottle merchant and the manufacturer:⁶³

They send a monthly account and sell for ready money so that we have no bad debts. We draw on them at 60 days date for the amount of what's sold the month preceeding so that amounts to near ready money.

These were certainly the terms on which Webb and Farmer dealt with all the other north-east manufacturers and there is evidence that they acted as agents for all of them. Cookson's letter book mentions that in 1759 Mr. Airey, Mr. Hewitson, Mr. Henzell and himself were to share the cost of £800 insurance of the stock in Webb's warehouse.⁶⁴ Mr. Wilson of Sunderland is mentioned in connection with Farmer. Indeed as Webb and Farmer are among only three bottle warehouses to be mentioned in a London Directory of 1763,⁶⁵ it appears that the north-east manufacturers were to a certain extent forced to share their facilities if they did not wish, or could not afford, the trouble of retailing the bottles in London themselves. Webb and Farmer both sold the bottles for the manufacturers deducting sums for commission plus the expense of warehousing. In 1781 Joshua Henzell laid out the details of their deductions which by this time he considered far too large; he considered the whole arrangement far too favourable to the merchant at the expense of the manufacturer:⁶⁶

Out of the London retail price of 2s 9d per dozen:

9³/₄d paid on Farmer's terms, viz:

4³/₄d commission
1¹/₂d freight
³/₄d risking debts
³/₄d breakage and risk at sea
1d breakage in the warehouse.

Leaving 23³/₄d for the manufacturer

From which deduct:

9d excise duty
12d materials and wages

Leaving the utmost profit 2¹/₂d - 2³/₄d per dozen

Hartley bottles were marketed under a different arrangement. The services of an independent merchant were not entirely dispensed with but he was placed in a position far more advantageous to the manufacturer. On the one hand the merchant was less independent in that he dealt only in Hartley bottles and relied completely on the works for his livelihood; he was more of an agent and a warehouseman. On the other hand he took

more of the responsibility and risk of bad debts for he was obliged to buy the bottles from the works at an agreed price as soon as they were delivered at the warehouse. The advantages of this latter provision from the manufacturer's point of view are obvious: the merchant was in effect advancing him the price of the bottles before they were finally disposed of, and it was the merchant who shouldered the entire risk of bad debts. In practice this arrangement worked almost identically to the more traditional arrangements in that, although in theory Delaval's interest in the bottles ended once he had delivered them to the warehouse and received payment for them, in practice his merchant kept him closely informed on the state of trade in London so that he could increase or decrease the shipments as required.

The first merchant to take on the sales of Hartley bottles in London was Charles Broughton, a merchant with a variety of other interests including salt and alum. When the bottle works passed from Thomas Delaval to his brother Broughton took the opportunity of negotiating a more favourable position for himself by suggesting that he take on the freight of the bottles from Hartley to London in return for a reduction in the price he paid to 17d per dozen. This was not agreed to by Sir John, largely on the advice of Thomas who told him to begin by paying all the charges himself so that he would know exactly what they amounted to.⁶⁷ Broughton also wanted six months credit for payment and when this was refused threatened to terminate the contract and make an alternative arrangement with a Bristol house where, he claimed, he could get the bottles 5% cheaper with credit into the bargain. Despite this threat a contract was drawn up between Broughton and John Delaval in December 1771. By the terms of this Broughton was to take all the bottles manufactured at Hartley except those sold by Sir John to private

people in Northumberland and those for his own use. The prices to be paid on delivery of the bottles alongside the warehouse at

Blackfriars were:

Double quarts	43d	per dozen
Common quarts	21½d	"
Common pints	19d	"

(These prices were about 7d below the final retail price). Broughton was to unload the cargoes within eight days and notify Sir John by letter of their arrival. £5% discount was given on discharge of the Bills of Exchange with an extra 2½% if discharged within 40 days. Both sides gave a security to guarantee this contract which Broughton took great exception to doing. He even complained about having to formalise the agreement into a contract at all saying that contracts were "unheard of in mercantile affairs".

Contracts continued to be made between Delaval and his bottle merchants until Delaval's death. In some respects they became increasingly unnecessary as the growing capital invested by both sides in the trade guaranteed their commitment to each other. However they did provide some measure of security which both sides appear to have found reassuring. From the point of view of the historian they are extremely useful in providing an outline of the changing circumstances in the trade plus the increases in production at Hartley (see Fig. 11).

The 1771 contract with Broughton came to an abrupt end in December 1772 when, largely as a result of the Scottish circulation crisis, Broughton was declared a bankrupt. At the time his balance with Sir John Delaval stood at £1,904 but fortunately most of this was accepted by Benjamin Harrison who had gone into partnership with Broughton in January 1771.⁶⁸ Harrison was extremely keen to continue the correspondence with

Figure 11: Contracts made between Sir John Delaval and Charles Broughton or Benjamin Harrison.⁶⁹

<u>Date</u>	<u>Quantity to be delivered</u>	<u>Price</u>		<u>Discount</u>
		<u>Quarts</u>	<u>Pints</u>	
1771	All bottles manufactured at Hartley except those sold in Northumberland	21½d	19d	7½% at 40 days date
1773	120,000 dozen except those sold 90 miles from London	21½d	19d	7½% on the first 80,000; 12½% on the remainder
1777	120,000 dozen except those sold 40 miles from London	22d*	19½d*	8% at 50 days date
1779	100,000 dozen except those sold 40 miles from London	22½d	20d	8% " " " "
1780	100,000 dozen except those sold 40 miles from London	22½d	20d	8% " " " "
1781	150,000 dozen except those sold 40 miles from London	22½d	20d	8% at 6 months date
1782	£12,000 worth except those sold where Delaval "thinks proper"	26d	23½d	12% at 30 days date
1783	£12,000 worth except those sold where Delaval thinks proper	26d	23½d	12% at 30 days date
1784	£12,000 worth except those sold where Delaval thinks proper	26d	23½d	12% at 30 days date
1789	All bottles manufactured at Hartley except 15,000 dozen	27d	24½d	8% at 60 days date
1793	All bottles manufactured at Hartley except 15,000 dozen	27½d*	25d*	8% at 60 days date
1800	All except 15,000 dozen	29d	26d	12% at 6 months date
1801	All except 15,000 dozen	30d	26d	12% at 6 months date

* = These additions were Harrison's half share of an extra 1d charged for freight.

Hartley and wrote to Sir John "I neither wish to dissolve my capital in the business which is just under £10,000 ... nor embark on new connections in these risky times". Delaval was at first reluctant to commit himself rather preferring to consider the possibility of staffing the warehouse with his own salaried agents. He eventually agreed to give Harrison a year's trial with the possibility of a contract following after being reassured by his London lawyer that "both Lady Harrison and all her sons are people of very great property": Harrison was in fact the second son of Sir William Harrison, the Chamberlain of the City of London.⁷⁰ His main commercial interest was bottles and until 1786 he owned a bottle house of his own at Gravel Lane in Southwark. He proved a most satisfactory correspondent for Delaval and continued to manage the Hartley warehouse until his death in 1797 when he was succeeded in the position by his son. Both Harrison and his son were also Treasurers of Guy's Hospital.

Following the success of the year's trial a contract between Harrison and Delaval was signed in December 1773. This differed from the previous contract in that the number and type of bottles to be sent to London was specified as not more than 120,000 dozen of which not more than 1,500 dozen were to be Winchester quarts and not more than 500 dozen marked bottles. Marked bottles were bottles ordered by private customers with their own monogram or crest, usually in the form of a seal, on the neck of the bottle. They were ordered by Harrison from London in quantities as small as 12 dozen although inns, clubs or other establishments might order larger quantities.⁷¹ During the 1780s and 1790s large quantities of bottles marked "Guys" were ordered for the hospital. Marked bottles were invoiced at the ordinary prices despite the extra cost of cutting a seal. The other difference

in the 1773 contract was that Sir John was permitted to extend his direct sales to customers not living nearer than ninety miles from London plus "such bottles as may be sold by him for exportation".

The fact that this contract survived unchanged until 1777 can perhaps be taken as an indication of both sides' satisfaction with it. Shipping notices from Hartley certainly suggest that the trade between Hartley and London settled down into a regular routine. The bottle sloops were loaded with 3,000 - 4,500 dozen bottles and left for London more or less once a week. They returned loaded with cullet from Harrison plus ashes bought by Harrison at the best price he could obtain; most usually 6 shillings per cwt. There were occasional complaints from Harrison about the shape or colour of the bottles, and occasional complaints from the agents at Hartley that Harrison was breaking sub-standard bottles instead of returning them to the works to be sold in Northumberland where the customers were "less nice in their choice", but no serious differences of opinion.

This amicable state of trade was not, however, seen as satisfactory by the other north-east manufacturers who had been forced to reduce their prices as a result of the new competition. When Thomas Delaval first began to sell Hartley bottles in London they were sold 2d cheaper than the established retail price. As a result in 1764 both Webb and Farmer wrote to the other manufacturers pressing them to reduce their prices to match. This the manufacturers were reluctant to do and Cookson wrote to Webb informing him of this:⁷²

The manufacturers are of the opinion that with regard to quality their bottles deserve better 2s 6d than the other's 2s 4d

(2s 6d was of course the final retail price) Later Cookson argued further that:

The Northumberland Warehouse must sell their bottles at one price or another, if we fall 2d per dozen still they would go below you so you would not be any better in a fortnights time. By what you say Mr. Farmer is a man of spirit and will not be beat off his trade by anybody.

Efforts were made to persuade Delaval to raise his prices but evidently without success for in 1765 Cookson wrote to Dixon.⁷⁴

I think it will hardly be possible to hold the prices of bottles long. Mr. Deer and Mr. Ridley's partner have been twice with Mr. Delaval but I think nothing will come of it.

Prices were reluctantly reduced; according to a later comment made by Evan Deer⁷⁵ champaign quarts were never sold for less than 30d per dozen before Mr. Thomas Delaval established his warehouse since when the other manufacturers "were under the disagreeable necessity of lowering their price so they could serve on the same terms as that warehouse".

At the end of 1776 an effort was made once more to persuade Delaval to conform to a trade agreement. Evan Deer first wrote to Harrison:⁷⁶

There is a general complaint throughout the glass houses at Newcastle and Sunderland of the insufficiency of the price for which bottles are sold in London. Please let me know your prices and your agreement with Sir John so he can settle with the other proprietors.

Delaval was invited to a meeting of the trade at Loftus's coffee house in the Bigg Market which he did not attend himself but was sent a copy of the meeting's resolutions for his comments. The resolutions were in essence a price agreement, not of retail prices but the prices at which bottles were sold wholesale to bottle and wine merchants:

Resolutions of the trade

1. To be no difference in price between champaign and common bottles
2. Bottles to be sold from the houses at 23d quarts; 20d pints (per doz)
3. Bottles to be sold coastways at 23d " 20d "
except to Lynn 22d " 20d "
and the Channel Islands The best terms available
4. Bottles to be sold at London at 21d " 19d "
5. 5% discount for ready money at the Channel Islands. 5% discount and three months credit at London.

Delaval's reply to these resolutions is interesting and brings out some of the main differences between him and the Tyne manufacturers. Above all he maintained that he had to sell independently of the trade in order to secure a market and his profits. He had no desire to sell at lower prices. and, as he saw it, make a lower profit in consequence, but it was forced upon him by his situation. With landsale bottles, for instance, his bottles had to be cheaper in order to induce people to come to Hartley. With coastwise sales the difference between the ports of Hartley and Newcastle was greatly against him. He had no opportunity at Hartley of sending occasional small quantities and as coastwise sales were usually to customers who did not require large supplies this was a considerable disadvantage. In essence Delaval felt himself to be a newcomer to the trade and at a natural disadvantage, he therefore felt he had to push for trade by selling competitively. He was also reluctant to conform to an agreement that he could not be absolutely certain his neighbours would conform to and he noted that he had recently been told of ash ships from the Tyne manufacturers at Yarmouth selling bottles far beneath these prices. (Deer acknowledged this to be true but justified it on the grounds that they were substandard bottles). The trade also asked Delaval's opinion on the possibility of raising the price of quarts in London to their old price of 30d but Delaval was against this on the grounds that the houses at Bristol, Stourbridge and Liverpool could send bottles to London at that price; to which Deer replied that he was sure they never could for the navigation was too long and tedious.

Delaval did not commit himself to the resolution but when, in December 1777, a new contract was made with Harrison the prices of both quarts and pints rose by 1d. In addition Harrison was to pay an extra

sum equal to the amount of the new excise duty plus an additional $\frac{1}{2}$ d per dozen "so long as the Newcastle proprietors of glass works continue to pay the sum of 2d per dozen for the freight of their bottles to London". This latter point is not entirely clear; it may well have been that his own carriers had insisted on payment at the Newcastle rates and the cost was being passed on to Harrison. The other major change in the contract was that Delaval's selling area was extended to include customers living not nearer than 40 miles from London.

The problems inherent in trade agreements came to the surface in periods of depression in the trade when sluggish sales created an incentive to depart from the trade agreement in order to get stocks moving. The price agreement of 1776 was soon put under strain by a severe decline in demand beginning in 1778 and blamed, at least by Harrison, on the outbreak of hostilities with America. In December 1778 Harrison wrote to Delaval asking him to hold shipments because of his heavy stock on hand, caused by the loss of the American trade, the "precarious state" of the trade to the West Indies, and its dull state to the east:⁷⁷

The last two months used to be the briskest of the year with the shipping to the east Indies but this year it is dull. Two warehouses that used to take considerable quantities off me have stopped. At Bristol it is the same, all have heavy stocks on hand.

The following June at Harrison's request the contract was altered, reducing the quantity to be delivered from 120,000 dozen to 100,000 dozen and extending his credit from 40 to 50 days. The bad state of trade was echoed in a letter from Middleton Hewitson of St. Lawrence to Sir Matthew White Ridley in November 1779 acquainting him of the difficulties all the bottle houses were experiencing in attempting to vend the quantity made:⁷⁸

Some houses, as formerly when times were bad, have exported and adventured large. Quantities of bottles are supposed to have been sold at considerable loss, others 'tis apprehended have departed from their agreement with the trade and by underselling have got off considerable quantities.

During the depression, and perhaps as a consequence of it, the Ouseburn bottle houses made an attempt to establish a new and independent method of selling in London.⁷⁹ This episode is interesting as evidence of growing dissatisfaction on the manufacturers' part with the established trade methods; and in particular the amount of commission taken by the London merchants. During 1780 an approach was made by Joshua Henzell and Sir Matthew White Ridley to the London Glaziers' Company, to which they already sent broad and crown glass, suggesting that they start retailing bottles. This was to be done on a partnership basis; the manufacturers presumably hoped that a partnership would spread the profit from the retail sale more evenly between the manufacturer and the retailer. The London Company was not however keen to enter into a new line of business except as selling agents only which would have meant a similar arrangement to the existing one with the bottle merchants. The ^{glaziers} were not even particularly keen on the idea of acting as selling agents and sent back their estimate of the cost of fitting out a warehouse which, set against the fact that they would have to push for trade by offering bottles at a competitive price, led them to doubt whether the whole operation would answer the expense plus leaving something for their trouble as agents.

Although this scheme came to nothing it is perhaps a significant indication of a trend towards bottle warehouses owned directly by manufacturers. This trend can certainly be seen by the early years of the nineteenth century when, besides the Hartley warehouse, London included bottle warehouses owned by the Ayres Quay Bottle Company, George Fenwick's

Sunderland Bottle Company and, briefly, Francis Blakett.⁸⁰ In addition Cookson appears to have reverted to selling bottles through his own warehouse and his own agent, John Maxwell. The two Ouseburn houses continued to use the independent bottle merchants but, according to a comment made by Middleton Hewitson in 1811, with increasing dissatisfaction⁸¹ (also see p. 266):

I have before stated my opinion upon the advantage to be derived from the pursuit of the bottle trade, and am still convinced no certain return can ever be reckoned on without the medium between the manufacturer and consumer is set aside. This certainly would require an increase in capital.

The depression in trade which had begun in 1779 continued until 1783. In 1782 trade was believed to have improved sufficiently for Harrison's reduced contract of 100,000 dozen to be increased to 150,000 dozen. This proved impossible for both sides to meet and in 1783 a new contract was drawn up. This had the significant difference that the amount of bottles to be delivered was specified in value, £12,000 worth, rather than quantity (although it was specified that this was to include not less than 100,000 dozen bottles and squares). This change was almost certainly a reflection of Harrison's growing interest in the retail rather than the wholesale trade, and more specifically in the retail of goods other than wine bottles such as large "hollow ware" and small bottles of pint size and under.

In September 1780 Harrison had written to Hartley asking if he could be supplied with "large hollow ware and retorts for chemical manufactories". These had previously been made at his own glass house which he had recently relinquished and Harrison was able to recommend a worker, William Oxley, capable of making such vessels. Oxley was sent up to Hartley, a large hole knocked in one of the furnaces to accommodate him and trial workings passed off successfully.⁸² By 1781 the deliveries

to Harrison included such items as gallon receivers to hold $4\frac{1}{2}$ -5 gallons, boltheads (between gallons and pottles in size), sublimers, retorts, large globes 3 feet in diameter and small globes 2 feet in diameter. Hollow ware was never a particularly large section of Harrison's trade but small pints and half pints sold to chemists and apothecaries, were. They were also, according to Harrison, the section of trade on which his profit, and Sir John's, depended for they were sold at full retail price. Harrison had occasionally spoken before of his dependence on his retail trade. For instance in 1776 when towards the end of the year the factory found itself unable to deliver the full quota of bottles, Harrison commented that if he had known sooner he would not have disposed of so many to the wholesale trade for he was left with none for his retail trade "on which alone my profit arises"; what he disposed of to the trade was "at a profit by no means equivalent to the risk". In 1783 Delaval proposed a general increase in prices and Harrison argued that this would lose him his trade in hollow ware and squares and that "without these my bottle retail would fall off considerably. Risks are so great on wholesale that I must decline being the middle man if you raise the price". In May 1789 Delaval again proposed a general increase in price and again Harrison objected on the grounds that this would harm his retail trade. He was particularly concerned with his trade in the smaller bottles for he saw it as a growing trade and one that should be encouraged by a reduction in price rather than an increase, particularly in view of the fact that, in terms of the cost of manufacture and the amount of metal used per bottle, they were already overpriced:⁸³

As a manufacturer I know that at the time of the pots giving way much advantage arises from being able to dispose of the metal in pints and smaller bottles, and I verily believe that the existence of the only glass house now working in London is owing to the advantage taken of the inequality of the prices, and selling to the apothecaries and trades who use the bottles rather than the phials and who would use more if the price of them was more fairly proportioned to that of sized bottles. Excepting what are sold at the (this?) glass house I sell more pints and small articles than all the warehouses in town. It would in fact be more for the advantage of the factory to increase the consumption if it could be done by lowering the price rather than discouraging it by the least addition.

The phials Harrison mentions were phials made out of flint glass which was the traditional material for small apothecaries' bottles. It seems probable that the competition from small bottles had developed as a consequence of the excise duties, particularly the doubling of the duties in 1777, which made flint glass expensive for this particular use. As the treasurer of Guys Hospital it seems fair to assume that Harrison had ready connections in the pharmaceutical field. The stock accounts of the Ouseburn glass houses in 1780 indicate that, unlike Hartley, they dealt entirely in sized bottles so it is probable that Harrison's excursion into the retail trade was not typical of other bottle merchants. By the 1790s the variety of articles manufactured at Hartley and sent to London was large including, mustard squares, "gooseberries", round snuffs, olive half pints, winchester half pints, plus the retorts and other chemical ware.

Delaval was by no means convinced by Harrison's argument that because of the size of his trade in small ware it should be encouraged by a reduction in price. In fact it seemed to him to be a good argument for increasing the prices. He instructed his agents at Hartley to find out what the amount of small bottles sent to Harrison yearly was; "if they are not many then I would not differ with him, if it be many then he ought to give a proper advance". The agents reported that in

fact, as Harrison claimed, the amount of small bottles he dealt in was quite large and in the preceding year had amounted to 14,525 dozen. Eventually Delaval prevailed and in the resulting contract the prices of all bottles were advanced by 1d per dozen. In addition the quantity of bottles to be delivered to Harrison was redefined as "all the bottles manufactured at Hartley except 15,000 dozen". This was probably meant to cover the potential production from the third glass house which had been built in 1788 but which, because of difficulties in hiring sufficient workmen, was not working at full capacity. This particular wording proved a good bargaining point for Delaval in 1793 when the owners of the bottle sloops at Hartley demanded an extra 1d per dozen for the freight of bottles. Delaval passed half of this extra charge on to Harrison threatening to reduce his production to the absolute minimum if he refused:⁸⁴

I might sustain less loss by reducing the bottles made to a small quantity sufficient to keep my best workmen together until our agreement expires in August 1794. I have it in my power to make as little as 15,000 dozen above what's made for other customers.

Another severe depression in the bottle trade developed in 1795 when both the amount produced and the amount sent to Harrison were reduced. Despite these precautions another large stock of bottles accumulated at Hartley and the main preoccupation became the lack of cash with which to pay the excise, wages and other expenses. This was somewhat overcome by agreeing that some expenses be paid for in goods, for instance the bottle sloop owners were paid in part with coals. The excise bills were sent to Delaval in London to pay through his London bank, and an extra credit was taken out with the Newcastle bank of Surtees and Burdon. This depression was not confined to the bottle trade. In May 1796 Delaval's clerk Stephen Oxley wrote that:⁸⁵

Nothing can exceed the outcry for want of money in Newcastle and its environs. The banks have now agreed to discount no notes of hand or drafts except on London and the coal owners are selling at what price they can get.

By 1797 trade was still, according to Harrison, "stagnant" and he still had an over large stock, however in October 1798 he wrote to say that demand was increasing and that they might possibly consider returning to the previous quantities sent. He was nevertheless hesitant,⁸⁶

The present demand is so confined to particular sizes that I am at a loss to say if it is likely to continue, the present demand being chiefly for the West Indies.

Despite this hesitation he very soon agreed to accept an extra 80,000 dozen with certain provisos:

I see no objection to extending the manufacture of bottles provided the bottles are properly finished for since there has been so much competition in the sale of bottles the wine merchants have been very particular in the make and shape. Since you reduced the quantity your finish has been much improved.

By 1799 trade had recovered sufficiently to cause Harrison to complain that he had not been supplied with bottles for five weeks and was much in want of them.

There is no doubt that the 1790s saw a great increase in competition in the trade, not merely as a consequence of the depression but because the number of manufacturers supplying the market was increasing. Harrison occasionally commented on this, most usually describing the new competition as "speculators" but nevertheless noting their potential danger: "if their trade increases ours must diminish". In view of this increased competition it is perhaps hardly surprising to see evidence of continuing attempts to regulate prices in the trade. In 1799 Delaval was approached by a Bristol manufacturer, Lucas Chance, noting that because "the general opinion" of the bottle trade was that an advance in price was necessary to meet the increased costs of manufacture a meeting was to be held at

Ferrybridge between the bottle manufacturers of Bristol, Stourbridge, Coalbrookdale, Thatto Heath, Warrington and Scotland.⁸⁷ This appears to be the earliest evidence of price agreements between bottle manufacturers on a national scale and may well have been a consequence of their recent co-operation against the Board of Excise over moiles. (See Chapter Five). The previous price agreements made between the north-east manufacturers had almost certainly been confined to the region. Unfortunately there is no indication of whether any north-east manufacturer attended this meeting or indeed whether any price agreement emerged from it. However there was certainly a price rise introduced by the north-east manufacturers in 1800 which may have been a consequence of a national agreement. In March 1800 Mr. Blakett and Mr. Carr delivered a list of advanced prices to Delaval which in fact increased prices by the large sum of 2d per dozen.⁸⁸ The contract price between Harrison and Delaval was increased to match but after the usual argument about the small bottles the pints were only increased by 1½d and the price of half pints remained the same. A year later there was another price rise of 1d per dozen, excluding again the pints and smaller sizes. This rise also appears to have been initiated by "Mr. Blakett and the other manufacturers".⁸⁹

If these price rises were the result of national agreements then it seems clear that the national accord did not last for in 1803 some of the Newcastle manufacturers reacted independently. In June 1803 Harrison wrote to Hartley in alarm saying that Mr. Cookson and the other Newcastle manufacturers had suddenly reduced their prices by 2d per dozen and as the bottle merchants and customers were invoicing at the lower prices he had been forced to follow suit.⁹⁰ Harrison's reason for their action is quite interesting; they acted, he reported, "to enable them

to keep the trade in the usual channels". By 1803 the bottle trade was in another depression and this reduction of prices was certainly a consequence of the decreased demand and increased competition. In September Harrison described trade as totally stagnant and overwork at Hartley was reduced by half in an attempt to cut the yearly production by 200,000 bottles. By April 1804 trade had improved but was still dull.

(b) The coastal and export trade

Information on the coastal and export trades, like the London trade, comes primarily from the Delaval papers. However unlike the London trade Delaval's activity in the coastal trade was more typical of his fellow bottle houses: firstly, in that his coastal trade was less important overall than that to London, and secondly, that trade to other towns and cities was irregular and unpredictable and depended much on chance and personal connections.

The Hartley works had been established specifically to supply the London demand and it was not until the period 1778 - 1783 that the coastal market developed an importance of its own. A comparison of the production figures for the year ending July 1778 and the year ending July 1783 shows the growth of the coastal market within this period:⁹¹

1) Year ending July 1778:

	Doz.	bots.
Delivered to Harrison	120,524	6
Broke in the voyage	3,911	10
Broke in the warehouse	618	10
Sold by landsale	209	7
Sold coastways	9,271	2
	<hr/>	
Total vended and broke	134,554	11
Total bottles made	145,618	6

2) Year ending July 1783

Delivered to Harrison	100,000
Coast and landsale	17,000
Total bottles made	135,600

As these figures imply a major reason for the growth of the coastal trade during this period was the reduction of Harrison's contract to 100,000 dozen in 1779. At Hartley a new round house had been completed in 1778 and with a potential production of 140,000 dozen bottles a year the agents were to a certain extent forced to turn to the coastal market in order to avoid a large stock building up at the works. A large stock on hand was not merely an inconvenience, sluggish trade meant a lack of incoming bills; Stephen Watson the clerk at Hartley, whose main concern was cash, wrote to Delaval in June 1779 bemoaning the slowness of trade, "great stocks of bottles and coal remain on hand. We need a quicker sale of both to answer the great expense".⁹² By summer 1780 an exceptionally large stock of 50 - 60, 000 dozen bottles had accumulated at the works and the agents were told to make extraordinary efforts to reduce it. Before looking at these efforts it is perhaps worth saying something about the coastal trade up to this time.

There had always been some small trade to coastal towns from Hartley largely, it seems, in order to dispose of the bottles that were not of sufficient quality for the London market. In 1773 an agent had been told by John Delaval to try to establish a vend for bottles and salt at Hull and York but to make sure that "no bottles must go thither that are fit for the London market".⁹³ Coastal trade was also useful in that it could be combined with trade in other commodities from Hartley - salt, copperas, coal or timber - or help in the supply of essential materials to Hartley. For instance bottles were occasionally accepted in part payment for the Stourbridge clay delivered to Hartley by the Gainsborough merchants Joseph and Aaron Smith. These arrangements with coastal merchants were always individual transactions; there were no regular supplies sent and although some merchants were regular

customers of Hartley they were only sent bottles in response to a definite order. One regular customer of Hartley was Sam Baker of Lynn who offered to take bottles "on consignment" from the works, in other words to act as a commissioned agent for selling them at Lynn, but this offer was refused by Delaval.⁹⁴ He insisted on the bottles being purchased by a merchant no doubt as a precaution against possible bad debts from private customers.

The export trade was, like the coastal trade, subsidiary to the London trade and carried on for similar reasons namely as a means of disposing of substandard bottles and as a useful complement to trade in other commodities. Until the relaxation of the regulations surrounding the export of glass in 1777 manufacturers appear to have involved themselves very little in the actual export of glass, leaving it entirely to other merchants to whom they would sell the glass at an export price and claim the drawback themselves. In 1775 the Hartley works sold 616 dozen bottles to Messrs. Rayne and Row of Newcastle at the export price of 16d per dozen champagnes, and 14d per dozen commons. On this occasion Delaval calculated that the transaction left him £2 better off than if the same quantity had been shipped to Harrison⁹⁵ and that "the export trade is better than my trade with Harrison". Perhaps as a consequence of this he attempted to open a correspondence at "Dunquerque" later in that year learning from Mr. Watson, a Blyth ship owner, that bottles were sent there from Sunderland, delivered sound, at 13d per dozen excluding freight. Watson was told to offer the French merchants 14d per dozen including freight but nothing appears to have come of this.⁹⁵

The importance of both the coastal and export trade increased considerably around 1780. Efforts to reduce the large stock at the works

began with letters being written to merchants in Hull, Yorkshire, the coastal towns and even the clay merchants at Bristol where it was thought a vend might possibly be got as most of the Bristol bottles were for export. When letters yielded no response Joseph Oxley, the chief land steward at Hartley, suggested sending out a traveller and was himself given the task, with the aim of securing sales for Hartley bottles, copperas and kelp plus collecting debts. Oxley's journey lasted from November 1780 to January 1781 and took him to Yorkshire, East Anglia, London and the south coast. He reported to Sir John by letter almost daily and the result is quite a comprehensive survey of the provincial bottle market in 1780.⁹⁷ His approach was a simple one: he stayed at inns and inquired of the innkeeper who were the local wine merchants or dealers in bottles. To these he offered bottles at 22 shillings per dozen shipped free with a 5% discount for ready money. This was undoubtedly a generous offer and it is hardly surprising that his journey was, in respect of bottle sales, a successful one.

Oxley's first stop was a York where he secured an order from John Wormwald a merchant who was later to extend his interest in Hartley (see below). At Scarborough there was no vend for bottles at all, it being "cattle country". Nor was there a vend at Boston where, besides being impressed by the beauty of the church, he noted that Hartley coals were not liked because they burnt too quickly. At Wisbech orders were secured from two bottle dealers and a wine merchant, Mr. Horrocks, and Oxley was also successful at Spalding and Lynn where he got an extremely large order of 300 gross from Sam Baker to be sent at intervals throughout the coming year. Baker was a previous customer of Hartley and one must assume he was taking the fullest advantage of the cheap prices being offered. Oxley continued to Swaffham, Norwich, Acle and Yarmouth where

"the people have a good stock on hand but promise to take from you in the future". The Yarmouth trade was one sought after by all the north-east manufacturers because of the suppliers of soapers' ashes to be got there; Oxley saw a ship loading ashes for Hartley whilst he was there. Also at Yarmouth he tried to sell kelp but without success for " the soap boilers here use wood ashes in place of it". At Ipswich the three wine merchants had stocks of bottles on hand and at Colchester where there were five bottle dealers he unfortunately arrived three days after Russell of Sunderland had landed a large bottle cargo.

From East Anglia Oxley went to London in order to sell kelp to the soap boilers. London he found to be "a surprising place but by no means a desirable place to live". From London he set off along the south coast to Portsmouth and Southampton where he had little success as most of the wine merchants were supplied with bottles from Bristol. Bristol bottles, he noted, "are better made than yours and rather heavier. Three of them probably make $5\frac{1}{2}$ lbs, yours only $5\frac{1}{4}$ lbs." By the end of January Oxley was back at Seaton Sluice having secured orders for 4,548 dozen plus the 300 gross to Baker at Lynn. He returned with a great enthusiasm for the coastal trade and estimated that with some effort they could sell 4,000 dozen at Lynn, 3,000 dozen at York and Hull and the Fen towns, 3,000 dozen at Colchester and Ipswich and 4,000 dozen in the Portsmouth area. The main difficulty he saw was not in getting orders but in getting ships to carry the bottles to market. This was something constantly complained of at Hartley and some of Oxley's orders were in fact dispatched from St. Anthony's quay in Newcastle.

By April 1781 most of Oxley's orders had been dispatched but as the stock at Hartley was still around 50,000 dozen Oxley was sent on a journey to Scotland for a similar purpose. This journey was less

successful and resulted in orders for only 116 dozen. This was partly no doubt due to the presence of bottle manufactories in Scotland, and also to the interest in the Scottish market taken by the other Tyne bottle houses. Oxley attributed most of his lack of success to the fact that he seemed to be following in the footsteps of a traveller from the Closegate bottle house. He noted that many merchants were already well stocked with bottles from the Tyne or Sunderland. At Montrose he noted with surprise that although large quantities of bottles were sent there from Newcastle the townspeople got their coal and cinders from Sunderland.

In the same way that Hartley bottles upset the London market in the 1760s so Hartley's increased activity in the coastal towns around 1780 caused complaints from the other manufacturers; again they were being undersold. In July 1781 Joshua Henzell wrote to Sir Matthew White Ridley asking his opinion on a "scheme" drawn up by James King to purchase Delaval's interest in the bottle trade by offering him £500 a year to be paid for by the bottle houses in Scotland, Newcastle and Sunderland raising their prices as soon as he had quit the trade.⁹⁸ Henzell himself did not think this a realistic idea for "if he sees them suing for peace his terms will be high especially as an object for him was the consumption of his small coals". Instead Henzell suggested "a small war and a short one" by underselling Delaval at every port where he had recently sent bottles. Henzell was convinced this plan would succeed because Delaval's bottles had to be inferior otherwise he could not be selling them at 22s per gross when the trade price was 25s, 26s and 27s. Neither of these plans to destroy Delaval's interest appear to have been executed. By September 1781 Henzell was still complaining about being undersold by Delaval:

He has disappointed me of some orders from Scotland by his selling price being 22 shillings per gross, yours is 27 shillings I know the Closegate bottle owners sell at 25 shillings per gross shipped free on board at that price here for Montrose and Aberdeen.

The coastal trade continued to be an important, if not a particularly vital, element in Hartley's whole trade. One of the main disadvantages of opening trading connections at low prices was the difficulty in trying to maintain the trade at a more reasonable rate. In 1782 Oxley approached the same merchants for repeat orders but could only succeed in getting them at the old price. In 1783 he wrote,⁹⁹ "I have not been able to raise the price of bottles to be sent coast-ways more than 1d per dozen after delivering all those ordered at the old price (which have not all been delivered for want of opportunity of ships)". Despite this the trade continued. Shipping notices for 1783 and 1784 show that orders were being dispatched to new destinations including points as near London as Billericay and Gravesend. This was a consequence of an alteration made in the contract with Harrison in 1783 which permitted Delaval to sell "where he thinks proper" instead of beyond the previous forty miles from London limit.

The logical conclusion of this growth in the coastal trade was to enter into a regular contract with a coastal merchant. This was first tried in 1782 when the York merchant John Wormwald offered to take 30,000 dozen bottles a year from Hartley.¹⁰⁰ The only problem with this arrangement was that Wormwald proposed to sell these bottles in London through a friend. Delaval was understandably worried as to whether this would break his contract with Harrison but was, unfortunately as it turned out, persuaded by Wormwald that it would not:

My taking your bottles on my own account in my own ship at your works fully clears you of any contracted limits as you or your agents do not know (or ought not to ask) to what market I am consigning them. In London the place is large enough not to interfere with your friend's sale. My friend's sale will only be among his set in the wine business.

The whole adventure miscarried. Not only did Wormwald's friend prove bad and unable to sell the bottles but Wormwald, in an attempt to salvage his investment, attempted to sell the bottles to Harrison who knew nothing of the affair. Despite Delaval's insistence that it was only something done to oblige a friend, Harrison was angry and sternly reminded him that "occasional customers can in the end be of no benefit to you".

A contract was again suggested in 1783 and this time was brought to a successful conclusion.¹⁰¹ William Row, the Newcastle merchant, agreed to take 12,000 dozen bottles during the year at the export price for which he was to deliver a quantity of square timber and waggon rails at Hartley. Row's ship left Hartley at the end of April 1781 loaded with 6,000 dozen bottles. It was certainly destined for the Baltic for by June it had returned with timber to be reloaded. An added advantage of this arrangement was that Row agreed to take common bottles which in 1782 Harrison had said were no longer saleable in London and which had always constituted a substantial proportion of Hartley's make. Commons differed from champagnes only in shape and finish, they were made from the same metal in the same capacities but because of their lack of finish were quicker to manufacture.

What of the other north-east bottle houses and the extent of their coastal and export trade? Details about their activities are scarce but it seems fair to assume that, like Hartley, they relied on personal connections in other towns whom they supplied with bottles when required, and often did so in combination with other commodities. This was

certainly the case with John Cookson whose letter book reveals him to have been carrying on a varied trade in bottles, grindstones, salt, butter and coal, amongst other things. There is no evidence that any of the Tyne or Sunderland houses maintained stock in a warehouse in a coastal town; stock accounts for the Ouseburn bottle houses in 1780 show that they at least only maintained stock in the three London warehouses. The Scottish market should perhaps be mentioned as particularly important for there is evidence that the Tyne houses had a sufficient interest in Scotland to establish a trade agreement. In 1767 John Cookson wrote to John Inglis of the bottle house at Leith justifying some measure of retaliation from the Tyne bottle houses after the breaking of "a good agreement in trade":¹⁰²

You must remember when you could not vend more than 35 weeks' work in every year your hands went to Glasgow. When it increased the Glasgow agreement was dropped and you made the whole year. All that time we had the coast and some at Leith but that was grudged us, another house was erected and we were driven out of the whole trade. Such treatment produces the steps we have taken you cannot but blame yourselves as the aggressors, not us.

The "us" almost certainly referred to all the Tyne houses. A letter of same date to John Inglis in Matthew Ridley's letter book¹⁰³ expresses equal concern about the confusion in the trade at Leith. This letter is also interesting as an illustration of Cookson's and Ridley's different degrees of involvement in the trade. While Cookson has a complete grasp of the situation Ridley admits that:

For my own part I am not so much master of the trade as to undertake to say what is best to be done but have communicated the contents of your letter to the gentlemen concerned in the manufactory and you will hear from them more particularly.

It is difficult to imagine this interest in the Scottish market being maintained in the later years of the eighteenth century with the establishment of other bottle houses at Grennock, Leith, Alloa, Dundee and Dumbarton. Before Joseph Oxley set out on his journey to Scotland

in 1781 he collected Customs House entries of the amounts of bottles sent from Newcastle to Scottish provincial towns the preceding year; the total was not a large one:¹⁰⁴

Aberdeen	432 gross
Montrose	265
Dundee	318
Perth	119
Banff	70
Galloway	50
Arbroath	48
Inverness	30
Kirkwall	19
Dunbar	12
Total	1,363 gross or 16,356 dozen bottles.

The available figures showing export of bottles from the Tyne indicate that, like the coastal trade, the export trade never approached the importance of the London trade in terms of quantity (see Fig. 12). The destinations, as might be expected, are largely within northern Europe. The most surprising aspect of the port book figures is that they indicate an enormous trade in bottles from Sunderland to Holland and Belgium. Quite why this should be so is not known and it can only be presumed that it was a long established trade connection. Both the 1780 figures collected by Joshua Henzell and the 1789-90 port book figures indicate that by far the largest exporter was Isaac Cookson with, in 1790, Cookson Deer and Wilson. The names entered for the 1760 figures are of individuals rather than firms. Many of them appear to be merchants with no connections to manufacturing bottles but some names are those of bottle manufacturers or managers of bottle firms; for instance Jacob Wilson of Bill Quay, Middleton Hewitson, James King, and Paul Failie who was connected with John Williams.¹⁰⁵

Cookson's interests in the export trade is confirmed by his letter book which includes letters to foreign merchants, many of whom Cookson appears to have acquired as a consequence of taking over James Dagnia's

bottle house. Among these merchants were John and Stephen Van Os of Amsterdam to whom Cookson sent "Holsteen quarts" and negotiated prices in guilders and stivers.¹⁰⁶ Thomas Hozitsky of Dantzic and Messers Welder of St. Petersburg were also supplied with bottles on consignment. The letter book also shows that the export of north-east bottles cannot be measured just by bottles exported directly from the Tyne. Cookson quite frequently supplied bottles at export prices to other merchants in other towns and cities. Alexander Baxter and Sons of Edinburgh were important customers for Cookson in this respect. According to letters from Cookson to Baxter in 1763, Cookson was keen to encourage the trade, via Baxter, to the Baltic; "it is in our interest to support the bottle trade to the East, if it is attacked from any quarter we must support our footing".¹⁰⁷ This apparently referred to a proposed increase in prices which it was thought might encourage the erection of bottle houses abroad. In a later letter Cookson declared his own feelings to be that they should stay competitive in order to keep the trade:

It certainly would be wrong to have the prices of bottles so high as to encourage erections abroad. There are some houses at Dantzic and for all that their supply is from here and they are now at 2s 6d there if anything of that sort should happen we must support the merchant in regard to price not to lose the branch.

Baxter also took bottles from Cookson to send to St. Petersburg for when, in 1764, Cookson was approached by another customer for bottles for the same market he felt obliged to inform Baxter.¹⁰⁸

A gentleman here is applying for a large quantity of bottles and I am apprehensive they are intended for Russia. I cannot supply both you and he provided your quantity is anything near what it was last year. If I do not hear from you soon I must engage with my friend here but I shall not do till I hear from you on the matter.

Figure 12: Exports of bottles from Newcastle, 1760, 1776, 1780, 1790

A: 1760

	<u>cwts.</u>	
The Sound	1,710	<u>Exports of bottles from Sunderland</u>
Rotterdam	1,700	Rotterdam 3,830 cwts
St. Petersburg	1,400	
New York	1,070	
Boston	975	
Dublin	765	
Oporto	307	
Drontheim	307	
Nova Scotia	160	
Christiansand	1	

B: 1776

Holland	4,284	
Russia	3,002	
Africa	565	
Portugal	457	****
Ireland	418	
Guernsey	248	
Jersey	213	
Gibraltar	203	
Denmark & Norway	96	
Germany	41	

C: 1780

	<u>dozens</u>	
Copenhagen	68,988*	
Elsinore	42,800*	
Channel Islands	14,384	****
Ostend	2,228	
Hambro ^o	2,399	
Emeldon	760	
Amsterdam	720	
Lisbon	380	
Dantwich	1,764	
Christiansand	192	
Mundhole	84	

D: 1790

	<u>cwts</u>	
Guernsey	2,428	<u>Exports of bottles from Sunderland</u>
Lisbon	1,276	Ostend 21,600 dozen
Rotterdam	313	Havre de
Jersey	220	Grace 12,000 dozen
Drontheim	200	
Jamaica	40	
Denmark	23	
Maudelle	20	

(cont.)

(cont.)

Sources:

- A: PRO E190 259/6
- B: Hutchinson A View of Northumberland (Newcastle 1776) Vol ii p.464, said to be taken from Customs Books.
- C: ZRI 36/1. Joshua Henzell to Ridley 24 October 1781. Figures taken by Henzell from the Customs House in Newcastle.
- D: PRO E190 289/4

*The quantity exported to Denmark was the result of a government commission. Denmark usually prohibited imports of glass in order to protect their own manufactories, but the sudden destruction of their national glass house led to this large order from Newcastle. Cookson secured the commission, to the disappointment of the Hartley agents (see 2DE 4/3/36 and 2DE 4/9).

2. 1800 - 1850

This period was one in which the north-east industry, building on the potential established in the eighteenth century, made full use of the new trading opportunities of the nineteenth century. Although certain firms quit the trade because of financial dissatisfaction, or in one case bankruptcy, and a few works decreased in size; overall the local industry saw an increase both in the number of firms engaged in the trade and the number of bottle houses in the region. By 1832 Tyne and Wear boasted seventeen working bottle houses and an additional five temporarily dormant. Some of these bottle houses represented the expansion of the older firms; at Bill Quay, Closegate, Bishopwearmouth and South Shields additional bottle houses were erected. Others represented entirely new establishments notably at St. Peter's in Newcastle, Deptford and Ayres Quay in Sunderland. There is no doubt that the north-east's share of the total national production during this period was a substantial one. The 17 bottle houses working in the area in 1832 represented nearly half of the 39 bottle houses licensed by the Excise in that year. However, the size of the north-east bottle industry should not be taken as evidence of the region's complete predominance in the trade. Although bottle manufacturing at Bristol is said to have seen a decline over this period, other areas, notably Lancashire and Yorkshire, certainly increased their share of the national market. This increase in the number of manufacturers can roughly be measured by the corresponding increase in the number of bottle merchants in London. During the late eighteenth century London trade directories never list more than seven. By 1817 twenty-one are listed¹ and of these only eight are known to have had dealings with north-east bottle houses. Before looking at this increased competition within the trade, the

histories of the individual north-east houses must be outlined.

(i) The Cookson Houses: Closegate, Bill Quay and South Shields

In 1802 the ownership of the Cookson bottle houses was reorganized following the death of John Cookson, the eldest son of John Cookson. All his shares "in his bottle houses on the river Tyne carried on to very great profit" were advertised for sale in August.² These shares certainly included shares in the South Shields bottle houses for in March 1803 Middleton Hewitson wrote to Sir Matthew White Ridley that "the bottle houses late Mr. John Cookson's are at last disposed of Mr. Cookson with Mr. Cuthbert I understand take the whole of them".³ The firm of Cookson and Cuthbert was to occupy the South Shields bottle houses until the 1850s. Previously the houses had been run as Cookson Deer and Blakett but c. 1801 Francis Blakett had left to establish a completely new bottle firm with Simon Temple a South Shields ship builder. They were, interestingly, also in partnership as common brewers. The bottle house of Temple and Blakett came to an untimely end in April 1804 when it was completely destroyed by fire, wrecking £3,000 worth of damage.⁴ The enterprise was abandoned and Blakett eventually took up the post of manager in Lord Delaval's Hartley works. The brewing partnership was also dissolved but Blakett continued to run the brewery at Mill Dam in South Shields on his own. Under Cookson and Cuthbert a third bottle house was added and by 1842, the works employed 118 adults, 22 "young persons" and 16 children.⁵

John Cookson may also have had a share in the Bill Quay house for around 1802 it too appears to have undergone a change in ownership; from Cookson, Deer and Wilson to John Cookson & Co. This John Cookson was the eldest son of Isaac Cookson. (It is quite interesting that most of Isaac Cookson's sons began their careers in bottle manufacturing.

Besides John and Isaac, who were given shares in the Tyne bottle houses in 1802, Joseph Cookson bought a bottle manufactory in Bristol in 1809 where he was later joined by his brother Septimus. According to Joseph bottle manufacturing was a second choice. It had been intended that he should go into a career in banking but this plan fell through.⁶) Cookson, Deer and Wilson had purchased the land on which the bottle works was built in 1802, which transaction provides a useful map of the property at that date (Figure 13). Around 1815 John Cookson took John Coulthard into the partnership. Coulthard (1777-38) was a Sunderland man and had previously been the clerk of the Deptford bottle works. He was a vigorous Wesleyan and whilst at Bill Quay was said to have made strenuous efforts to improve the morals of his employees.⁷ He was succeeded at Bill Quay by his son who later purchased Heworth Chemical works. The firm remained Cookson and Coulthard until it was sold in 1847. A second glass house was built c. 1825 and the firm also took over the St. Lawrence bottle house in Newcastle for a brief period from 1835 to 1839. By the time of the work's sale in 1848 it consisted of two large bottle houses and a recently erected flint house, ninety workmen's cottages, a manager's house of twelve rooms, plus twelve acres of land. A large gasometer had recently been erected with pipes all over the works.⁸ After quitting the works John Cookson remained owner of the land until 1883 when it was sold to the Ecclesiastical Commissioners.⁹

The Closegate bottle works also saw little change in its ownership. From 1802 it was run by Isaac Cookson and Son, the son being Isaac Cookson jr. The series of cash books belonging to Isaac Cookson jr. provides some quite detailed information about the Closegate works. It is clear that by 1816 a second bottle house was in operation but exactly when this was erected is not certain. It is possible it dates from c. 1802

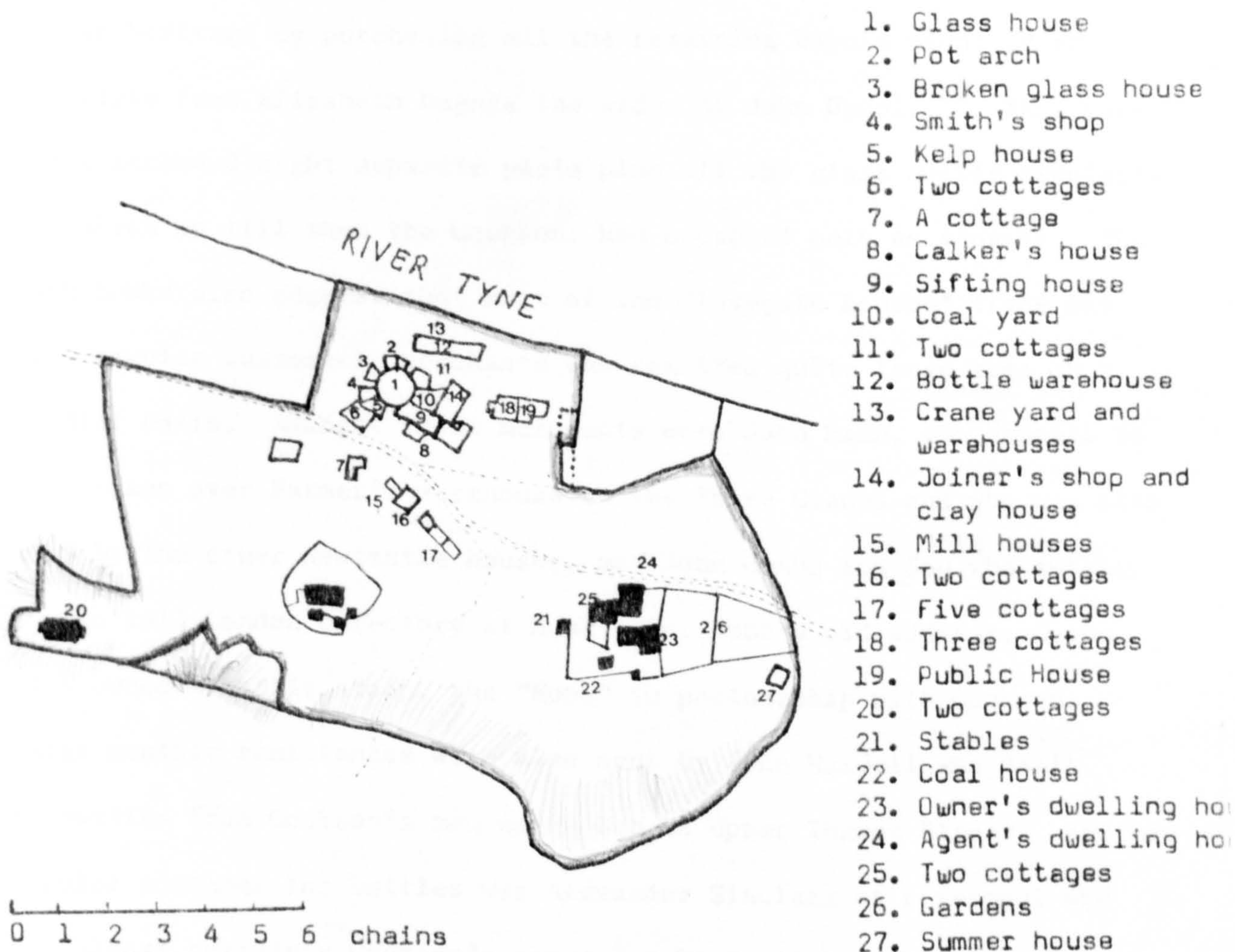


Figure 13: The Bill Quay Bottle House, 1802

Source: Bell Collection, Gateshead Public Library.

for in that year the Cooksons completed their take-over of the Dagnia heritage by purchasing all the remaining Dagnia property in the Close from Elizabeth Dagnia the widow of John Dagnia.¹⁰ This purchase included eight separate plots plus all the glass bottle manufactory which up till then the Cooksons had occupied only as tenants. The cash books also suggest that most of the Closegate houses' trade was with regular customers; merchants who remitted quite large sums on a regular basis. Amongst these merchants were John Mann, who appears to have taken over Farmer's warehouse at the Three Cranes and who was also used by the other Newcastle houses, and John Combs and Son who appears in the 1817 London Directory at Bush Lane, Webb's old address; Combs also owned a bottle sloop, the "Hope" in partnership with Cookson. Large monthly remittances were also sent by John Maxwell who dealt in bottles from Cookson's own warehouse in Upper Thames Street. Another regular customer for bottles was Alexander Sinclair of Liverpool who was almost certainly Cookson's agent for he is listed in the Liverpool Directories as owning a warehouse for crown, plate and bottle glass, and later soda. Payments from smaller customers were collected by travellers who were sent out regularly on journeys to the South, Scotland and Ireland. One other interesting aspect of the bottle houses revealed by the cash books is that coal was purchased from a number of different collieries, amongst them Benwell, Elswick, Walker and Walbottle, instead of being supplied by one colliery on a regular basis. By 1842 97 adults were employed in the two houses¹¹ under a manager Mr. Dawson.

(ii) Newcastle

The early years of the nineteenth century were not a particularly profitable period for the St. Lawrence bottle house. Middleton Hewitson's

letters to Sir Matthew White Ridley are mostly concerned with speculation as to why the house was working to so poor an account. Besides the difficulties of selling through a London agent (see p.266) the disappointing return was usually attributed to production difficulties particularly the pots breaking which Middleton Hewitson guessed was caused by using them before they had matured sufficiently. The few available profit and loss accounts for the house suggest that Hewitson and Ridley did not actually make a loss but Middleton Hewitson was certainly not satisfied with the return and wrote to Ridley in 1809:¹²

The profit of the bottle house is certainly inadequate to the pursuit, I conceive £1,000 is what ought to be produced annually as only a fair profit.

Despite the profit in that year being "more than I could have expected", Hewitson felt that only £600 could be divided between the partners. He was particularly unhappy with the house's performance in view of the fact that its neighbour, the High Bottle House, was far more successful and in 1808 out of net proceeds of £1,281 had given a dividend of £1,200.

According to Middleton Hewitson:

There is little difference if any in the materials they use and our bottles are acknowledged equally good, that would the pots stand the results of both houses ought to be the same.

The partnership between Middleton Hewitsion and Sir Matthew Ridley was renewed in 1806 on an entirely new basis after an enquiry into the muddled history of ownership found that the house was the sole property of Middleton Hewitson and awarded him £1,659 as arrears of rent since 1780. As part of this renewed partnership a valuation was made of the property which gives a useful picture of its size and extent. Besides the bottle house itself the manufactory included a clay house, ash yard, iron house, cullet house, clay mill, kelp house, crane, quay, 40 rooms occupied by workmen and a house of 5 rooms occupied by an agent.

A fair rent for the property was agreed to be £180 a year. A new managing agent, Mr. Calvert, was appointed to oversee the day to day working of the house with the intention that Hewitson should "just be left the amusement of doing the books". In fact the difficulties the house experienced meant that Hewitson continued to take an active part in the concern.

In 1811 the partnership came to an end with the death of Middleton Hewitson snr. and the reluctance of his son Middleton Hewitson jr. to continue as the manager of the house. Sir Matthew White Ridley was not, as he stated in a letter to Hewitson, anxious to give the business up:¹³

I cannot but sincerely lament that the bottle house should have afforded so little satisfaction to either of us of late I certainly cannot pronounce it as my wish that the concern should be altogether abandoned although profits do not appear to have been altogether favourable.

However Hewitson repeated his conviction that returns would never be certain without an increase in capital in order to open a warehouse in London, and soon after this the partnership was dissolved and the house put up for sale.¹⁴

St. Lawrence was bought by Thomas Clarke, a merchant with a variety of interests. He ran the bottle house in partnership with Robert Plummer, an insurance broker. Clarke and Plummer were also partners in a flax spinning mill at St. Lawrence. Neither merchant appears to have taken a particularly active part in their bottle manufactory although Robert Plummer was, during the 1820s, the secretary of the Tyne Bottle Manufacturers' Association. This association was a formal one with meetings and a yearly subscription of 5 guineas per house.¹⁵ It does not, however, appear to have been a particularly powerful association

and almost certainly did not regulate prices as its informal eighteenth century predecessor had done. Its main purpose seems to have been to add weight to petitions to the Board of Excise and the Treasury. During the 1820s St. Lawrence was leased out by Thomas Clarke to Robert Todd who also purchased the High Bottle House from the broad glass owners in 1823. Todd was one of the most successful Newcastle bottle manufacturers of the second quarter of the century and eventually took over Isaac Cookson's Closegate bottle works.¹⁶ Like Clarke and Plummer Todd had other commercial interests and owned a large timber yard in the Close, Todd remained in occupation of the High Bottle House, or the North Shore bottle house as it came to be called, but gave up the St. Lawrence house in 1835 when it was advertised to let.¹⁷ The house was briefly leased to Cookson and Coulthard, advertised to let again in 1839,¹⁸ and eventually came into the possession of John Smith & Co. who advertised it to let in 1852 noting that the cone and furnace had recently been rebuilt.¹⁹

The most important development in bottle manufacturing at Newcastle during this period was the establishment of a completely new site at St. Peter's Quay. The owner of the quay was William Row and, as was suggested in connection with flat glass, he appears to have been anxious to build up St. Peter's as a major manufacturing centre on the river. It is hardly surprising that Row should have started by building a bottle house for he had already had considerable experience of the trade during the eighteenth century as a customer and shipper of Hartley bottles. The St. Peter's bottle house was erected c. 1815 and was originally carried on by William Row jr. in partnership with his father. This partnership came to an end in 1820 when "in decayed and embarrassed circumstances" William Row jr. was forced to petition the Exchequer for

an extent - in - aid to enable him to pay £1,552 owing in glass duties.²⁰ His deposition claimed that he was owed over £1,000 by Messers Westbrook and Jones bottle merchants of London and therefore only needed the money as a bridging loan. Unfortunately in 1821 he was obliged to apply for another extent, this time for £1,214 to cover duty charged from 18 November 1820 to 26 March 1821. Again Row claimed he was in a completely decayed state with no floating capital:

The deponent further saith that the stock in trade at the manufactory is of trifling value, the bottles made there being taken away as fast as they can.

The inquisition made on Row's bottle house confirmed that this was indeed the case; the whole stock was valued at £43 11s 6d (although it must be said that many items in the inventory seem undervalued). This sum plus £48 in cash and a debt of £40 from a bottle merchant in Leith amounted to Row's total assets.

The ownership of St. Peters during the 1820s is not entirely clear. Either it was carried on by William Row snr. or it was leased to Richard Lambert who appears in the directories of 1825 and 1827. In 1826 the cone bottle house at St. Peter's was certainly advertised to let.¹¹ From 1830 its ownership becomes quite clear for it passed into the capable hands of Thomas Ridley.²² Thomas Ridley was the brother of John Ridley who already owned the North Tyne Glass Company also at St. Peters. He proved highly successful as a bottle manufacturer so much so that he was joined by his brother. By the 1840s there were two bottle works at St. Peter's, the Albion Glass Works under Thomas Ridley and Co. and the Byker glass works under Ridley Brothers. The Byker Glass works also included a soda works established by John Ridley. In 1843 one of these bottle works, probably the older house, was advertised for sale noting that it was let to a highly respectable firm.²³

(iii) Sunderland

Perhaps the most significant growth in the area occurred at Sunderland. By the time of the 1833 Commission Sunderland produced more bottles than any other local centre of manufacturing; in 1832 Sunderland paid £22,480 in bottle duty, Newcastle £15,003, Shields £8,876 and Hartley £6,480. It was during this period that the foundations of Sunderland's later importance in the industry were laid.

Both of the original Sunderland bottle house sites continued to be occupied; Ayres Quay by Richard Pemberton, and Bishopwearmouth by George Fenwick of Lambton and his family. It was reported to Delaval in 1807 that Mr. Fenwick was erecting a second bottle house and this was correct. This second house was worked under the name Addison Fenwick, George Fenwick's son, who also managed and was a partner in the original house working under the name of George Fenwick and Co.²⁴ The Fenwicks owned a warehouse in London through which their bottles and crown glass were sold. This was sold in 1813 after a compulsory purchase order from the government made under an act empowering the purchase of land in Upper Thames Street in order to build a new Customs House.²⁵ The Fenwick warehouse then moved to Bull Wharf Lane and finally Lower Thames Street where it remained as the Sunderland Bottle and Glass Warehouse. It is possible that the manufactory was not a particularly productive venture since in the returns of 1832 Addison Fenwick appears to be working only one bottle house. The second continued to exist however for when George Fenwick's estate was advertised for sale in 1848²⁶, it included "two cone bottle houses on the Ford estate". The Fenwicks were also interested in two breweries, at Chester-le-street and Sunderland, which certainly would have com-

plemented their bottle manufacturing. Despite the fact that the works was advertised for sale in 1848 the family appears to have continued as owners and occupiers. In 1859 Robert Fenwick gave his sons George, a banker of Newcastle, and Robert, a bottle manufacturer of Sunderland, all his shares in the two breweries and the Sunderland Glass Company.²⁷ At this time the bottle manufactory was carried on by four equal partners, Robert Fenwick snr. and Robert Fenwick jr. plus Henry and John Watson. John Watson was the company's agent in London and since the 1820s had appeared in the directories at the Sunderland Bottle Warehouse's address.

From c. 1797 to 1818 the Ayres Quay houses were occupied by Richard Pemberton. In 1817 they were advertised to let for a period of 17 years and were taken on by Pemberton's son Thomas. Thomas Pemberton's occupation of the bottle houses is chiefly memorable for his feud with his excise officer and his trial in the Exchequer in 1824 (see chapter five, section 5, iii). Unfortunately the trial throws up little additional information about the works beyond the fact that its production included, besides "common wine and beer bottles", utensils and octagonal half pint bottles. After being fined £600 Pemberton put the manufactory up for sale²⁸ and included with it the London warehouse, "the bottle warehouse carried on in the name A. Major and Co. at Allhallows Lane", which the Ayres Quay Company used and which Pemberton evidently owned.

The Ayres Quay houses appear to have been taken over by Walker Featherstonhaugh, the proprietor of a new bottle works at Deptford. Exactly when the Deptford house was erected is not certain but it was in existence by 1816 when an extent-in-aid on account of glass duties was issued to Marmaduke George Featherstonhaugh of Durham County and London.²⁹

By the 1820s the Deptford works was known as the Wear Glass Bottle Company with Walker Featherstonhaugh as its managing partner. In 1828 the "premises occupied by M.G. Featherstonhaugh on the south side of the River Wear at Deptford "was advertised for sale"³⁰, but the works continued under Walker Featherstonhaugh who was working it, plus the two Ayres Quay houses, in 1832. The 1832 returns show that one of his houses paid an extremely large amount of duty, £5,095, which was by far the largest of all the bottle houses in the area. In 1849 the Ayres Quay Bottle Manufactory "at present in the occupation of Walker Featherstonhaugh" was offered for sale³¹ and was purchased by William Kirk who occupied it until 1881.

Around 1820 a second bottle firm established itself at Ayres Quay. The works became so successful that it usurped the title "Ayres Quay Bottle Works" from the elder neighbour which, in the later nineteenth century, became known as the Ballast Hill Bottle Works. The new firm was established by five local men, Thomas Bonner, Philip Laing, John Hubbard, John Scott and Nathan Horn jr. In 1821 the partnership was dissolved in respect of Thomas Bonner and carried on by the remaining partners as John Hubbard and Co.,³² or later Laing, Horn, Scott & Co. In 1832 two houses were in production and by the 1850s the firm had expanded to six houses. The Ayres Quay Bottle Company was to become the leading bottle firm in Sunderland during the latter half of the century and one of only two bottle firms in the town to survive into the twentieth century.

Finally one other new bottle house should be mentioned. This was the bottle house run from 1809 to 1828 by Hilkiah Hall on the south side of the Wear at Bishopwearmouth. This house was said to be on the

site of the flint glass house occupied during the eighteenth century by John Hopton, which Hall purchased in 1809 for £2,500.³³ Hall appears to have had a turbulent career as a manufacturer. He was said to have mortgaged his property heavily to the Backhouse Bank and by the time he quit the trade was in debt to them for £9,700. He also appears to have fallen out with the Excise and was prosecuted three times in the Exchequer:³⁴ in February 1822 he was fined £50 for making a false declaration and removing glass; in November 1822 he was fined £300 for similar offences; and finally in June 1827 was fined yet again (the exact sum is not known but it was sufficiently large to force him to apply for an extent-in-aid³⁵ and to force him to quit the trade). In 1828 his bottle house was put up for sale³⁶ and it is quite interesting that his property included lime kilns, for a report in the Newcastle Courant of 1826,³⁷ describing a patent taken out in France for manufacturing glass without alkali, noted that the process was "exactly as done by Mr. Hall ten years ago on the Wear"; it is quite probable that Hall's "glass without alkali" was a lime soda glass of the kind mentioned by Parkes in 1815 (see p.9).

(iv) Hartley

The death of Sir John Delaval in 1808 brought to an end the family's direct involvement with bottle manufacturing. Under his heir, his widow Lady Delaval, the bottleworks was leased out to other companies. Delaval naturally foresaw the situation that would develop after his death and a year previously had tried himself to lease out the works. The potential lessee was the newly formed company Cookson and Cuthbert which, in March 1807, wrote to one of Delaval's agents inquiring if it was true that Lord Delaval was intending to lease the works.³⁸ Cookson and Cuthbert received a favourable reply and by April Lord Delaval and

Cookson were exchanging proposals on the terms of the lease. The issue that immediately emerged as an irreconcilable one was the terms on which the glass works should be supplied with coals from the colliery which was to remain under the direct ownership of Lord Delaval. Delaval offered what he called the "market price" for coals but Cookson was quite adamant that this was too vague and he had to have the security of coals at a fixed price. Cookson's main argument was that "market price" was a debateable thing and as the bound tenants they could not make the manufactory profit if they had to pay as much as 13 shillings per chaldron which the owners of the colliery might decide to be the market price. He reminded Delaval that although the trade was at present in a state of briskness the present establishments were fully capable of supplying the demand and with the recent increase in the number of bottle houses ("Mr. Featherstone and Mr. Fenwick have each built an additional house and get glass house coals at 5 shillings per chaldron") competition must increase and costs had to be kept low. Delaval argued that it was impossible to foresee exactly what price coal would be for the next twenty one years and the lessee of the glass houses would have his security guaranteed by the "mutual and inseparable profit" between the glass house and the colliery. The issue was not resolved, neither side altered their stand and negotiations came to an end.

The first lessees after Delaval's death were Matthew and Benjamin Harrison, the London bottle merchants, who signed a 21 year lease in January 1813.³⁹ The lease does not mention the price of coals but it is clear that they were to be supplied with coals at "the market price", and, as Cookson had foreseen, this definition led to different interpretations (see chapter one). The rent of the houses was fixed at £300 per house whilst the war continued, should peace come it was to be

raised to £400 per house. In addition the Harrisons paid Lady Delaval £5% of the value of the materials and stock on hand. An inventory was taken of the works on the Harrison's entrance and another when they prematurely quit the works in May 1820. One of the most interesting differences between the two inventories is the presence of alkali in the 1820 list; in 1813 there were twelve tons of kelp and ten tons of patent flux at the works, in 1820 this had changed to five tons of flux and seventy four tons of alkali. This difference provoked a complaint from Lady Delaval's lawyer who maintained that she was under no obligation to buy back from the Harrisons any materials that they had added, particularly as the alkali "is of very little value; so little that the present occupiers of the glass works will not take it as they can make bottles of flux and salt a great deal cheaper."⁴⁰

There are two possible reasons to explain why the Harrisons quit the works so soon after entering it. First, there was certainly the difficulty of carrying on the glass works independently from the colliery. Second, their operations were adversely affected by a law of 1812 which forbade the manufacture of bottles in smaller capacities than "a reputed half pint".⁴¹ The importance of Harrison's trade in small bottles has already been mentioned and it appears that they maintained a large interest in this trade into the nineteenth century. Immediately after the 1812 Act Benjamin Harrison wrote to Richard Wharton, the Treasury Secretary who had framed the bill, saying that he had been informed from Hartley that the excise officers were halting the manufacture of the type of bottle called "eight square half pints" because they did not contain the full measure.⁴² According to Harrison the bottles were indeed strictly less than half pints in capacity but they had been known by their present appellation for more than twenty-five

years. When he had approached Wharton before the regulation was adopted they had agreed that these bottles should be allowed to be manufactured by permitting the manufacture of "half pints and reputed half pints"; in other words that bottles which were traditionally called half pints and yet which traditionally were only 6 ounces in capacity were not prohibited by the 1812 Act. The Excise Report confirmed that reputed half pints were allowed and issued positive instructions to the officers at Hartley accordingly.

The Harrisons were not the only manufacturers to be affected by this new regulation. In 1811 Middleton Hewitson asked Sir Matthew White Ridley on behalf of Isaac Cookson, what he had heard about the proposed measure; Cookson was concerned as "he manufactures a great many bottles approaching to phials".⁴³ In April 1818 Isaac Cookson signed a petition to the Treasury (on behalf of the Bottle Trade on the Tyne) on the subject. The petition echoed one sent by the Harrisons a fortnight earlier complaining that the Excise had decided to put a new construction on the wording of the 1812 act and were halting the manufacture of reputed half pints.⁴⁴ Cookson's petition insisted that since the passing of the act the black bottle manufacturer's right to make reputed half pints had never been questioned. The report of the Excise confirmed that they had recently ordered their officers to confine black bottle manufacturers to the legal size of half pint bottles and they justified this on the grounds that the measure had been introduced to protect flint glass manufacturers who, as the act was now interpreted, received no protection at all. They also submitted a report from their solicitor on the legal size of half pint bottles. The outcome of this difference of opinion is not known but it seems likely that the Board of Excise succeeded in suppressing the manufacture of "reputed half pints".

The Harrisons' successors at Hartley were the most obvious candidates for the glass works' tenancy - the lessees of Hartley colliery which since 1809 had been occupied by a partnership headed by John Carr, previously a farmer at Ford, and James Jobling a colliery viewer. In 1820 Carr and Jobling took the glass works on trial and by January 1821 were sufficiently confident to be able to take it on a permanent basis. The rent they felt they could pay was only £200 per house "but should trade improve we would have no objection to paying £300 per house". Carr and Jobling continued to run the Hartley bottle works until its closure in 1872. It did not expand, indeed by 1832 only two houses were in operation. By 1842 97 men were employed.

(v) The Trade

Although there is little objective evidence on the subject of competition in the very early years of the nineteenth century, comments from manufacturers bear witness to their own impressions of growing competitiveness. The St. Lawrence house felt this particularly keenly. In 1806 the house was "thrown into a great stock of bottles"⁴⁵ by what Middleton Hewitson called "the loss of Major's House". This loss was not, as it perhaps appears, a bankruptcy but the loss of a London selling agent. The bottle warehouse of Ann Major in All Hallows Lane continues to appear in the London Directories but as the bottle warehouse for the Ayres Quay Company at Sunderland. The problem of selling in London continued to cause concern for St. Lawrence. In 1805 a large stock accumulated at the works which led Middleton Hewitson to suggest that they consider opening a warehouse of their own in London, as other manufacturers had done:

Indeed we shall be under the necessity soon of either adopting some plan to relieve our warehouses or stop the work. It grieves me to trouble you at all upon the business but am at a loss how to act for the best and as I believe the Upper Bottle House warehouses are also nearly full, 'tho with a quantity far short of ours, it may be the interests of both concerns to act in concert as the Trade is now situated upon this river - I mean by having a warehouse in London.

This suggestion was not acted upon and in 1809 Middleton Hewitson took up his complaints about the London merchants again; this time he accused them of a deliberate discrimination against St. Lawrence bottles provoked by competitors:

One thing our house suffers from as well as the pots not standing is the want of a ready demand for bottles. This I can't account for in the London market as I believe they get no better from any house whatever, but they are an article that always will admit of a fault being found in some, where there is a disposition to do it - and this does seem to have been the case towards ours, and from whatever cause it carries I trust this view may be frustrated..... How bottles may be supplied to the London market upon better terms than ours I have not grounds to speak but when it is considered the quantity manufactured by our neighbours which must necessarily be forwarded - also their views as regard to the wo houses clearly seen in their intentions towards Mr. Rutherford you will agree with me any steps to retard our sales will not be wanting, more especially at periods there may be a slackness in demand. The Upper House has more connections in London than ours, as no doubt Mr. Rutherford would have found himself similarly situated to us 'ere now.

Whether St. Lawrence was typical in experiencing increasing competition in the London market cannot be said for certain but in view of the increase in the number of bottle merchants in London it can certainly be said that larger numbers of bottles were coming in to London. Many of these bottles were being retailed through warehouses belonging exclusively to individual manufacturers. Manufacturers like Ridley and Hewitson who did not have the security of a warehouse ran a far greater risk. It was this situation that gave rise to Hewitson's later comment that he believed no return could be secured without removing the medium between the manufacturer and the customer.

The evidence of competition in the later decades of the century is more substantial: above all there is the evidence given to the Commissioners of Excise Enquiry into the Excise on Stone Bottles. Glass bottles were relevant to this enquiry in that the duty on stone bottles had been imposed in 1812 primarily as a protection to glass bottles. The question the 1834 Commissioners addressed themselves to was whether this protection was a necessary one. Among the evidence given was a table of retail prices of glass bottles in London (in part supplied by John Watson the agent for the Sunderland Glass Company). This showed a distinct decline in price which was specifically attributed to the effects of competition: and in particular the increased number of manufacturers:⁴⁶

Prices of Glass Bottles from 1811 to 1833

Period	Duty	Price per gross
1811 - July 1812	4s 0d per cwt	40s
1812 - Jan. 1820	8s 2d "	52s
1820 - Jan. 1822	" "	45s
1822 - Oct. 1825	" "	42s
1825 - Sep. 1828	" "	44s
1828 - Aug. 1829	7s 10d "	42s
1829 - Jan. 1831	" "	40s
1831 - Oct. 1833	" "	38s

The Commission found that the stone bottle tax was an unnecessary protection for glass bottles. The main market for glass bottles was the wine trade which would certainly never consider the use of stone bottles. The Commissioners conceded that there was some competition in ginger beer bottles and bottles for beer and porter but that this was not sufficient to justify the tax. Their findings did not stop the glass bottle manufacturers complaining about competition from stone bottles once the tax was lifted. Another constant complaint, although again probably an unjustified one, was the competition they suffered from dealers in second hand bottles. This was even mentioned in Parliament by Sir Matthew White Ridley in 1825:⁴⁷

The manufacturers of English bottles had now to compete with a new class of tradesmen who had lately risen up and were known by the title of 'Dealers in Old Bottles'.

Sir Matthew's remark was made in the context of the debate on Huskisson's Customs Consolidation Bill, and specifically on his proposal to reduce the customs duty on imported bottles which, naturally, Ridley was opposed to. Imported bottles represented by far the biggest threat to the English manufacturer and the largest potential source of competition. Fortunately for the English manufacturers they remained only a potential threat, heavily penalised by both customs and excise duties. Since 1787 foreign bottles had been subjected to an excise duty and by 1802 paid 5 shillings per dozen customs duty plus 4s 1d per cwt for the excise. The one exemption to this was a large one - bottles full of wine. In 1815 bottles of wine were finally included in the penalised bottles by an act⁴⁸ which stated^{as} its specific purpose "to encourage the manufacture (of glass bottles) in Great Britain". This act imposed an excise duty of 8s 2d on all imported bottles. Predictably the heavy duties on imported bottles came in for some criticism from those advocating a freer trade. Huskisson attempted unsuccessfully to reduce them in 1825 in his Customs Consolidation Bill, calling attention to the fact that the duty on the bottle amounted to over half the value of the wine it contained.

The competition in the trade during the first half of the nineteenth century must be seen in the light of an expanding demand and the establishment of new markets for glass. Particularly important in this respect was the development of a market for bottled beer. Unfortunately there seems to be very little detailed information on the adoption of bottles as a packaging for beer. The only observation that can be made is a general one; that it appears to have occurred during the period 1790

- 1830. Certainly the market for the north-east bottle manufacturers around 1790 consisted primarily of wine and claret bottles, by 1830 they were also producing bottles for beer. "Bottled Liquor Dealers" have been noted in 1819 and it was during the 1820s that bottles began to be used for the export of beer to hot climates.⁴⁹ It is particularly unfortunate that not more is known about the development of the bottled beer trade since during the later nineteenth century the north-east was associated almost exclusively with the "black bottle" trade, or dark bottles for beer and stout. The description "black bottle" is usually thought to have arisen in order to distinguish the older type of bottles from the new pale bottles manufactured in Yorkshire from the 1850s onwards. It is therefore quite interesting to find the term being applied to the north-east houses as early as 1835. William Powell of Bristol, who appears to have been primarily a manufacturer of wine bottles, described the north-east men as "those in the black bottle trade" to the 1835 Commission.

An important element in this new market for beer bottles was the suitability of bottles for the export of beer to countries with hot climates; bottling enabled beer to survive through, for instance, tropical Indian summers. By the 1830s the importance of the export trade in bottled beer, and indeed bottled wine and spirits, was fully apparent to the 1835 Commissioners and the Board of Excise. The Commissioners seized on the fact that nearly half the duty paid on bottle manufacture was repaid in drawbacks of duty (on export) as a good reason why the duty should be repealed. The Board of Excise were also concerned about the high proportion of duty being repaid in drawbacks particularly as they suspected that the drawback on the bottles gave a small bounty to the export of wine. However it recognised the importance of the beer

and wine trade and for that reason was not anxious to alter the drawback arrangements; in the words of the Supervisor General, "It comes simply to the question of what the effect of withholding the drawback would be upon the beer trade and the wine trade".

The importance of the export of bottles as containers for other commodities is underlined by a series of related complaints to the Board of Excise from the manufacturers. All were concerned with the method of awarding the drawback to full bottles. When bottles were exported full, or in large quantities, it was not practically possible to weigh them in order to calculate the drawback and so, in 1806, a new method was introduced whereby the drawback was given not on the real weight but on a weight calculated on an average weight of 18lbs per dozen. This method was introduced primarily to frustrate frauds in the shipping of empty bottles loose rather than packed. Previously the loose bottles had been put, ten dozen at a time, into large baskets to be weighed by the excise officers before being stowed loose in the holds of ships like bricks or tiles. Some frauds had been discovered, namely different baskets of bottles being substituted for the weighed baskets before they were put on board, and in 1806 the Board issued instructions that no bottles were to be stowed loose at all. This was impracticable and they eventually settled on the method of averaging.

The change provoked an immediate protest from the Bristol bottle manufacturers claiming that their bottles weighed on average 21 lbs. per dozen and that they could not afford the alternative of packing bottles in sealed crates (in which case the bottles would be weighed and the crates marked by the excise officer to avoid any possibility of fraud); "we are obliged to ship loose or not at all as the article

will not bear an extravagant freight".⁵⁰ Receiving no reply to their petition the Bristol manufacturers attempted to enlist the help of those in the north-east by writing to both Lord Delaval and Isaac Cookson. Cookson's reply is quite interesting for it implies that the method of averaging had been introduced largely on the suggestion of the north-east manufacturers:⁵¹

The trade here have for some months past been corresponding with the Excise particularly respecting their former injunction which made it necessary to pack in crates on board whatever might be exported and thereby in a great measure nearly ruined our trade. Were we ourselves principally the cause of the Excise substituting the present system of averaging rather than submit to the plan of packing but we did not, we confess, conceive they would limit the allowance to 18lbs per dozen which we are perfectly aware is much too little.

The Excise did not alter its ruling and averaging on the basis of 18 lbs per dozen continued to be the method whereby bottles shipped loose, and bottles full of wine or beer, received their drawbacks. The Bristol manufacturers appear to have been particularly hard hit by this ruling and in 1812 petitioned again on the subject⁵² (bearing in mind the comments of Joseph Oxley in 1781 on the greater weight of Bristol bottles it seems probable that their complaints were justified). The English manufacturers were however fortunate in being able to export loose at all; in 1813 the Scottish bottle manufacturers petitioned the Treasury claiming that the Scottish Board did not allow them to "stow" bottles at all. The issue re-emerged in 1825 when certain excise duties were transferred to the customs. By this time quart bottles were still being given a drawback at 18 lbs per dozen but bottles of lesser size had to be weighed. Two petitions, (from the Bottle trade on the Tyne and the Bottle Trade on the Wear) from the north-east complained that neither customs officers nor excise officers would assume responsibility for the weighing.⁵³

By the time of the 1835 Commission the average weight had been altered to what the manufacturer entered but the method still created dissatisfaction. William Powell of Bristol complained that spot checks were made on the bottles and if one dozen were underweight the whole shipment was confiscated even if the total weight tallied. This had also been complained of in the 1825 petition from the Tyne manufacturers who claimed they were obliged to enter bottles at less than their real average weight in order to prevent the whole cargo being seized. In 1835 the Newcastle manufacturers also complained that in busy ports like London nothing was weighed and the bottles were given drawback at 20lbs per dozen when in fact they only weighed 18 lbs. Another large complaint was that the customs ad valorem duty payable on export was calculated on the home value, i.e. that they paid a duty on the drawback. A further complaint was that the bottle manufacturer could not avoid paying the duty on the commodity inside the bottle; William Cuthbert gave the example of bottles full of oil of vitriol, ten of which would receive a drawback of 8s 6d yet would pay bonds and debentures amounting to 10s 6d which was a tax not so much on the bottle as the oil of vitriol. All these points, plus the great breakage of bottles at sea meant, in Cuthbert's view, the drawback was not sufficient:

If we paid duty on 100 cwt. of metal and exported the whole we should be saddled with a duty ... We are paying a duty on every bottle we export and break: the loss is very great. Indeed I will venture to say that all the bottles exported from London are saddled with a duty of 10% upon the present duty ... which is a bounty to the foreign manufacturer.

Despite these many complaints about the drawback system the export of bottles does not appear to have been inhibited. All the evidence for the north-east manufacturers suggests that they at least exported large quantities of bottles to a variety of destinations. Bottles were usually loaded on board last with the result that there was frequently found to

be not sufficient room. There were many petitions to the Newcastle Customs House.⁵⁴ from bottle manufacturers asking for a return of duty after only a proportion of the bottles entered was actually shipped. Destinations included Gothenburg, New York, Rio and India. The export trade was sufficiently important for Cookson and Coulthard to petition for a customs searcher to examine the bottles at the manufactory in order to save them having to send them up river to Newcastle to be examined.⁵⁵ They begged to be allowed "the same indulgence allowed the manufacturers of glass at Shields" which is an interesting suggestion that even without a Customs House at Shields customs business was carried on. A similar petition was received from William Row whose house was at St. Peters.⁵⁶

3. The Bottle Workers and their Wages

Before leaving the bottle industry in this period, something should certainly be said about the bottle workers and wage arrangements. It is an interesting subject in its own right but it also needs to be looked at in order to put later developments in the bottle industry into a context. During the latter half of the nineteenth century the development of the bottle industry was dominated by a series of strikes, lock outs and disputes between masters and men most of which centred on attempts to alter the rate of wages and the archaic method by which they were calculated.

The time honoured basis for a bottle worker's wage was that he should manufacture 62 dozen bottles per journey and work five journeys per week. This continued to be the basis on which he was paid despite technological advances and increased expectations which made a normal week's work produce a far greater quantity. There is no doubt that the survival of this system owed a lot to the general prosperity of the industry up to the 1850s. All the evidence points to the fact that until the 1850s wages and earnings maintained an upward trend and that this was primarily due to two things in combination: the willingness of a manufacturer to entice workmen to his bottle house by offering higher wages and the willingness of a bottle worker to travel to a new job should higher wages be offered. If either of these factors was the more important of the two it was certainly the action of the manufacturers

A good early example of higher wages being offered is Thomas Delaval's recruitment of bottle workers in the early 1760s to staff his new houses at Hartley. Inevitably his recruiting was done in the neighbouring glass houses and John Cookson was a manufacturer who lost

bottle workers and a smith to Hartley. In 1762 Cookson was so apprehensive about losing more workmen that he wrote to Thomas Farmer in London asking him to retrieve and bind some of his workmen who had recently left in search of work there:⁵⁷

Deer and I think it best to secure the hands. The wages of a bottle-maker (finisher) is 18 shillings per week, house and fire, a blower 12 shillings with the same allowance. Fix with them before they come down or they will be going to Scotland or elsewhere.

The wages offered by Cobkson can be compared with the earliest surviving indentures from Hartley which offer two skilled blowers 14 shillings a week plus board and lodgings.⁵⁸ One of the blowers, Simon Patterson, was from the High Bottle House at the Ouseburn, the other, John Catchside, was from South Shields. Farmer in fact was not able to secure Cookson's hands at the wages he suggested and went higher which was not to Cookson's liking:

The method you speak of reducing them (wages) afterwards will have this bad effect. All our hands will be displeased if persons of inferior ability are given advanced wages.

Other indentures from Hartley show that Delaval was employing boy apprentices from Northumberland, South Shields and even London. He was also said to have taken two men from Ayres Quay but returned them immediately he found out that they were already bound.⁵⁹

A complete list of the workmen at Hartley and their wages in 1775 exists, and from this it can be seen that the wages were certainly higher than those offered by Cookson in the previous decade (fig. 14). The total number of workmen and the total wage bill of £33 17s 6d was not extravagant for two houses, and in fact represented the situation after, in an effort to reduce costs, four blowers and one carpenter had been dismissed. By 1778 the number of employees had increased to 95 with the addition of a smith, a joiner, a warehouse manager, two

colour mixers, pattern makers and fourteen labourers. When three houses were in work the number of employees nearly doubled.

The competition amongst manufacturers for good workmen led to quite a high percentage of the workforce being bound, particularly when a potential threat was seen. For instance in 1781 William Allen wrote to Delaval that he had heard some men were taking over Mr. Hopton's glass house at Sunderland and therefore thought it prudent to bind all of the workmen. The disadvantage of binding was that in times of bad trade the manufacturers were obliged to pay wages. In 1779 Middleton Hewitson wrote to Matthew White Ridley that he had only bound two of their men "knowing much had been given away in one house paying full wages to bottle makers when they could not be employed".⁶⁰ An echo of this is found at Hartley where, in 1780, two finishers (Benjamin Leck and Henry Gilroy) were discharged not because they were bad workmen but because they were the only two not under articles. The two were not able to find alternative work at Shields or Newcastle and returned to Hartley where they were looked on with sympathy and given one finisher's place between them to work alternate weeks until they found work.

Un-bound workmen were a permanent risk to an employer in that in times of good trade certain manufacturers were not loth to tempt them away with promises of higher wages. In 1778 Ralph Ashworth, a finisher in Mr. King's bottle house at Dumbarton (Ashworth himself had at one time been employed at Hartley but was discharged as a trouble maker) "came among the glass workers in a clandestine manner"⁶² to lure them away with the promise of 1 shilling more than their present wages. He even persuaded an articulated workman to get drunk and abuse the agent in order to be discharged. Hartley had already lost its pot maker to

Figure 14: Glassmen in the employ of Sir John Delaval, 20 September 1775⁶¹

Finishers

	Weekly Wage
John Manchester	20s *
Jo. Henderson	20s
Cuthbert Henderson	20s *
Andrew Berry	20s *
John Bailes	20s
Jas. Grooves	20s *
Robert Brotherton	20s *
Benjamin Gilroy	20s *
Martin Spur	20s

Blowers

Henry Leck	14s *
Wm. Henyside	13s *
John Nelson	13s *
James Mustard	12s
Jas. Sykes	14s *
Richard Ashworth	12s
John Bell	13s
Ralph Potts	12s
Ratcliffe Manchester	12s
John Crawford	10s *
Robt. Abernethy	7s *

Gatherers

Six from 5s to 12s. All*
(not named)

Boys

Eighteen from 3s 6d to 5s. All*
(not named)

Miscellaneous

4 teazers	12s
4 founders	9s
2 caskermen	8s
3 ash sifters	8s 6d
2 coal wheelers	13s
1 mason	11s
1 carpenter	10s
1 apprentice pot maker	7s
1 smith	17s
1 packer	9s
2 drink finders	4s
2 boy runners	6s 6d
1 labourer	7s

* = Bound workmen.

Total weekly wages payable: £33 17s 6d.

Dumbarton, which was quite a serious loss; again he had been secured by clandestine means in that King had made a private agreement with him whilst he was still under articles and had even paid him an allowance until he was free to go to Dumbarton.⁶³ A similar poaching of workmen occurred in 1791 when the agent of Ramsey Williams and Co. of Leith came to Newcastle and Hartley to hire hands and after treating three of Delaval's workmen with drink got them to sign new contracts at higher wages (2s per week more for blowers and 1s for gatherers plus an extra 5½ guineas to defray travel expenses to Leith). These particular workmen were already under articles and the case was taken to the magistrates.⁶⁴ Unfortunately for Delaval the case was won by Ramsay who claimed that the previous contracts were null and void as the workmen had not been given duplicates of the documents.

Clandestine poaching was not altogether typical of manufacturers' recruitment methods. Most manufacturers appear to have behaved in a more honourable way as, for instance, did Robert Scott of Glasgow who wrote to Hartley in 1777 asking if they had any blowers to spare "because of the new works which has carried off some of ours", presumably another reference to Dumbarton. The well established manufacturers were the ones most likely to lose by the offering of higher wages. Not only did they lose men but they were also forced to increase their wages to match. In 1803 Delaval himself wrote to Isaac Cookson complaining that one of Cookson's agents had approached a Hartley man and offered to agree to whatever terms he asked for. Delaval felt sure that Cookson would not approve of this as such tactics would result in all the manufacturers having to increase their binding money and their wages.

Evidence on wage rates in the first half of the nineteenth century is, unfortunately, unavailable but it is quite certain that they maint-

ained the upward trend that had been established in the eighteenth century. Almost immediately after the repeal of the glass duties^{in 1845} the issue of bottle makers wages began to divide masters and men, not at first in the north-east but certainly in Lancashire and Yorkshire. In 1853 the Newcastle Courant stated that the bottle makers strike had extended to Newcastle and reported a case of breach of promise brought before the magistrates concerning two workers at St. Peters bottleworks.⁶⁵ The report included a useful table of the wages paid in all the local factories at that date which certainly shows an increase on the eighteenth century rates:

	Finisher	Blower	Gatherer	
Bill Quay	28s	24s	19s	
South Shields	24s	20s	17s	Wages
Hartley	24s	20s	17s	per
Blaydon	24s	20s	17s	Week
Seaham	28s	24s	19s	
The Tyne	24s	20s	17s	

The bottler workers' weekly earnings did not, however, consist entirely of his weekly wage. The weekly wage was only payment for the 62 dozen bottles per journey specified in his articles, anything above that was paid as overwork. Although 62 dozen may at one time have been the average of a journey's production it is clear that by the late eighteenth century it was far beneath the average. The Day Book for the Hartley works in 1780⁶⁶ shows that 62 dozen was only not exceeded when the pots burst and that as many as 73 dozen could be manufactured depending on the amount of metal in the pot. In 1783 John Bryers told Delaval that "the usual quantity of overwork at a mean is near about eight dozen each pot per journey".⁶⁷ Overwork is never mentioned in indentures but it appears that the traditional method of payment for overwork was to pay it at the same rate that the ordinary work was paid. In 1783 Bryers reported that the men had finished their fifth journey by nine o'clock on Friday

and were given the opportunity of working an extra journey but that they refused without something extra allowed, "more than 1/5th their usual, weeks wage",⁶⁸ which implies that the proper amount should have been exactly one fifth of their usual weekly wage. By 1807 it is clear that overwork was being paid at a higher rate than the basic wage. A calculation was made on the cost of working an extra sixth journey in the week which estimated the labour on an ordinary journey of 248 dozen (four holes producing 62 dozen) cost $3\frac{1}{4}$ d per dozen whilst the same journey paid as overwork cost 4d per dozen.⁶⁹

The proposal to work a sixth journey at Hartley underlines the fact that a manufacturer could not avoid overwork; it was an essential to him, as a means of increasing his production, as it was for the worker, as a means of increasing his earnings. Overall the expense of working a sixth journey as overwork was considerably less than the expense of building a completely new glass house, and the results in terms of increased production could be remarkably similar. Hartley did introduce a sixth journey in 1807, worked on Saturday by only one of the three houses, with the result that the overwork for one week amounted to:

	Overwork
House 1 (five journeys)	330 dozen
House 2 (" ")	357 "
House 3 (six journeys)	708 "

The total of 1,395 dozen amounted near to what an extra house might produce. Another indication of the increasing importance of overwork to Hartley can be seen in a sample of the fortnightly wage bills for the glass works:⁷⁰

<u>Fortnight Ending</u>	<u>Weekly wages</u>		<u>Overwork</u>
2 Aug. 1775	£33 0s	10 $\frac{1}{2}$ d } £32 16s 10 $\frac{1}{2}$ d }	£1 8s 3d
13 Sept. 1777	£35 16s	1 $\frac{1}{2}$ d } £37 4s 11 $\frac{1}{2}$ d }	£7 4s 11 $\frac{1}{2}$ d
15 Oct. 1784	£36 11s	10d £37 9s 0 $\frac{1}{2}$ d	£4 10s 6d £2 16s 3d
8 Nov. 1790	£50 10s	3 $\frac{1}{2}$ d £51 2s 11d	£7 8s 0d £6 9s 0d
29 Sept. 1810	£76 9s	0 $\frac{1}{2}$ d £75 3s 11d	£18 13s 5d £15 8s 11d

The extra cost of overwork does not appear to have been resented by the manufacturers during this period. At Hartley the debate on whether to introduce a sixth journey or not centred not on the cost but on the effect on the workmen's sobriety; paying them wages on a Saturday night would, it was claimed, lead them to spend the rest of the weekend in a state of inebriation which would leave them unfit for work on Monday. It was only later in the century that manufacturers began to question the practice of apying high rates for "overwork" that was only defined as such by an archaic standard of production.

CHAPTER FOUR: THE FLINT GLASS HOUSES

1. 1700 - 1800

Unlike both flat glass and bottles the flint glass produced in the north-east depended, at least for the greater part of the eighteenth century, primarily on a local consumption. Although this local consumption included a slight demand from local merchants for export and coastwise shipping, there is no evidence that flint glass was shipped to London regularly or in large quantities. The reasons for the provincial character of this branch of the north-east glass industry are not hard to find given both the nature of the market for flint glass and the nature of the north-east as a location for glass manufacturing. As we have seen, the major advantage of the north-east for flat glass and bottles was the low cost of manufacturing, due above all to the cheapness of the coal. Whilst low cost was undoubtedly a significant advantage in the manufacture of utilitarian types of glass, in the manufacture of flint glass, the one type of glass that could fairly be described as a "luxury", it was not so significant an element. Although low manufacturing costs were clearly desirable, the demand for flint glass depended as much on the quality of the product and the taste of the purchaser as on cheapness. The London manufacturer whose costs were high was not, therefore, necessarily at a disadvantage. The London manufacturer in fact enjoyed certain advantages over his provincial rival: he was at the centre of the major market for flint glass and could respond to fashionable taste, he could employ skilled craftsmen, in particular decorators of glass, who were largely based in London.

The decoration on a piece of glass can perhaps be taken as a rough measure of its quality in eighteenth century terms; the more cut or

engraved the glass, the more fashionable and expensive it almost certainly was. Measured by decoration alone there seems little doubt that provincial flint glass rarely approached the standard of London flint glass. The decorative techniques of cutting and engraving were largely confined to London, and in particular to a colony of German emigres who were said to have introduced glass cutting into England.¹ The only decorative technique that appears to have been practised on any scale in the provinces was white enamelling but at best white enamelled glass was only a poor and distinctly provincial imitation of engraved glass.² By the 1770s the London flint glass industry included a number of "cut glass manufacturers", firms who merely decorated already manufactured glass.³ By 1787 there was at least one glass cutter and engraver at work in Newcastle,⁴ but neither technique was fully adopted by provincial glass houses until the last quarter of the century. The predominance of London flint glass is to a small degree confirmed by the evidence that London flint glass found a ready market in the north-east:⁵

Robert Barker at his warehouse in Middle Street Newcastle, has just laid in an elegant assortment of cut and plain flint glass in the newest fasion and the best London polish; as reasonable as at any warehouse in Great Britain.

Miss Hodgson from London has laid in at her warehouse in Sunderland a large and elegant assortment of plain and cut drinking glasses, decanters etc. which she intends selling at the very lowest London prices.

London possessed the additional advantage of being the city where flint glass had first been developed. Like bottles, flint glass owed nothing to Mansell's glass industry beyond the fact that its development was in part a consequence of the introduction of the coal firing process. Flint glass (or glass containing lead oxide which rendered it translucent, lustrous and highly refractive) was patented in 1684 by George Ravenscroft, a London glass merchant previously engaged in importing Italian crystal;

as later research has shown Ravenscroft's patent should be seen as the culmination of the researches of a number of people.^{5a} When the patent expired the manufacture of flint glass spread to other glass houses in London. By the end of the century it was also being manufactured in the provinces although in 1696 it was claimed that two-thirds of all English flint glass was produced in London.⁶ This claim is to some extent backed by John Houghton's table of glass houses in 1696 which clearly illustrates London's predominance:⁷

	Flint & Ordinary	Flint, Green & Ordinary
London district	9	-
Woolwich	1	-
Isle of Wight	1	-
Bristol district	3	-
Worcester	-	1
Stourbridge	5	-
Coventry	-	1
Liverpool	-	1
Asworth, Notts.	1	-
Nr. Asworth	1	-
Newcastle	-	1
Glass houghton	1	-
Yarmouth	-	1
	<hr/>	<hr/>
Total	22	5
	<hr/>	<hr/>

The limited local market available to the north-east flint glass houses inevitably restricted the growth of the industry in the area. Until the 1740s only one flint glass house was at work in the area and as late as 1780 there were only two. Those who embarked on flint glass manufacturing were, for the most part, men with existing interests in other branches of glass manufacturing. It is perhaps also significant that flint glass saw more failures than in any other branch of glass; a short lived house at Sunderland closed c. 1775; in 1785 another unsuccessful attempt was made to set up a flint glass works at the South Shore near Gateshead. The last two decades of the century did however see the successful establishment of two new flint glass houses

and these two can be seen as the beginning of a growth in the industry that was to continue well into the nineteenth century. It was not until this period that north-east flint glass joined flat glass and bottles as a significant local contribution to the national glass trade.

The first flint glass house in Newcastle was established by John and Onesiphorus Dagnia on the north side of the Close in 1690, six years after their original bottle house had been built on the south of the same street. Their partnership continued until 1707 when the stock of both the Newcastle glasshouses was transferred to the new Dagnia bottle house at South Shields. The Newcastle houses were certainly restarted by the Dagnias and both the Common Council lists of glass houses, in 1732 and 1742, include one bottle house and one flint glass house at the Closegate. As we have seen in the previous chapter, following the death of Onesiphorus Dagnia (the son of John Dagnia) in 1724 both glass houses appear to have been carried on by his cousin and partner John Dagnia of South Shields and following the death of John Dagnia in 1743 the ownership of the two Newcastle houses appears to have been split between the Newcastle Dagnias, who took the whole of the bottle house, and the sons of John Dagnia of South Shields who took the white glass house. In June 1749 a freehold glass house, "without the Closegate", was offered for sale by James Dagnia, John's eldest son, and this was certainly the white glass house for in January 1750 James and his three brothers sold it to John Williams.⁸ (The deed of sale included a covenant that the property should remain on lease until certain claims to the premises made by Messrs. Wall and Pearson were settled. This minor point suggests that the white glass house had been restarted on the site of the original bottle house on the south of the street.

Richard Wall had been a partner in this bottle house, the Pearsons leased^a a dyehouse on the south of the Close and had previously had cause to complain of the damage done by the neighbouring glass houses.⁹⁾

John William's purchase of the white glass house can perhaps be taken as evidence of its previous profitability. In 1731 he had married the widow of Onesiphorus Dagnia and therefore had had some experience of the income to be got from the house. The same could also be said of William's partner in iron, John Cookson, who entered the flint glass trade as a manufacturer at about the same time, and whose Day Book for the 1740s contains occasional shipments of flint glass for the Dagnias.¹⁰ Cookson's venture in flint glass manufacturing took the form of a partnership, Airey Cookson & Co. which occupied a glass house at the Closegate. It has been suggested that the partnership was established in 1728¹¹ but there is no evidence of this (the Common Council lists of 1732 and 1742 only list one flint glass house in the Close) and it seems likely that the partnership was founded on the death of Joseph Airey in 1749 by Cookson with Airey's two sons, Thomas and Joseph; the first apparent reference to the company is in 1749 when it appears in the Port Books as an exporter of flint glass (see Fig. 15). Thomas Airey was a lead merchant and by this time John Cookson himself was also concerned in the working of the lead mines at Fallowfield in Northumberland which may well have provided further encouragement to him to embark on this particular branch of the glass industry.¹²

Although it is possible that the partnership of Airey Cookson & Co. lapsed during the 1760s, John Cookson at least maintained some interest in flint glass. In 1763 he informed the Edinburgh merchant Alexander Baxter that he was concerned in making flint glass as well as bottles

and suggested that Baxter take a cargo on consignment to St. Petersburg:¹³

I have a prity quantity of flint glass which is of sundry sorts and not so saleable here. To get rid of them (I) would go as low or lower than the German, the quality of which you know is indifferent. Would it be amiss if a trial was made in St. Petersburg? If you approve of it I shall consign to your house thirty or fourty pounds worth for a trial.

In 1770 the partnership of Airey Cookson & Co. was revived but with new partners and a new capital:¹⁴

John Cookson	15/30th	£3,750	Total Capital £7,500
Thomas Airey	9/30th	£2,250	
Joseph Wilson	4/30th	£1,000	
George Dickinson	2/30th	£ 200	

George Dickinson was a merchant with an existing interest in the flint glass trade. Thomas Airey was a general merchant and, as agent for Greenwich Hospital mines, well placed to supply the concern with lead. Joseph Wilson was almost certainly to act as the managing partner (whether he was any relation to Jacob Wilson, Cookson's manager at Bill Quay, or Samuel Wilson, Cookson's manager at South Shields, is not known). He was succeeded by his son William Wilson who was eventually to take over the firm.

X The revival of Airey, Cookson & Co. in 1770 was one part of a sudden investment on the part of the Cookson family in flint glass. 1770 also saw the establishment of a new flint glass works at Glasgow; the grandly named "Verreville" which was built to manufacture "crystal glass according to the finest manner of the Continent" for which glass cutters and engravers were brought from Germany.¹⁵ The partners in this venture included two Glasgow merchants, Alexander and John Ritchie, and four Tyneside glass manufacturers; Isaac Cookson, the eldest son of John Cookson, Charles Williams, eldest son of John Williams who had died in 1763, Joseph Robinson and Evan Deer. Unfortunately the partnership came to grief during the American wars and the house passed to another, wholly Scottish, company, Hamilton, Brown, Wallace & Co.

Figure 15: Flint glass exports from Newcastle 1730 - 1790

<u>Year</u>	<u>Destination</u>	<u>Quantity or weight shipped</u>			<u>Exporter</u>
1730	-	none			-
1739	Rotterdam	17,004	drinking glasses		Wm. Errington
	Amsterdam	1,650	"	"	Wm. Selby
	Hambro ^o	216	"	"	Thomas Slater
	South Caroline	200	"	"	James Proude
	The Sound	36	"	"	Thomas Hervey
	Boston	480	water glasses		Robert Fenwick
		71	coarse glasses		
	Bremen	600	coarse glasses		William Kent
1745	Dublin	10,000	pieces flint glass		John Cookson
	Dram	584	drinking glasses		Fenwick & Watson
	Dort	1,800	"	"	Robert Roddam
	Hambro ^o	720	"	"	John Cookson
	Norway	480	"	"	George Marshall
	Moss	36	"	"	Ralph Carr
		<u>cwts</u>	<u>qrs.</u>	<u>lbs</u>	
1749	Rotterdam	26	0	11	Joseph Airey,
	Amsterdam	28	3	11	Airey Cookson and Company
	New York	9	2	9	Robert Carrick
	Dort	4	2	2	Joseph Airey
	Drontheim	36	wine glasses		Thomas Waters
1750	New York	67	0	0	John Cookson
	Rotterdam	64	3	3	{ Joseph Airey, Airey Cookson & Company, Thomas Bates John Cookson, A.C. & Co. Thomas Airey John Williams
		26	glass lamps		
	Hambro ^o	6	2	18	
	Dort	3	0	0	
	Christiansand	20	doz. drinking glasses		
1780	Amsterdam	173	3	22	{ Charles Williams, A.C. & Co.
	Rotterdam	118	2	0	{ Charles Williams A.C. & Co.
	Guernesey	17	0	24	George Dickinson C. Williams
	Hambro ^o	12	0	0	John Cookson, William Row
	New York	6	0	0	Thomas Scarth
	Lingsound	0	1	0	An alien merchant
	Frederickstalle	0	1	0	Hindmarsh & Co.
1790	Rotterdam	294	0	0	Airey Cookson & Co.
	Amsterdam	100	0	0	{ The Northumberland Glass Co., Walter Trevelyan & Co.
	Hambro ^o	138	0	0	
	Copenhagen	17	0	0	
	Nossingen	4	0	0	Hindmarsh & Co.
	Elsinore	22	0	0	W. Trevelyan, Thos. Robinson
	Guernsey	0	22	0	Cookson, Deer & Blackett
	Jamaica	6	0	0	Walter Trevelyan

(cont.)

Figure 15 : (Continued)

<u>Year</u>	<u>Destination</u>	<u>Quantity or weight shipped</u>	<u>Exporter</u>
<u>Exports from Sunderland</u>			
1770	Amsterdam	45 casks, 3 boxes	John Hopton

Sources: PRO E190/ 235/6: 242/15: 245/1: 249/2: 250/8: 279/5: 289/4.

These figures are only taken from sample years and are intended only to give a general indication of the geographical range of the export trade from the Tyne. The port books between c. 1755 and c. 1775 do not distinguish between flint and crown glass.

* * * * *

The capital for this Glasgow venture was almost certainly provided in part by John Cookson and there seems to be no obvious explanation for his sudden interest in flint glass beyond the possibility that he felt it to be a branch of the glass industry whose potential, at least in the provinces, had not as yet been realised.

Airey, Cookson & Co. proved more durable than the Verreville partnership. It continued until 1803 and export figures bear witness to the boost to the local industry to which it gave rise. The Williams' house however was not so long lived and ceased production in 1782 after the whole building had been destroyed by fire.¹⁶ This particular house appears to have been extremely susceptible to fire and had previously suffered damage in 1760 and 1764.¹⁷ The house does not appear to have been rebuilt as a flint glass house after the 1782 fire, although it is possible that it was absorbed into Cookson's Closegate bottleworks.

Cookson's new investment in the flint glass industry on the Tyne was slightly predated by the building of the "New Glass House" on the Wear by John Hopton in 1769. During 1769 Hopton advertised a reward for the conviction of those "ill disposed persons stealing timber work on the arches of the new glass house now building near Sunderland",

and by September he was able to advertise "all sorts of Double flint glass, white enamel, fine blue and green glass, etc." for sale.¹⁸

Nothing certain is known about John Hopton but it has been suggested that he was previously a partner in a London flint glass manufactory.¹⁹ If that was the case then his move to Sunderland was a most interesting one and a clear suggestion that by the 1770s the advantage of the north-east's low manufacturing costs were beginning to become apparent. Despite evidence of a growing export trade to Amsterdam (see Fig.15) Hopton's venture did not last. In 1775 Sir John Delaval was informed that Hopton had come to his bottle works seeking to exchange a large quantity of ashes for bottles.²⁰ The house was certainly dormant by 1781 for in that year William Allen reported to Delaval that he had heard some men were taking over Hopton's house but later found that the rumour was unfounded.²¹ The house was eventually sold to Hilkiah Hall and converted to a bottle house.

There was no further activity in the local flint glass industry until the mid 1780s which saw the establishment of two new flint glass houses on the Tyne, one successful the other not. The unsuccessful house was built on the south shore of the Tyne at the Saltmeadows near Gateshead by Joshua Henzell, John Grey and Richard Shortridge who petitioned the Common Council in September 1785 saying that they were "desirous of establishing a manufacture of flint glass and other types of glass ware" and asking for a lease of a parcel of land in the Saltmeadows which they thought would be most suitable. They were granted a 21 year lease and the house was erected. By the time it was able to advertise goods for sale ("all kinds of flint glass and phials, at the customary prices and usual discounts for prompt payment")²² the partners

also included James King and son, and the house therefore became a casualty of King's and Henzell's bankruptcy in 1786. In 1787 Joshua Henzell's five sixteenths' shares in the house, consisting of working utensils and large stock of manufactured goods, was offered for sale by auction.²³ James King's share was probably the three sixteenths of the stock and utensils offered for sale in July 1786.²⁴ The remaining partners do not appear to have continued to occupy the house which in 1791 passed to three London merchants, creditors of Joshua Henzell,²⁵ and the site eventually became a part of Hawks, Crawshay & Co's iron works. The remaining partners, Richard Turner Shortridge and John Grey, did however continue as flint glass manufacturers. In 1791 a new flint glass house was erected at South Shields by R.T. Shortridge on land leased from the Dean and Chapter of Durham. This house appears to have been the sole property of R.T. Shortridge but it seems probable that John Grey, who on his death in 1796 was described as a flint glass manufacturer, continued in partnership with him. R.T. Shortridge was a Stockton man by birth and possibly, like James King, a Quaker.

The other flint glass^{house} that was established in the mid 1780s was the more successful Northumberland Glass House. As its name suggests it was owned by the same company which in 1791 erected the large crown glass works at Lemington. The single flint glass house was situated quite separately in the Close in Newcastle and, as it is listed in the 1787 Newcastle Directory, appears slightly to predate the larger Lemington works. The managing agent named in the 1787 directory was John Dyson who became a partner in the 1791 company. Dyson possibly had some connection with the lead trade for when he quit the glass house in 1802 it was in order to become a white lead merchant in York.

Unlike the existing glass houses in the Close, the Northumberland Glass House was within the town walls. The property, which bordered on the town's Mansion House, had previously been a dwelling house owned by the Peareth family.²⁶ Perhaps inevitably emissions of smoke from the house created a public nuisance and in 1797 the Company was indicted in the local assizes on this account but reprieved when it promised to raise the cone of its glass house a little higher and make other alterations in order to render the house as little offensive as possible.²⁷ By the 1790s the Close had become the clear centre of the Newcastle flint glass industry housing not only the two glass houses but, according to the 1796 directory, three independent cutters and engravers: Thomas Alexander, Edward Jackson and Robert Hudson.

2. 1800 - 1850

The first quarter of the nineteenth century was a period of growth for the flint glass industry, as indeed it was for all branches of the glass industry in the north-east. By 1825, in addition to the three older houses at Newcastle and South Shields, three new houses at Gateshead were in operation plus new singlehouses at Sunderland, North Shields and Carr Hill near Gateshead. This growth was in large part a consequence of the industry's emancipation from a purely local demand. Although there is evidence that London flint glass continued to be offered for sale in Newcastle,²⁸ there is no doubt that the products of the local houses were also being shipped for sale in London and other parts of the country.

Two reasons could be put forward for this extension of the north-east houses' market. Firstly the expansion of the market for cheap glass goods, and secondly the improvement in the quality of provincial glass which made it well able to stand comparison with London glass. The first reason is perhaps the most important of these. The north-east, with its cheap manufacturing costs, reaped the full benefit from the increasing use of flint glass not as a luxury but as ordinary household ware. The north-east was particularly well suited to the production of "tale goods", or goods which were sold by the dozen rather than by the pound weight, such as ordinary plain glasses or phials and small medicine bottles.²⁹

The corollary of the increase in the number of provincial glass houses was the decline of those in London. By 1833 there were only two flint glass houses left in London and both of those, belonging to Apsley Pellatt and William Holmes, were establishments of great prestige

producing high quality and expensive goods. The banishment of the coarse manufacturers from London was something that was frequently blamed on the effects of the excise,³⁰ but there is no doubt that at root it was simply a consequence of the difference in costs between London and the provinces.

Coal was, of course, significantly cheaper at Newcastle than at London and so was another expensive ingredient, lead. The proportion of lead (or litharge) used in the flint glass batch varied according to the quality of glass that was required: for particularly fine quality glass it could be as high as 40% but 17% - 33% was more usual for ordinary glass. A recipe for flint glass was included in a patent taken out by the Gateshead glass manufacturer, Joseph Price, in 1814:³¹

420 lbs. Lynn sand
280 lbs. Litharge
147 lbs. Pearl ash
14 lbs. Nitre
336 lbs. Cullet
 $\frac{3}{4}$ lbs. Manganese.

This appears to be a typical recipe for a reasonably good quality glass.

It would perhaps be a mistake to over emphasise the association of the north-east houses with cheap ordinary glass for there is no doubt that they also produced expensive, highly decorated glass. The second reason for the growth of the industry in the early years of the nineteenth century was the almost certain improvement in the quality of provincial glass and particularly in its decoration. A major component of this improvement was the adoption of steam power for glass cutting machinery which put the major decorative technique of the period within the capability of the ordinary glass house and the ordinary glass worker. By 1825 most of the leading north-east houses possessed machinery for cutting: when the Wear glass house was put up for sale in 1822 it possessed a

6 hp engine and machinery for twenty cutters;³² in 1819 the North Shields glass house invited proposals for erecting a 4 hp engine and apparatus for turning glass cutters' wheels, when it was put up for sale in 1821 it included an "excellent steam engine and apparatus for 24 cutters"³³; the Skinnerburn glass house, put up for sale in 1819 included machinery for cutting glass:³⁴ in 1832 a glass cutter at Carr Hill was killed whilst oiling the 14 hp engine.³⁵ Cutting was done at the factory and the list of employees of the Northumberland Glass Company in the 1842 illustrates the size of the cutting department as compared to the rest of the works:³⁶

25 glass makers over 18
16 " " under 18
22 glass cutters over 18
2 " " under 18
13 men variously employed
2 women variously employed
5 clerks and agents.

The cutters worked continuously from 6 am to 7 pm and, like the glass makers, were paid a basic wage for an agreed quantity of work plus overwork for the rest. Engraving was done at the factory but it was also practised by independent engravers who worked to commission. Robert Hudson was the chief among these in Newcastle, by 1800 he was fully established as a "cut glass manufacturer" and advertised "coats of arms, crests, cyphers or any other devices engraved on flint glass in the neatest manner".³⁷ In Sunderland independent engravers such as Robert Pyle and Robert Haddock were also at work in the town.³⁸

A memorable illustration of the skilled and high quality work that the local glass houses were capable of producing can be found in the description of the glass makers' procession of 1823.³⁹ The workers of the five leading houses, (the Northumberland house, the Wear house, the South Shields house, New Stourbridge and the Durham glass works) organised, at the expense of the masters, a large procession in order

to see who could produce "the most curious and best piece of workmanship". They walked through Newcastle and Gateshead holding their creations which, besides ornately cut and decorated goblets, decanters, salvers and ordinary table ware, included glass trumpets, bird cages, top hats, a glass fort complete with cannon, a curious tube that by the action of different fluids represented the circulation of blood in the human body, and a large model of a glass house.

Despite the advantages of the north-east which favoured the growth of the local industry in the early nineteenth century, the local manufacturers did not escape the difficulties that were so apparent by the time of the 1835 Commission. By this time the local industry showed some signs of decline and R.T. Shortridge told the Commission that there were only five houses in work in the area as compared to seven previously. This decline in numbers was put down largely to the effects of fraudulent competition the interference of the excise regulations and the insufficiency of the drawback of duty on export.

(i) Newcastle, North and South Shields

By the early nineteenth century flint glass was firmly established in Newcastle as a local industry of which the town could be proud. According to the Reverend Baillie, writing in 1801, the Closegate glass houses were one of the sights of the town:⁴⁰

Viewing the glass warehouses in the Close, the eye is struck in beholding vast piles and arrangements of beautiful vases of crystal or white glass, lustres etc. The artists who have served their apprenticeships at this business earn two or three guineas a week with ease.

This enthusiastic view of the flint glass trade was not however shared by the partners in Airey, Cookson & Co. who dissolved the company in 1803. In April 1803 5/30ths of the partnership was advertised for sale, in May

a further 15/30ths was advertised for sale, and in September it was announced that the works was to be carried on from henceforth by William Wilson & Company.⁴¹ Wilson was the previous managing partner and by the time of the end of the partnership in 1819 his partners included Thomas Hopper, Francis Innes and the executors of the late William Ellison.⁴² By 1819 the firm occupied a completely new glass house at the Skinnerburn to which they had moved in 1811.⁴³ The old Closegate house was put up for sale by Isaac Cookson but without apparent success although it is possible that it was taken over by Joseph Price in the late 1820s. On the dissolution of William Wilson & Co. the Skinnerburn House was put up for sale and was eventually taken over by the Northumberland Glass Company.

The Northumberland Glass Company was one of the few firms to remain in the hands of the same partnership throughout the first half of the century. It did however change glass houses after the original house in the Close suffered a disastrous fire in 1821. The fire destroyed the working area, the warehouse and £10,000 worth of stock. This was not in the least covered by the £1,800 insurance taken out on the property.⁴⁴ Only the cone was left standing and immediately after the fire Joseph Lamb considered giving up the flint glass trade altogether. He was encouraged to do so by his friend John Bowes Wright:⁴⁵

With respect to one subject mentioned by you (viz) that you think of abandoning the flint trade, it is the firm and matured opinion of both Humble and myself that you ought to do so without hesitation. The crown glass and your other numerous avocations will be ample employment for you and you will sieze an excellent opportunity to rid yourself of a constant and vexatious tie to a petty concern.

Lamb did not act on this advice and the trade was resumed at the recently vacated Skinnerburn house of William Wilson. This was a far more appropriate location for a glass house in view of the permanent risk of fire.

The Northumberland Company remained at the Skinnerburn. In 1844 it was taken over by J.G. Dodd, who, like William Wilson, had previously been the manager of the house.

A price list from the Northumberland Glass Company exists which gives us a comprehensive picture of the type of goods it produced and their prices.⁴⁶ The house produced goods in five types of glass, the basic prices of which were:

	<u>per lb.</u>
All plain flint glass	1s 4d
Strong flint glass for cutting	1s 6d
Common green glass	1s 0d
Best green glass	1s 6d
Best blue glass	1s 4d

Common green glass was a pale greenish clear glass, coloured only by the presence of impurities in the raw materials. Best green glass was a deep green colour produced by the addition of copper scales to the metal. Best blue glass was also a deep colour and was produced by the addition of oxide of cobalt. Articles were variously priced at these prices or above according to the degree of skill necessary for their production: for instance, deep blue and green decanters with two or three rings cost 1s 8d per lb; pitchers with coloured edges cost 1s 9d per lb.; candlesticks with square feet cost 2s 0d per lb. Most expensive of all were those articles which demanded faultless glass: prisms cost 2s 6d per lb., and thermometer tubes 4s 0d per lb. In addition the price list contains a large proportion of table goods which were priced by the dozen; or for smaller articles by the gross. Table wine glasses cost 4s 0d per dozen, table pint beakers 8s 0d per dozen and common flint ink wells 24s 0d per gross. The list also includes a number of small phials named after the medicine they contained: Turlingtons (cello shaped bottles used for "Turlington's Balsalm of Life") sold at 24s 0d per gross, and Daffys (used

for "True Daffy's Elixir") at 30s Od to 40s Od per gross depending on their size.⁴⁷

R.T. Shortridge's house at South Shields also remained in the hands of the same company until 1840s. Shortridge's partners in the flint glass house do not appear to have been the same men as those he took as partners in the crown house. In 1817 the flint glass house was put up for sale⁴⁸, possibly on the death of R.T. Shortridge, but was carried on by his son in partnership with G.E. Sawyer and Edward Walker. By 1833 Walker had been replaced by Charles Henry Cook.⁴⁹ The house appears to have continued in production without any major upsets apart from the loss of several workmen in 1810 after they had been "seduced" into going to the United States by one William Richmond, a Dumbarton glass maker who had emigrated to America and had been sent back to England deliberately to poach hands.⁵⁰

In 1814 two new flint glass firms were established on the Tyne, one at Newcastle and one at North Shields. Both of these firms were short lived and both met ignominious ends as guilty defendants in an excise prosecution. The establishment of two new flint glass houses in 1814 is at first quite surprising since 1814 was only two years after the introduction of the double duties which, according to most flint glass manufacturers, had had a disastrous effect on the trade. In these two cases however it appears that the disadvantages of the double duties were outweighed by the advantages of the system of assessment also introduced in 1812. This system provided that the duty on the glass was assessed by the weight of the manufactured goods rather than the weight of the materials before manufacture. It had been welcomed by the manufacturers but not by the Board of Excise which saw it as providing too many opportunities for

fraud. Both these cases served to justify the Board of Excise's fears for both appear to have been deliberate attempts to defraud the revenue by means of the new system of assessment.

In June 1815 John Bell and Mr. Carnes, flint glass manufacturers of Newcastle, were tried in the Exchequer on charges of not providing a secure weighing room and removing glass.⁵¹ The prosecution's case was straightforward. The officer of the Excise had seen candlelight in the weighing room at a time when it was supposed to be locked and on investigating further found a secret panel in the door to the room that could be removed in order to permit entry. The door was exhibited in court and agreed to be a piece of villainous invention. On the same day an identical case was heard against James Turnbull a flint glass manufacturer of North Shields.⁵² Turnbull had commenced manufacturing on 8 December 1814 and his foreman, Benjamin Wilcox, had come to him from Bell and Carnes in Newcastle. The excise officer had become suspicious about the amounts of glass being charged with duty and on examining the door to Turnbull's weighing room found a secret panel identical to that found at Bell and Carnes. Both cases were undefended and in both cases a verdict was found for the crown.

Bell and Carnes appear to have given up manufacturing quite soon after their prosecution. In January 1817 the "newly erected glass house at East Ballast Hills late in the occupation of Messers John Bell and Co." was advertised for sale.⁵³ James Turnbull carried on but in December 1815 was prosecuted again.⁵⁴ This was a rather more complicated fraud but basically Turnbull had devised a method of concealing whole trays of goods in the hear thus preventing them ever reaching the weighing room; a fraud to which his workmen were party. Again there was no defence and

Turnbull was fined £600. In August 1816 his manufactory was put up for sale "by order of a writ of venditioni exponas",⁵⁵ along with a large quantity of manufactured goods (decanter, chandeliers, smoke shades, tumblers, salts, pepper castors, goblets, cut glass bowls etc.) and materials (Lynn sand, emery, cullet, manganese, pearl ash etc.). Turnbull was also the subject of an extent-in-aid.⁵⁶

The North Shields glass house was sold to a company headed by George Burrell, a Tynemouth ship owner, who renamed the works the Tyne Flint Glass Works. The main improvement Burrell introduced was a steam engine to power the cutting machinery (see p. 293). Following Burrell's death in 1821 the works was advertised for sale without success.⁵⁷ In 1826 the premises were taken over by Tyzack Dobinson and Co., manufacturers of cables.

(ii) Sunderland

Although the manufacture of flat glass and bottles became firmly established at Sunderland during this period, the same was not true of flint glass. The only flint glass works in operation on the Wear until the 1840s was the Wear Flint Glass Works which was situated at Deptford on the south bank of the river. The works remained in production until 1843 but the available details of its history suggest strongly that it was not the stable concern that it appeared to be.⁵⁸ At least six different partnerships attempted to run the works during its existence and none appear to have been able to produce sufficient profits to enable the works to operate relatively independently and without regular injections of new capital through new partners. Indeed it is certainly possible that the works would not have survived at all had it not been owned by the White family which was able to support the works when needed with short term loans

or extra capital; had the works' owners been less comfortably off it is probable that the works variable profits and large expense would have caused its closure at an earlier date.

The original company was founded by John White c. 1805 in partnership with C.T. Thornhill and Andrew Young. White (1764 - 1830) was a wealthy ship owner, land owner, and proprietor of Bishopwearmouth iron works. He was also a Wesleyan as was Andrew Young who was connected to White by marriage. Young was a ships' chandler. C.T. Thornhill was a merchant of Antigua and the heir of a wealthy Sunderland coal fitter and land owner. Two further partners were admitted (as managing partners), Joseph Tuer and William Formain (previously of the new Stourbridge house at Gateshead, see below) who left in March 1816.⁵⁹ The subsequent partnership (in which White and Young owned six sixteenth shares each and Tuer the remaining four) was dissolved in 1822 when Tuer left to go to a pottery in Newcastle. Stock accounts for the company reveal its declining fortunes: in 1818 when White calculated his share to amount to £4,000 but by 1821 it had declined to £2,500. Unsurprisingly the works was put up for sale and was described as consisting of one glass house with an eight pot furnace, a six horse power engine, two lears, twenty eight workmen's cottages and a manager's house.⁶⁰

Lack of purchasers forced White and Young to continue but a new capital of £7,200 was advanced between them, and a new manager, Edward Leadbitter, who had previously been at the Carr Hill Glass House (see below), was appointed. New investment was made in cutting machinery and by 1824 the works included an eight horse power condensing engine with machinery for twenty cutters (this was valued at £800 in 1824 although it had cost £1,245). This appears to have been a reasonably prosperous

period for the glass works. White and Young were certainly helped by the commission of a large glass 200 piece dinner service from the Marquis of Londonderry in 1824.⁶¹ In 1827 the Duke of Wellington visited the works which can also perhaps be taken as evidence of the works prosperity and reputation.⁶² Nevertheless the works was not sufficiently prosperous to persuade the families of White and Young to continue manufacturing. In 1830, on the death of Andrew Young and the ill health of John White, the works was put up for sale⁶³ and eventually taken by a partnership headed by William Booth and including John French (who was later to become manager of Sowerby's glass house at Gateshead), Thomas Turnbull, William Wilkinson and William Ferry. In 1832 Turnbull quit to go to the Carr Hill glass house (see below) and a new partnership was formed between Booth (holding 5/12ths), James Vint (5/12ths) and French (2/12ths).⁶⁴ Vint was another Wesleyan and, besides being the owner of a Sunderland newspaper The Herald, was also a retailing chemist which could in part explain his interest in a flint glass since phials and medicine bottles were a standard part of a flint glass house's production. The Wear house had certainly been manufacturing small mustard bottles in 1812 when White and Young petitioned the Treasury over the export of bottles filled with mustard.⁶⁵ This partnership was equally short lived and in 1834 it was found necessary to raise new capital by introducing new partners. These new partners were the two sons of John White, Andrew and Richard White, who besides buying two shares from Vint agreed to advance the company a further £3,500 at £5% interest. They also agreed to reduce the rent of the works from £260 to £240 per annum. In addition all partners were to advance a further £500 each bringing the total new capital advanced to £4,000. This was almost certainly used to erect a second glass house which was completed in March 1836.⁶⁶

Despite a fire in 1839 which destroyed £2,000 worth of the property but which left the working area unaffected, Booth continued to occupy the house until 1834 when it was put up for sale "by order of the mortgagee".⁶⁷ Booth was undoubtedly a victim of the general depression that afflicted the flint glass trade during the late 1830s and early 1840s but his departure from the trade may have been accelerated by his prosecution in the American courts in 1840 for invoicing . . . goods at a false valuation.⁶⁸ In 1840 Booth shipped a cargo of goods to Barclay and Livingstone of New York but the articles were seized by the American Customs service on the grounds that they were valued at a lower price than their real worth; the valuation was important in that the goods were subject to an ad valorem import duty. The differences between Booth's valuations and those settled on by the New York Customs were indeed quite considerable:

	<u>Invoice price</u>	<u>Customs Valuation</u>
tumblers	1s 9d per doz.	3s 6d per doz.
decanters	4d per lb.	10d per lb.
wine glasses	1s 3d per doz.	3s 0d per doz.
hooks	2s 0d per doz	3s 6d per doz.
finger basins	5d per lb.	10d per lb.

Booth defended himself on the grounds that the New York Customs were valuing the goods according to what they would fetch in the British market. The American price, he insisted, was the home value minus the drawback and free of freight, which was customary when the customer was a large buyer. He maintained that the prosecution had been got up by American manufacturing interests in order to protect their home market. Whatever the motives of the prosecution Booth lost the case and was not granted an appeal for a re-trial. It should perhaps be noted that according to Joseph Price, giving evidence to the 1835 Commission, the American import duty was indeed payable on the British value:

There is a great deal of up-hill work now in getting goods into the foreign market; we cannot go into the American market without paying on plain or uncut glass a penny a pound, and twenty per cent ad valorem on the value here; there are freight, insurance, commission consular certificates bond and debenture etc. to be paid then on cut glass they charge three halfpence a pound and thirty per cent on the value here.

Despite the reduction of the flint glass duty in 1841 and 1844 plus the abolition of the glass duties in 1845, the Wear Flint Glass Works remained unsold and was eventually absorbed into the neighbouring Deptford Bottle Works.

Gateshead

Perhaps the most impressive growth of the flint glass industry during this period was its growth at Gateshead where three new houses were established in the first decade of the nineteenth century. There seems to be no obvious explanation for this sudden growth on the south bank of the Tyne. The first house was that of Atkinson and Wailes in Pipewellgate. Exactly when it was founded is not known but in 1805 the partnership of Thomas Wailes, John Atkinson, James Seager and William Formain was dissolved when Formain left to go to the Wear glass house.⁶⁹ The Gateshead glass house was carried on by the first three partners. Thomas Wailes of Newcastle was the receiver of Greenwich Hospital⁷⁰ and the brother in law of John Atkinson of Heworth Shore. This partnership probably came to an end c. 1811 from which date the house was carried on by James Seager alone. Seager's occupation came to an abrupt end in 1814 when he was prosecuted in the Exchequer for an offence committed the previous year and fined £600.⁷¹ Seager vehemently denied the charges which, judging from the account of the case, do indeed appear to have been based only on circumstantial evidence (see the excise chapter for an account of the case). Seager was found guilty and forced to quit the trade as a result; during the case he was described as "a manufacturer

not advanced far in the world". In July 1814 the Union flint glass house in Pipewellgate was put up for sale along with "good quality ware" and materials.⁷² The house appears to have been taken over by Joseph Price, owner of the neighbouring flint glass house, on lease from Thomas Wailes; in 1839 a glass house in the occupation of Joseph Price but the property of George Wailes, eldest son of Thomas Wailes, was advertised to let.⁷³

Thomas Wailes' second son was William Wailes, one of ^{Newcastle's} most celebrated Victorian stained glass manufacturers. In view of the family's connection with a glass house and Joseph Price's production of stained and painted glass (see below) it seems more than probable that William Wailes was connected in some way with the Pipewellgate glass house in his early years - perhaps being employed by Price as a glass painter or colour mixer. When Wailes went into business on his own in February 1836 it was quite clear that he had already had experience of the craft:⁷⁴

William Wailes, having studied the science of glass staining and enamelling for some years has now commenced the practice professionally at his premises in Mosely Street. William Wailes considers that the high prices hitherto paid have almost acted as a prohibition and is therefore determined to execute works committed to his care, though necessarily rather expensive from the costliness of the colouring materials and the tediousness and risk in the process, at such a price as shall offer an inducement for the more general introduction of what has always been considered the most gorgeous appendage of buildings - a profusion of stained glass.

← Wailes' reputation grew rapidly, thanks no doubt to his employment
← by Pugin to execute some of his earlier designs in stained glass.⁷⁵

Joseph Price was the most interesting of all the Gateshead flint glass manufacturers. He was an inventive and imaginative man who was involved in a number of other projects besides his glass works:- he invented a steam powered river tug, a gas apparatus and an improvement in railway carriages.⁷⁶ His fertile mind is certainly evident in his career as a glass manufacturer for he produced a far wider range of goods than any of his rivals. Besides

ordinary table ware Price produced lighting and illuminating apparatus, coloured enamelled and stained glass, glass steam tubes for boilers, optical glass, a patented kind of obscured glass and his unpatented but unique "Imperial Sheet Glass". Like Atkinson and Wailes, Price's glass house was in Pipewellgate, and was known as the Durham Glass House. Price probably commenced manufacturing c. 1809 and in 1810 opened a shop in Dean Street Newcastle from which to sell his products.⁷⁷ The shop was short lived and closed in 1811 selling off cheap its stock of girandoles, candlesticks in Grecian patterns and a variety of other goods.⁷⁸ Price's personal history is not in the least complete but he was certainly a local man and had previously been a wine and spirit merchant.⁷⁹ His enterprise in glass appears to have been largely self financed and the only indication of any partnership is a partnership between Price and Thomas Arbuckle as "The British Flint Glass Co." which lasted from c. 1825 to 1832. Price than took his son in law William de Pledge into the business and the works occasionally traded as Price and de Pledge.

Lamps, illuminating and coloured glass appear to have been always an important part of Price's production. In 1818 Price announced that he had engaged several artists and could supply painted or stained glass for churches, black glass for blank windows, bent glass for shop windows with coats of arms, designs or figures painted on them.⁸⁰ In 1821 he advertised that he had 100,000 dozen coronation illuminating lamps ready to be sent out to any part, complete with burners, in flint, green, blue, purple or amber coloured glass.⁸¹ His patent of 1814⁸² was for a kind of obscured glass made by blowing a gather of flint glass with a gather of white enamelled glass within it so that the glass would transmit light without being transparent. Price was also active in the production of optical glass and in 1830 and 1840 petitioned the Treasury asking for allowances in

order to manufacture optical glass (see the excise chapter).

Price's optical glass was manufactured from what he grandly named "Imperial Sheet Glass" which was basically flint glass blown in a cylinder and flattened. In 1835 Price and de Pledge petitioned the Treasury on the subject⁸³ after an order from the United States had been prevented from being shipped because the excise export officer had suspected the Imperial sheet glass of being crown glass fraudulently claiming a flint glass drawback. According to Price and de Pledge the glass was flint glass "flatted by us in a peculiar way yet unknown to the trade" and because it was quite void of colour, whereas crown and sheet glass had a bluish or greenish cast, was used for more costly purposes such as framing pictures and spectacle eyes; it was also coloured or stained for use in stained glass windows. This type of flint glass was also mentioned by Shortridge and Hawks to the 1835 Commission although named by them as "British Sheet Glass". They maintained that because it was so costly and difficult to manufacture it would never become a serious rival to crown or sheet glass, even if the duty on flint glass was removed.

There is no doubt that Joseph Price was successful. In 1822 he employed 130 men,⁸⁴ and in 1839 - 139, which was said to be a decline from previous years.⁸⁵ In 1832 he was working a third glass house in Newcastle which was possibly the old Closegate house. Price was also a public spirited man. In 1821 he donated a stained glass window to the new Lying In Hospital in Newcastle⁸⁶ and in 1847 donated a massive and beautifully cut six sided bottle to be placed in the foundation stone of the Gateshead Mechanics Institute as a "brilliant memorial to posterity of the local manufactures of our time".⁸⁷ Price continued to occupy the

two glass houses in Pipewellgate until 1846 when they were both, one a twelve pot furnace and the other a smaller seven pot furnace, put up for sale.⁸⁸ With no buyers coming forward, Price was forced to continue until his death in 1852. In 1850 when the chimney from one of the houses collapsed killing two men he was still taking an active part in the business.⁸⁹

The third of the Gateshead glass houses was established c. 1808 by a partnership headed by John Robertson. It was almost certainly the premises insured by Joseph Willis & Co. in 1808 with the Sun Fire Insurance Company and described as "buildings on the pot house quay Gateshead, unfinished but intended for a flint glass house".⁹⁰ The first partnership, which was dissolved in 1809, consisted of Joseph Willis, John Robertson, James Seager, Thomas Thompson, Richard Sowerby, Hindmarsh Thomson and William Birkinshore.⁹¹ Seager left in 1809 and the other partners continued as John Robertson and Company until 1812. The company's glass house was built on land leased from Cuthbert Ellison at the far west end of Pipewellgate. It was named by the company the "New Stourbridge" glass house, no doubt to match the "New Deptford" and "New Greenwich" works on the other side of Gateshead.

Robertson and Co. came to an end in 1812 following the prosecution of the company by the Board of Excise in December 1811.⁹² The offences had taken place in January 1810 and had been discovered when an officer entered the house suddenly and found men working glass from an unstopped pot. The manufacturers attempted to give this a plausible explanation by saying that the pot had suddenly cracked and they had sent off a little boy to notify the officer that they were going to unstop the pot in order to save the metal. The officer had not met a little boy and on gauging the pot, with the help of the two clerks Mr. Thompson and Mr. Sowerby,

found 10 inches of metal missing and no crack in the pot. The following day the pot was found to be cracked and broken but the prosecution's case was cemented by the evidence of Robert Butler, the metal mixer, who swore that the pot had been cracked after the officer had left and cullet thrown into the teaze hole to make it appear the pot had leaked. The company was found guilty and soon after this was reformed by John Robertson, George Sowerby, Robert Hood (a rope manufacturer and brewer), and William Birkinshore.⁹³ The company again fell foul of the excise in 1814 when they were prosecuted again and fined £200.⁹⁴ As the company consented to a verdict for the crown the case was not tried and the charges not known. The offence could have been something as minor as altering the position of the glass in the lear pans after the pans had been filled. On the same day Joseph Price also consented to a verdict for the crown and was fined £200.

The owners of the New Stourbridge glass house were next prosecuted in December 1816.⁹⁵ By this time the owners were George Sowerby and John Lowry who were said to have entered into the house on the 18 February 1813. This prosecution was another instance where the charges were vehemently denied by the accused who, despite being found guilty, continued to protest their innocence (see the excise chapter). John Lowry left the partnership quite soon after this and the house was continued by George Sowerby in partnership with his brother Thomas and John Phillips who were already in business together as timber importers. Both the glass house and the timber trade must have been reasonably profitable for in 1831 the Sowerbys and Phillips felt able to take a lease of Waldrige colliery near Chester le Street.⁹⁶ This was perhaps a little too ambitious for it necessitated large borrowing of capital from the Backhouse bank.⁹⁷ In 1832 the partners mortgaged a leasehold estate in Cumberland to the bank

"to induce them to continue their dealings with Sowerby, Sowerby and Phillips". In November 1833 Waldrige Colliery was mortgaged to the bank for £30,000 at 5% interest. In April 1834 the New Stourbridge Glass works was mortgaged for £5,000 as "further inducement" to the bank: by this time the Backhouse's capital in the Sowerbys amounted to £35,000; after George Sowerby's death in 1845 the debt stood at £41,794. In November 1857 the Backhouse bank stopped payment and the following year the debt was discharged by realising the colliery. The glass house was never realised and in 1863 was granted to the executors of Thomas Sowerby and John Phillips by the executors of George Sowerby who had by this time transferred their glass manufacturing interests to new premises.

The New Stourbridge works appears to have been a reasonably healthy concern. In 1839 it employed 87 men. In February 1844 George Sowerby, with the permission of the Backhouse bank, transferred the whole property to his eldest son John who was to prove a highly successful glass manufacturer in the last half of the century.

The fourth and final glass house established at Gateshead was of a slightly later date. It was also quite unique in that it was the only glass house in the area not situated directly on a river. It was situated some miles from the Tyne on Gateshead Fell at the small village of Carr Hill. This lack of a river side position does not appear to have disadvantaged the glass house in any significant way since it continued in production until the 1890s. The advantage of a glass manufactory at Carr Hill was almost certainly the nearby flint mill which provided a basic siliceous material instead of fine river sand. The existence of a white sand ware pottery during the eighteenth century was probably also due to the availability of ground flint.⁹⁸ The first occupiers of the Carr Hill

glass house were probably John Coulson and Edward Leadbitter who went bankrupt in 1821.⁹⁹ Leadbitter became manager of the Wear glass works soon after this. In 1822 Carr Hill was taken over by George Stevenson, who had previously been manager to the Northumberland Glass Works, in partnership with his brothers Anthony and Joseph.¹⁰⁰ Stevenson continued in occupation until 1833 when it was taken over by William Ferry and Thomas Turnbull¹⁰¹ who had previously been partners with William Booth in the Wear Glass Works. In 1836 William Ferry and John Booth (whether he was any relation to William Booth is not known), carrying on business with Thomas Turnbull as Ferry & Co., were declared bankrupt.¹⁰² The house was then taken over by Swanston Coulson & Co,¹⁰³ and finally, in 1844, by James Angus. Angus was a flint glass and china merchant who followed up his purchase of the Carr Hill works with the purchase of the newly erected flint glass house at the Bill Quay bottle works. Neither of these enterprises lasted long and in 1852 the Carr Hill works passed to A. Elliot and Co. which was to occupy it until 1868. The rapid turnover of owners plus the fact that many of them were ex-managers of larger works is almost certainly a reflection of the comparatively modest size of the works which made it a suitable situation for a manufacturer whose finances were limited. The 1832 returns show the house to have had an extremely small production.

(iv) The 1840s

The 1840s was a decade of great change in the north-east flint glass industry. The two major aspects of this change, the establishment of new firms and the departure of old manufacturers from the trade, are both illustrated in a court hearing that took place in 1847 in order to determine the compensation to be paid to the owners of the North British Glass Works.¹⁰⁴ The North British Glass Works was one of the many new firms

that entered the glass trade on the wave of speculation that followed the repeal of the glass duties. It had originally intended to manufacture crown glass at its small glass house in Pipewellgate but soon turned to less ambitious undertaking of flint glass. The house came to an abrupt end when it became the subject of a compulsory purchase order and was removed in order to build the approaches to the High Level Bridge.

The owners of the works claimed £5,000 compensation from the assignees of the house; a sum calculated on the valuation of the stock and fixtures, £1,833, plus the expectation of £1,000 a year profit. The assignees on the other hand offered £493; calculated from interest at 12% on the £1,500 capital for the time the works lay idle, plus £500 removal expenses to another works for, as they pointed out, there was no shortage of vacant flint glass manufactories in the area. Richard Shortridge and Joseph Price were called to the hearing by the assignees, largely to corroborate their assertion that the £1,000 a year profit on which the other side based their claim was a preposterous sum. Both Shortridge and Price had recently put their works up for sale and both gave their reasons for selling as poor profits. Their evidence turned the hearing into something of a lament for the past prosperity and present unremunerativeness of the flint glass trade. Shortridge stated that he had made his fortune in the glass trade but was unwilling to go forward with his works when they ceased to yield him a fair profit:

At present prices the flint glass trade would not yield common interest on capital because prices were falling before repeal and had since continued to fall and more. His friend Mr. Price and other manufacturers would be glad to get out of the trade. The reduction of prices was partly owing to the introduction of foreign goods but principally to increased competition at home.

It was put to Shortridge that he had recently quit his works because of a strike among his men, but he repeated that the root cause was falling profits.

The strike was for higher wages but he could not give these because his profits were so unsatisfactory. When he explained his position to his men they accepted it "but said they ^{were} obliged to strike. So he struck too and the works were closed". Similar sentiments were expressed by Joseph Price. He had been in the trade for 41 years and had made his fortune in glass but "those were his golden days, nothing was to be made now". He had also lost a fortune but not through glass, "by railways, collierys, by over-reaching and swindling".

Although both Shortridge's and Price's works were put up for sale following the repeal of the glass duties, neither found a buyer. Price decided to continue in the trade but Shortridge dismantled his works and sold the stock and fittings by auction in July 1847.¹⁰⁵ The glass house remained idle until 1860 when it was restarted by Edward Moore as a pressed glass manufactory. The compensation eventually paid to the North British Glass Works was £2,500 after it had been argued that although other flint glass works were vacant in the area they were all too expensive for a small company.

All of the other new flint glass houses erected in this decade appear to have been comparatively small concerns. In 1845 a new flint glass house was built at Oakes Place in Newcastle, next door to the North Elswick colliery. It was briefly occupied by Baker and Pallister but put up for sale in 1848 and advertised as a small six pot furnace, making only 60cwt. of goods per week and therefore suitable for a small capitalist.¹⁰⁶ The house was sold to the Wright brothers who had already established themselves in another new flint glass house built in 1845 at Regent St. near Forth Banks: this house was known as the Newcastle Flint Glass Works. Another new house had been erected in Newcastle following the reduction of the flint glass duties in 1841. This was at New Mills on Barrack Road

and was occupied until 1844 by Nicholson and Dixon, until 1850 by Jackson and Johnson, and until 1853 by Johnson and Selby. This also appears to have been a small house. One of the final owners, James Johnson, went bankrupt in 1853 and the bankruptcy hearing¹⁰⁷ makes it quite clear that he was not a wealthy man. The New Mills house appears to have been demolished soon after Johnson's bankruptcy. A new flint glass house was also built at the Bill Quay bottle works, perhaps to make the whole works more attractive to a potential buyer. The whole works was put up for sale in July 1848, The flint glass house plus the stock was bought in December by James Angus, largely, it seems in order to acquire the stock, and in June 1849 the flint glass apparatus, "the whole being nearly new having been only a very short time in use", was sold by auction.¹⁰⁸

The fifth new flint glass house built following the repeal, the Gateshead Flint Glass House, was like the others in that it was small. Its builder put it up for sale in June 1846 describing it as "moderate in size", with a six pot furnace capable of producing £200 worth of goods per week.¹⁰⁹ This house however deserves particular attention for it has the distinction of being the first flint glass house in England to be devoted entirely to the manufacture of pressed or stamped goods.

The beginning of the manufacture of pressed glass in the north-east must be counted as the most important development of the decade since during the later half of the century the north-east was to emerge as the centre of this particular branch of the glass industry. The establishment of pressed glass in the area can be credited to John Sowerby and his achievement must be seen as a substantial one for it was a pioneering move accomplished in the face of considerable opposition and quite independently from the other north-east manufacturers. Without Sowerby's initiative it is conceivable that pressed glass would never have been manufactured in the area

other than as a small subsidiary department in blown flint glass houses. It is also conceivable that Birmingham rather than the north-east would have emerged as the centre of pressed glass manufacture which by 1845 was quite strongly established in the Midlands. The Birmingham manufacturer Rice Harris, with the help of James Stevens a die sinker, was the first to explore the possibilities of pressed glass and Sowerby was only able to transplant the technique into the north-east with the help of Samuel Neville, a Birmingham glass house manager, Birmingham workmen, and the two sons of James Stevens as his mould makers.

The Gateshead Flint Glass House was taken over by Sowerby in November 1847 and converted to a pressed glass manufactory. According to Samuel Neville this was the first glass house in Great Britain to be devoted entirely to pressed glass, even in Birmingham it was only made in a subsidiary department of blown flint glass houses.¹¹⁰ This was also the case in the north-east where pressed glass machines were said to have been in operation at the Northumberland Glass Works, the Carr Hill glass works and the Newcastle Glass Works, for several years. The machine in use at the Gateshead Flint Glass House was said to have come from the recently closed North British Glass House. The technique of pressed glass had been known in England since the 1830s but it was not, as we shall see, until after the repeal of the glass duties that its potential was able to be fully realised.

Sowerby's first attempt at pressed glass manufacture was abortive, thanks solely to the opposition of the local Glass Blowers' Friendly Society which forced him to close the new house in March 1848 after only one year and four months in operation.¹¹¹ The glass blowers' opposition was not, they claimed, on account of the actual machinery used to manufacture the glass but the hours of work and methods of payment that Sowerby introduced.

Chief among their complaints was the fact that Sowerby paid his men by a fixed wage, 30 shillings per week, rather than by piece work which was customary in the blown flint glass houses. In December 1846 the committee of the Glass Blowers' Friendly Society wrote to the Gateshead Observer in reply to a report that their members had been molesting Sowerby's men. They accused Sowerby of reducing the price of labour and destroying jobs: he paid them 30 shillings a week whereas on piece work they could earn up to £2 a week, and he had halved the house's tiny workforce from twenty-four men to twelve. The charges were replied to by Samuel Neville, Sowerby's manager. Firstly he pointed out that as Mr. Sowerby's factory was entirely for pressed glass, the glass blowers' union had no business to be interfering in it. Secondly he maintained that 30 shillings per week was a fair and just wage considering that it was the machine, not the man, which was actually making the glass. Neville was supported on this last point by editorial comment from the newspaper which likened the introduction of pressed glass to the introduction of the printing press; how absurd, it said, to demand the same wage for printing a book as for copying it. The paper called on good sense to prevail particularly as Sowerby was not known as a hard master and as pressed glass held out such potential benefits for the British Flint glass industry which was increasingly hard pressed by foreign competition. The reply to this from the Glass Blowers' Friendly Society was slightly ^{more} moderate in tone. It repeated that the Society was not opposed to the principle of using machinery to manufacture glass, merely the method of payment and the hours of work; Sowerby had also instituted a working week of six twelve hour shifts.

The argument between the two sides came to a head with a case of breach of contract brought against one of Sowerby's workmen in January 1847.

The contract, dated 25 Noevember 1846, bound John Coulson (whether this was the Coulson who had previously been a partner in the Carr Hill works is not known) to John Sowerby to work at the pressed glass trade for thirty shillings per week taking twelve turns of six hours each. Coulson had broken this contract and absconded but only, he maintained, under duress from the glass blowers' union. The case turned into an argument as to whether the contract was a reasonable one or not. Both John French, the manager of Sowerby's blown glass house (previously a partner with Booth at the Wear Glass Works), and Samuel Neville, the manager of the pressed glass house, testified that thirty shillings was a fair weekly wage and compared well with the wages of a glass blower, particularly as wages could be earned whether glass was manufactured or not. Coulson was eventually found guilty but Sowerby asked the magistrates to use their power to discharge him from his contract "as he had no desire to enforce an agreement which, although voluntarily entered into, the defendant, through some influence or other, was now reluctant to fulfill".

The opposition of the local glass blowers' union was almost certainly a major cause of Sowerby putting the Gateshead Flint Glass House up for sale in March 1848, particularly in view of the fact that when he restarted the manufacture of pressed glass on a large scale at his new Ellison St. glass works in 1852, he brought fifty workmen and their families from Birmingham in a special train to staff the new works.

CHAPTER FIVE: THE EXCISE ON GLASS, 1745 - 1845

There are two good reasons for looking at the excise on glass in some detail. Firstly, the effects of the tax on the industry were so extensive that it is difficult to come to any adequate conclusion about any aspect of the industry during the period 1745 - 1845 without being aware of, and taking into account, its context within the chronological framework of the development of the glass duty. Secondly, north east manufacturers played a decisive role in shaping the legislation surrounding the glass duty and this in itself is therefore one aspect of this particular study.

The first reason is perhaps the most important one. From 1745 to 1845 glass manufacturers were working in an artificial context where "natural" economic conditions did not exist and where all aspects of their activities were, to a greater or lesser degree, distorted by the existence of the tax. Without possessing some understanding of this artificial context it would be easy to draw quite misleading conclusions about certain aspects of the development of the glass industry during this period, particularly as the statistics which form the basis of our understanding of the industry's development originate from the excise. This much is, perhaps obvious since the effect of taxation on various other excised commodities has already been pointed out. What is perhaps less obvious is that the glass duties themselves underwent a considerable development during their existence and in order to look at the effects of the tax on the industry at any one point in time it is important to know exactly what glass legislation was in operation at that time: the glass excise of, say, 1750 was very different to the glass excise of 1830 since the former was a relatively simple tax, levied at a low rate, the latter was a dense and complicated body of legislation affecting almost every aspect

of production from the specific gravity of the glass to the length of time the glass should be left to be annealed.

Before looking at the effects of the glass tax on the industry then, it is necessary to devote some space to the development of the tax itself from 1745 to 1845. This is in many respects a more interesting subject than its effect on the industry for it touches on an important area of historical interest - the relationship between government and manufacturers. Three bodies of interest went into shaping the glass tax's development - firstly, the Treasury with its need for revenue, secondly the Board of Excise with its need for a workable system to manage, and thirdly the manufacturers with their need for a satisfactory economic context in which to work. It was the conflicts and compromises between these three bodies of interest that caused the glass tax to develop and diversify during the hundred years of its existence; to end up in 1845 with a very different character to what it had been in 1745.

Of these three bodies of interest, the Treasury interest was always the predominant one. The state's need for revenue over-rode all other needs, as both the Board of Excise and the manufacturers were well aware. Increases in the rates of duty coming from the Treasury were never directly challenged. The manufacturers accepted them without question so long as the increases were accompanied by protective measures against, for instance, foreign competition. The conflict and the compromise occurred for the most part in the relationship between the Board of Excise and the manufacturers. Although one might imagine that of the two the Board of Excise held the greater authority, this was not so. The Board was an arm of government but one that held very little power beyond the power to prosecute for actual statutory offences. Its job was essentially a

Figure 16: The Glass Legislation

1745 19 G2 c.12	Duty imposed
1777 17G3 c.39	Duty raised. Wastage allowance given.
1786 26 G3 c.77	Drawback regulations simplified
1787 27 G3 c.13	Excise laws consolidated.
1787 27 G3 c.28	Bounty added to the drawback.
1792 32 G3 c.40	Flint glass regulations
1794 34 G3 c.27	Duty and drawback raised on flint, plate and window glass
1795 35 G3 c.114	Duty on the manufactured goods for bottles
1803 43 G3 c.68	Duty raised
1805 45 G3 c.30	Duty raised by 50%
1806 46 G3 c.138	Irish countervailing duties
1809 49 G3 c.63	Duty on manufactured goods for window glass
1811 51 G3 c.69	Duty on manufactured goods for flint glass
1812 52 G3 c.77	Bounty re-introduced
1812 52 G3 c.94	Duties doubled
1814 54 G3 c.87	Duty on Irish window glass
1814 54 G3 c.96	Export regulations. Excise on imported bottles
1814 55 G3 c.7	Duty on Irish window glass repealed
1815 55 G3 c.113	Drawbacks altered
1816 56 G3 c.108	Drawback on unpolished plate glass reduced.
1818 58 G3 c.33	Allowance for plate glass altered
1819 59 G3 c.115	Duty on plate glass reduced
1825 6 G4 c.81	Licenses raised
1825 6 G4 c.117	Gauge re-introduced for flint glass and extended to Ireland.
1828 9 G4 c.48	Duty on Irish window glass
1832 2&3 W4 c.102	Flint glass duties altered
1835 5&6 W4 c.77	Flint glass duties reduced
1838 1&2 V c.44	Glass laws consolidated and amended
1839 2&3 V c.25	Broad glass defined
1840 3&4 V c.22	Broad glass duty raised
1844 7&8 V c.25	Flint glass duties reduced
1845	All glass duties repealed

Figure 17 : Rates of duty and drawback, 1745 - 1845.

Year	Plate	Flint	Crown and German sheet	Broad	Bottles
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Rates per cwt. unless otherwise stated. Drawback figures are in brackets.

1745	9s 4d (9s 4d)			2s 4d (2s 4d)	
1777	18s 8d (18s 8d)		14s 0d (14s 0d)	7s 0d (7s 0d)	3s 6d (3s 6d)
1779 } 1781 } 1783 }	//////////////////// Three 5% increases //////////////////////				
1787	(1s 5½d) (per sq. ft.)	21s 5½d (29s 0d)	16s 1½d (19s 10d)	8s 0½d (8s 1d)	4s 0½d (4s 0½d)
1794	(2s 2½d)	32s 1½d (43s 6d)	24s 2d (29s 9d)	8s 0½d (8s 1d)	4s 0½d (4s 0½d)
1803	(2s 2½d)	32s 8d (43s 6d)	24s 6d (29s 9d)	8s 2d (8s 1d)	4s 1d (4s 0½d)
1805	(3s 3½d)	49s 0d (65s 3d)	36s 9d (39s 7½d)	12s 3d (12s 7½d)	4s 1d (4s 0½d)
1809 } 1811 }	//////////////////// minor alterations to the crown, flint & broad duties////////////////////				
1812	(6s 6½d)	98s 0d (130s 6d)	73s 6d (89s 3d)	30s 0d (30s 0d)	8s 2d (8s 1d)
1815 } 1816 }	//////////////////// alterations to the crown and flint drawbacks////////////////////				
1819	60s 0d (2s 9d)	98s 0d (130s 6d)	73s 6d (89s 3d panes) (73s 6d tables)	30s 0d (30s 0d)	8s 2d (8s 1d)
1825	"	6d per lb (7d per lb)	"	"	"
1828	"	"	"	"	7s 0d (7s 0d)
1835	"	2d per lb	"	"	"
1840	"	"	"	73s 6d (73s 6d)	"
1841	"	1d per lb	"	"	"
1845	//////////////////// Duties repealed //////////////////////				

a mechanical one, that of ensuring that the amount of duty due to the government was actually received by the Treasury. It advised the Treasury on how best to secure the revenue but the Treasury was under no compulsion to accept its advice. Thus in contentious issues, where the law was not clear, or where new proposals were being made, both the manufacturers and the Board of Excise could appeal to the Treasury and if the Treasury decided that the interests of the revenue lay with the manufacturers then it was their wishes and not the Board's that won the day. The relationship between these three bodies underlies the whole development of the tax until the 1830s.

The second reason for looking at the glass duty in some detail is the role of the north-east manufacturers in shaping the legislation. Working from north-east sources and with these manufacturers in mind there is naturally a danger of over-estimating their influence. However, even making allowances for this, it is still arguable that compared to the manufacturers of Bristol, Stourbridge or Lancashire, the north-east manufacturers had the greatest voice of authority with the Treasury and the Board of Excise. That this was so was due in no small way to the fact that a substantial portion of the glass revenue came from the area. A further reason for the authority of the north-east men was that they could count in their ranks men of social importance and political influence: men such as Sir John Delaval and the various members of the Ridley family, who were both glass manufacturers and Members of Parliament. Although neither Delaval nor the Ridleys was possessed of great political power they were able to ease the channels of communication between the manufacturers and to open up certain channels that would not have been available without the help of personal influence. Personal influence was, of course, a common place of political life; the methods used by the

glass manufacturers differed in no great respect from those used by any other group seeking to influence Treasury opinion. However where Delaval and the Ridleys were especially important in comparison to those pressing other cases, was in the fact that they were manufacturers themselves with a positive financial commitment to the trade. Unlike, say, the salt trade, the glass trade could not rely on disinterested M.P.s to support it on theoretical or social grounds. Until the 1830s the glass duties were of very little interest to anyone outside the glass trade and glass manufacturing Members of Parliament were, therefore, invaluable. Delaval and the Ridleys appear to have been the only ones until the 1830s (by which time the major alterations in the tax had taken place) when Sir Matthew White Ridley was joined in the Commons by Thomas Hawkes of Dudley. The Ridleys and Delaval worked to protect the interests of the trade in general and not exclusively those of their fellow manufacturers in the north-east however it was to a certain extent inevitable that they should have reflected the opinions and desires of the trade in the north-east more than those of any other region.

1. 1745 - 1777

The tax on glass was introduced in 1745 by Pelham. Along with the raising of the duty on spirituous liquors it was a measure to help meet the cost of the War of the Right of Search and the suppression of the 1745 rebellion. The doctrine that lay behind the introduction of a tax on glass was the standard contemporary one that taxes should be levied on luxuries rather than the necessities of life. Glass was certainly categorised as a luxury and as such its taxation does not appear to have excited much opposition. Glass had already proved itself an eligible subject for taxation in that imported glass had borne a customs duty since 1690 and there had also been a tax on English glass for a short period during the 1690s. This duty had been introduced as a tax on a luxury and was repealed not because glass's luxury status was questioned but because of complaints from the manufacturers: its repeal was a measure for the relief of the manufacturer rather than the relief of the public. Despite the growth of production and consumption during the first half of the eighteenth century, by 1745 glass was still categorised as a luxury and thus a fit subject for taxation when financial pressure on the Treasury necessitated the opening up of new revenue sources.

A gesture was made, however, towards the obvious fact that certain types of poor quality glass were less of a luxury than others in that the Act of 1745 (19 G2 c12) divided glass into two categories and put appropriate rates of duty on each. "White glass" which was described as "crown, plate and flint" paid 9s 4d per cwt. (1d per lb.) whilst "green glass and bottles" paid 2s 4d per cwt. ($\frac{1}{4}$ d per lb.) Imported glass paid a customs duty at a far higher rate: 8d and 2d per lb. respectively. Other standard excise measures were introduced. Excise officers

had the power of entry into the premises at all times and were to make returns to the Board every six weeks (four weeks for London glasshouses) of the weight of materials used. Payment of the duty had to be within six weeks of entry for provincial glass houses and four weeks for those in London. A drawback of the duty could be claimed when the glass was exported.

The 1745 Act was a simple and straightforward piece of legislation. The regulations it contained were uncomplicated to the point of being crude compared to those in the later glass acts. The fact that it lasted 32 years without alteration could be seen as a memorial to the benefits of simplicity. It is more likely, however, that it survived without amendment because the rates of duty were low rather than because the simple system was a satisfactory one. Whilst the duty was low the faults in the system such as the lack of provision for wastage in the manufacture only amounted to a slight inconvenience. As the duty was increased so did the losses from these faults and the manufacturers began to demand that the system itself be altered. The uncomplicated nature of the 1745 Act led directly to the complicated legislation of the period 1777- 1811 because at root the system established in 1745 was an unsatisfactory one for glass. The two particularly unsatisfactory aspects of the system established in 1745, and which were both to give rise to a series of problems, were: firstly, the method of assessing the duty by a gauge; and secondly, the divisions between the various qualities of glass.

Gauging was a method that was used to assess the duty on a number of other excised commodities - beer and malt for instance - but it was not at all well suited to the glass manufacturing process. Although the duty was ostensibly on the glass itself, the 1745 act had directed that the amount payable was to be ascertained by the weight of the materials used

for making glass. The materials were either to be weighed before they were put into the melting pot or gauged when they were in a molten state in the pot. In practice gauging was always the method used but it created many practical problems for the glass manufacturer. Most importantly, once the metal had been gauged the manufacturer was prevented from making any of the alterations necessary to bring the fluxing metal to a perfect state. He was allowed to improve the metal by taking glass metal from the pot i.e. skimming off the impurities from the surface, but he was not allowed to add anything to the pot thus preventing him from adding manganese, extra cullet, arsenic or any other material that would cleanse or improve the texture of the metal. From the glass manufacturer's point of view gauging was also unfair in that between the gauging of the metal in the pots and the completion of the manufactured goods there was considerable wastage of glass therefore duty was paid on glass that was not eventually made up into goods. The gauge was a perennial subject of complaint from glass manufacturers throughout the eighteenth century. In March 1760 a petition of provincial glass makers (excluding those in the north-east) pleaded for a change in the method of assessing the duty; "that instead of the present method of collecting the duty on glass it may be laid on the saleable manufactured goods".¹ As we shall see the Board of Excise was eventually forced to adopt this method instead of the gauge but in 1760 it rejected it as being conducive to fraud and not wanted by the majority of glass makers,

The second unsatisfactory aspect of the system was the division of glass into different categories. Although the intention behind the introduction of categories was to reflect the real differences between different types of glass, the divisions introduced by the excise were necessarily artificial and frequently proved incapable of coping with

the infinite variety of glass able to be produced. The simple categories introduced by the 1745 Act - "white" and "green" - were soon proved inadequate (see below) and the following act of 1777 attempted to make the tax more realistic by introducing four categories instead of two. In many ways this increased the artificiality of the distinctions made by the excise and amplified the whole problem of how the various types of glass were to be defined. Under the 1777 act glass had to fall into one of four categories: plate, flint, crown, broad or bottle. Although apparently four distinct types of manufacture certain types of glass still presented a problem: what was the difference between blown plate and german sheet? when did a bottle become a phial? should a wine glass made from soda glass be charged as crown or flint glass? These were typical of the questions that the Board of Excise had to contend with right up to repeal.

The problems caused by the division of glass into different categories were shown up at an early date by an incident concerning broad glass, a type of glass that had not been mentioned in the 1745 Act. In July 1750 a petition was sent to the Treasury from the proprietors of the middle glass house in Newcastle (part of the Newcastle Broad^{and} Crown Glass Company) complaining of the arbitrary and unjust conduct of the Excise.² According to this petition the excise officers had charged broad glass as green glass for the first few years of the tax but in 1748 had declared it to be white glass and ordered it to pay the higher duty. The manufacturers maintained that the colour of the glass was no better than what had previously been deemed to be green and they had refused to pay the higher duty. However, as the Board of Excise had commenced a prosecution against them to recover the arrears of duty they now appealed to the Treasury to cause the prosecution to be stopped and

to fix the rate which the glass in question should pay. As was the usual practice the petition was sent to the Excise Board for its comments. It reported back to the Treasury that the glass was certainly of sufficient quality to bring it under the higher duty and if the Newcastle manufacturers were allowed to pay the lower duty on it then other manufacturers would follow suit and the Revenue be diminished. The Treasury appears to have sided with the Excise and broad glass was ordered to pay the white glass duty unless it was made of common bottle materials and obviously a coarse and green glass. Soon after this the Board of Excise began a consultation with the manufacturers with a view to bringing in an Act of Parliament to fix a "middle duty" of 5s 3d per cwt. on broad glass. This Act was never brought in for, as a Report to the Treasury from the Excise in 1758³ explained, the manufacturers suddenly withdrew from the discussions having discovered that they could avoid paying anything more than the green glass duty by appealing to the local justices:

The glass makers in and about Newcastle make a certain species of glass which is denominated Broad glass but is greatly superior - as good a quality and colour as some crown glass and judged to be crown glass by several glass makers and glaziers. We have always directed the officers to charge the crown glass duty but the glass makers in and about Newcastle always dispute the same laying their complaints before the justices to be relieved from the duty of crown glass alleging that the Broad glass ought to be charged with green glass duty whereupon the justices always determine in their favour so that the Traders in those parts are encouraged to continue these disputes the duty is not payable until six weeks after the charge or return is made. The traders take the opportunity of applying to the justices for their warrants to be discharged the duty on white glass before it becomes payable, whereby the Revenue is deprived of having the point determined in the Court of Exchequer.

This report underlined the Board of Excise's problem with definition for there was no statutory definition of "white glass" that they could fall back on to prove that the broad glass made in Newcastle was white. They based their case on something that had no backing in law, namely that the quality of the materials used defined the manufacture. They

claimed that the Newcastle manufacturers made use of Yarmouth sand in their broad glass and this was sufficient to make it eligible for the higher duty.

Small white sand is used for white glass and any coarse hard sand for bottles and common green glass - such is the sand in Newcastle river and that which is dug out of rocks and banks at Stourbridge, but Yarmouth sea sand, which is of a much better quality, was never used for bottles or any other coarse green glass the Newcastle glassmakers have since not only persisted in improving the quality of their glass by varying the proportions of materials from what are used for common bottles but have privately made use of Yarmouth sand which the officers have detected therein.

Unfortunately for the Board the claim that the materials defined the manufacture had no backing in law, as the local justices realised. They ruled that the materials were in no way relative to the duty nor were the glass makers bound to any proportions by the present law. They would not suffer evidence of the materials to be examined "alleging that it would be discovering the Mystery of their Art" and would also be discouraging ingenuity. Their ruling was confirmed by the Attorney General, to whom the Board of Excise submitted the case in 1758, who clearly stated that "Materials ought not to decide the question, the glass itself when made is the touchstone by which the duty is to be fixed". He added that this was not a case which could ever be settled by any fixed rule as the law now stood and he recommended laying a middle duty on broad glass.

A middle duty of 5s 3d per cwt. on broad glass was the solution adopted by the Board of Excise. It was not to come onto the statutes until 1777 but the Board had urged it on the Treasury in 1756 along with several other clauses "for better regulating the dutys on glass"; these clauses concerned other types of glass such as enamelled, stained or paste glass which were ^{also} in an ambiguous position not having been mentioned in the original act. Why these recommendations were not made

law before 1777 is not known. In 1760 the Board of Excise drew the Treasury's attention to them once more but again legislation was not forthcoming.⁴ It seems likely however that the measures were introduced before 1777 in an informal way through either a Treasury or an Excise order. As the Excise reminded the Treasury on both occasions the measures had been agreed with the manufacturers who were as happy as the Board to find a means of putting an end to the "vexatious disputes" and if this was so, formal legislation was not perhaps seen as necessary.

The draft proposals for the middle duty on broad glass had only been drafted after the "principal officer" of the Board had travelled down to Newcastle to consult the manufacturers and hear their wishes on the matter. The fact that the manufacturers were being allowed the opportunity to influence the legislation is not merely evidence of the sympathy of the Board towards the manufacturers, but evidence that the successful operation of the tax depended to quite a large degree on the collusion of the manufacturers. This was a point that was to underlie the whole subsequent development of the duty. The tax could only work if the manufacturers themselves accepted the artificial distinctions it made.

2. 1777 - 1811

These years saw the transformation of the excise duty on glass from a tax that was relatively straightforward and simple to one of the most complicated of all the taxes under the Excise's care. That this occurred was largely due to the severe financial pressure on the Treasury during the years of war. This necessitated substantial rises in the rates of duty payable on excised articles and, thanks to the sympathy of the government of the day towards manufacturers, these were frequently accompanied by additional legislation to ensure that the higher rates of duty did not press too heavily on the manufacture. At the same time, as the duty rose so did the incentive to defraud the revenue and this necessitated further detailed and often complicated legislation. As a result the tax gradually took on the nature of the gross and swollen body of vexatious regulations so stigmatised in later years by the political economists. However in pointing to the jungle of regulations surrounding the glass industry as an example of offensive government interference the later critics of the glass duties failed to appreciate that in almost every case, the most complicated regulations were those adopted for the manufacturers' interests and in many cases were actually suggested by the manufacturers themselves. As a general rule it seems true to say that the more complicated the particular glass act, the more the manufacturers themselves had had a hand in framing it.

That the complicated regulations made their appearance during this period, the years when Pitt was in power, was no accident. Throughout the period Pitt showed himself to be greatly sympathetic to the manufacturers' wishes, even to the extent of going directly against the advice of the Board of Excise, and the increasing complexity of the glass legislation can in many ways be seen as a memorial to this.

This period saw substantial alterations in the mode of collecting the duties and the regulations surrounding the manufacture, both to the manufacturers' advantage. It saw a strong and positive encouragement to export and a strengthening of the home manufacturer's position in the home market. It would not be exaggerating to say that these changes came about largely because of the personal involvement of Pitt who appears to have combined a very real understanding of the problems facing a manufacturer under an excise with a willingness to experiment with methods that might weigh less heavily on the industry.

(i) The problem of moiles

The period began with a substantial rise in the rate of duties, the first since 1745. This, as Lord North made quite clear in his budget speech, was because of the increased demands on the revenue from the expenses of the American War.⁵ Having made out the case for increases in taxes, he then went on to state what was the accepted doctrine of contemporary taxation: that as a commercial country Great Britian should avoid taxes on manufactures; that taxes on articles of daily and necessary consumption should also be avoided in order not to press on the lower part of the community; that the only fit subjects for taxation were property and luxuries. Glass was certainly considered to be a luxury, however the view that a tax on glass could be seen as a tax on a manufacture was admitted by Lord North and, in order to give a degree of protection to the home industry against foreign manufactures, he also proposed additional duties on imports, "nearly equal to a prohibition", which would, "as far as home consumption is concerned give us the whole of the market": North also spoke of giving the home glass manufacturer a "monopoly" in the home market.

Thus a direct link was firmly established between the internal excise duties on glass and the customs duties on imported glass. This link was never to be broken and indeed was strengthened as the internal excise rates increased: prohibitive customs duties, designed to protect the home manufacturer and the government's revenue from the home industry, were an essential component of the glass excise.

The rise in duties enacted in 1777 (17 G3 c.39) was substantial. For all types of glass it doubled, as did the customs duties on imported glass which were accompanied by severe penalties for smuggling glass. Further regulations concerning the export of glass and the gauging of the pots were introduced: the export of glass from any quay or river near the glass house, provided an excise officer was present, was permitted (previously it had only been possible to export glass through a customs house). The gauging of pots was altered to give, for the first time, an allowance for wastage of glass. The allowance varied according to the type of glass being manufactured. Flint glass manufacturers were allowed one quarter of the total gauge plus one inch of metal in the pot (to allow for the sediment of unworkable glass left at the bottom of the pot). Window glass manufacturers were allowed one quarter of the gauge plus four inches, and bottle manufacturers were allowed one fifth plus three inches.

These allowances met one of the fundamental complaints of the manufacturers that they paid duty on gauged metal that was never made up into articles. But in order to prevent the possible abuse of the system the Act included a clause which was to give even greater cause for complaint. This clause, section 33, was designed to prevent the possible abuse of the gauge by manufacturers who added metal to the pots after

they had been gauged. The section specifically mentioned one of the practices it was hoped to put a stop to: "whereas some makers have also put in metal or materials into the pot after^a gauge of metal therein hath been taken by the officer, under pretence that the same were moyles of glass of the present or some former making, by which means the revenue is greatly defrauded". A "moyle" or "moile" was the glass that adhered to the blowing pipe when it was dipped into the pot to take a gather of metal. The time honoured practice had been to let the moiles cool and then "crack" them back into the pot leaving the blow pipe clean and the moile to be remelted and worked out again. The 1777 Act expressly forbad this practice on the grounds that the new waste allowances covered all losses, including moiles. Instead of being cracked back into the pot the moiles were to be cracked out somewhere separate along with all the other trimmings and skimmings, weighed, and charged with duty again. Understandably the ruling was seen by all glass manufacturers as extremely unfair, it was in effect charging the same metal twice for duty, but to bottle manufacturers in particular it posed a more serious threat. According to the bottle manufacturers to comply with the ruling on moiles would entail unacceptable losses since to make bottles it was necessary to dip the pipe into the pot at least three times and the amount of glass lost in moiles was far greater than in any other branch of the manufacture.⁶ For other glass manufacturers the moiles ruling appears to have been an inconvenience which they reluctantly accepted; for the bottle manufacturers it was a more serious matter which they could not, under any circumstances, accept.

The bottle manufacturers were encouraged to challenge the Board on this ruling by the fact that the issue had arisen before. In 1749 an order had been sent out from the Board in London forbidding the cracking of moiles and because of remonstrances from the bottlemakers the order had been

revoked and the practice admitted to be just. A letter in the Cookson papers dated 1765 confirms that at that time it was permitted: the Board had informed him that as a crown glass manufacturer he must not return waste metal to the pot for it was not permitted "except for the bottle makers who are allowed to crack their moiles into the pot from whence they were gathered".⁷

If the manufacturers were in any doubt as to the real meaning of the clause then the Board's intention was quickly made clear. Sir John Delaval, for instance, questioned the ruling believing that the Act's intention had only been to prevent new materials being put into the pot. But in July 1777 he received an answer from the Board via the supervisor at South Shields informing him that the Act included full recompense for all loss and damage and that no metal must be returned to the pot without a fresh notice in writing to the officer and a fresh gauge taken, and that "... the Board insists that you stop cracking the moiles unless proper notice be given", and if he did not they would be, "under the disagreeable necessity of prosecuting you".⁸

In November 1777 the bottle manufacturers of Northumberland and Durham sent a memorial to the Excise stating the effect the ruling would have on them.⁹ If they were not allowed to crack in the moiles, they claimed, they would be paying 4s 8d duty instead of 3s 6d per cwt., the home price would have to rise by 15% and the foreign trade be lost completely. They reminded the Excise of the events of 1749 and begged that any attempts to stop the practice be put a stop to. They also begged that no suits of law would be brought on the issue. The petition was forwarded to John Delaval's London lawyer, Oliver Farrer, to present to the Board of Excise. This he did in November by which time a prosecution had indeed been

commenced against John Delaval which added some urgency to the issue. Small infringements of the excise regulations were usually heard before the local justices but in matters of importance or indeed when the Board wished to remove any doubts about a ruling, the matter was withdrawn from the justices and an information filed in the Court of Exchequer. An Exchequer prosecution was a far more hazardous process for a manufacturer to undergo, it was more costly and the chance of being acquitted or fined a nominal penalty considerably less.

The ruling on mules affected all bottle manufacturers not just those in the north-east and with a view to uniting their efforts, John Wilcox, a Bristol bottle manufacturer, wrote to Delaval's agent, George Douglas, in November urging co-operation in pressing their M.P.s to bring the matter into the House of Commons:¹⁰

The trade in Newcastle seem shy in corresponding with us, you may inform them that it will be for the general good to unite, any information on their proceedings will oblige the trade in Bristol.

It does seem true that the Newcastle manufacturers did not feel the need to unite their efforts with others. In reply to a letter from John Delaval Middleton Hewitson of the St. Lawrence bottle house said that he had not corresponded with any London gentlemen on the subject for he felt that their own petition met the matter well.¹¹ Delaval had a London contact in Benjamin Harrison, his London agent who at this time managed a small bottle house of his own, with whom he certainly exchanged views on the subject. Harrison, being in London, was able to provide further information particularly on the subject Delaval was most anxious about - his impending prosecution. Harrison was in fact rather optimistic and wrote in December to tell Delaval that he didn't think the prosecution would take place for he had talked with one of the Excise Commissioners who had said that because of the loss of the American trade and its precarious state to the

West Indies the revenue would not be benefited by pressing the manufacturers too hard. This proved rather too optimistic for in January 1778 a writ was served against Harrison himself for cracking in the moiles.

It seems to have been the threat of prosecution that acted as a catalyst in bringing the glass manufacturers together nationally to challenge the Excise as one, united trade. At the end of January it was agreed that one manufacturer should be put forward as a representative to stand trial on behalf of the whole trade and the manufacturer chosen was Isaac Cookson. At the same time efforts would be made to bring pressure on the Board at a higher level. George Douglas, who had gone up to London to persuade the Board to cease the prosecution, wrote to Delaval on these matters in January:¹²

Mr. Cookson's name is given to the Solicitor of Excise to be the person who will stand trial on behalf of all the proprietors in this country. I have informed the Bristol people whom Farrer also works on behalf of. Hewitson says that if you and Sir Matthew White Ridley and the member for Bristol would speak to Lord North about the impropriety of the Excise's conduct he would put a stop to the prosecution.

Cookson's trial never took place. By April the issue appeared to have been dropped and Cookson felt able to return completely to the north. The reason for this, it later appeared, was that at the request of the manufacturers three of the Commissioners of Excise had personally attended at a bottle house in Gravel Lane in Southwark where, on inspecting and examining the process of manufacture, they became convinced that the manufacturers' case was indeed a just one. Whether this was the entire truth of the matter or whether their change of mind was also due to some pressure from above is not known. However in view of the later stubbornness of the Board over exactly the same issue it would not seem unlikely that pressure from the Treasury or other parts of the government had been brought to bear. For the moment the issue was dropped and the bottle

manufacturers continued to crack in the moiles as usual.

The issue of the moiles remained in the Excise's view as one of waste allowances and this was an aspect of the legislation that it became increasingly concerned with after the Act of 1777. The allowances made in that Act seem in many ways to have been rough estimate and the Board was therefore anxious to reassure itself that the allowances were not over-generous. Its most tricky problem in this respect was the waste allowance granted to the newly established British Plate Glass Company at Ravenhead. (The problems of this company were unique and highly complicated but, briefly, various allowances were tried culminating in an act of 1787 which fixed its waste allowance at 50% of the total gauge, although the company insisted that its waste was nearer 60%.) In 1787 the Board embarked on an effort to gather information about the loss in the more conventional branches of the industry and wrote to its various officers around the country bidding them enquire what the "actual waste or unavoidable loss" amounted to in various glass houses.

The Newcastle officer, Marmaduke Clark, was directed to enquire among the broad glass makers. He found that in both Sir Matthew White Ridley's house and George Lake's house the allowances provided by law were about right; one house wasting slightly more, the other slightly less than the statutory allowance. The proprietors themselves were well satisfied. The Supervisor at Bristol, Charles Johnson, was directed to enquire amongst the bottle manufacturers and his report once more threw doubt on the practice of cracking in the moiles. The implication of his report was that cracking in the moiles was not a universal practice and those manufacturers who kept their metal clean did not do it:¹³

"That which is complained of as a grievance then seems to be no more than this - the manufacturers in particular places (for such as have good metal have no reason to complain) finding themselves obliged to skim the pots frequently in the journey either by reason of the badness of the metal or a foulness caused by returning the moiles to the pot (which is a practice very unfavourable to the making of good bottles) waste the metal which ought to be made into goods, which is an evident loss to the manufacturers, but it is their opinion (the officers*) that this loss would always be prevented if good metal were made".

From all the other evidence available, (including the fact that the 1777 campaign to reverse the moiles ruling had been joined by most if not all of the English bottlemakers), it seems highly unlikely that there were bottle manufacturers who managed to make bottles without cracking in the moiles, but this was the argument that the Board adopted. In July 1793 an order was sent out to all officers once more forbidding bottle makers to crack in the moiles. In a report to the Treasury the Excise justified its action in that "... the practice was not universal and as we thought it not general thought it our duty to suppress it". Inevitably it soon brought a case in the Exchequer on the issue where to the alarm of the bottle manufacturers, verdict was found against the defendants. Action by the manufacturers was once again called for.

(ii) The bottle manufacturers' lobby

The story of the bottle manufacturers' lobby in the 1790s firstly to alter the order on moiles, and subsequently to alter the whole mode of assessing the duty, is an interesting one illustrating the channels through which manufacturers were enabled to protect their interests. It also contains an interesting illustration of the relationship between the Treasury and the Board of Excise, how the Board in reality held very little power and that when stood against an interest that could enlist support from the government, it was the loser. If one thing does emerge as the most significant aspect of the whole episode, it is the informality of the way the manufacturers approached the government. This was certainly a case

where personal influence and personal contact were all important and it is partly because of this that the north-east manufacturers seem to have played such an influential role. The mediation of the north east M.P.s, Delaval and Ridley, was all important and it was through them that manufacturers such as Isaac Cookson were enabled to bring their message right to the heart of the government.

Almost as soon as the order on moiles had been received, the north-east manufacturers wrote in a body to Delaval asking him once more to act on their behalf: a request to which he obviously agreed. His lawyer Farrer was once more brought in and, following the usual methods, a memorial was sent to the Board of Excise in August 1793.¹⁴ This proved fruitless and was followed, in September, by a petition to the Treasury.¹⁵

The September petition was far more impressive than any of the 1777 memorials, largely because it was signed by a deputation acting on behalf of the whole English trade, a clear indication that right from the beginning the manufacturers had determined to act in concert. The deputation consisted of Francis Blackett (Cookson's partner at South Shields), William Carr of the Ayres Quay Company at Sunderland, and Cornelius Fry of Bristol, (later they would be joined by Archibald Geddes representing the bottle manufacturers of Scotland). Besides this the petition also gave a firm indication that the manufacturers intended to act on their own accord to protect their interests, despite the Excise's ruling:

Your petitioners have determined as soon as may be possible after the meeting of the next session of Parliament to apply for and obtain an Act of Parliament whereby the bottle manufactory in England may be put under such regulations as will enable your petitioners to continue the same and secure to His Majesty the revenue arising thereon.

The manufacturers once more stated their case and the consequences of what would happen if the moiles were not allowed to be cracked in, which

was that the manufacture would cease entirely in England. They also prayed that the Treasury would protect them against prosecutions by the Excise until they could bring in their Act of Parliament.

This Petition was naturally passed on to the Excise for comment and its report back to the Treasury restated its firm conviction that the practice should not be allowed. According to its own officers the moiles never mounted to more than $\frac{1}{5}$ of the pot, the legal allowance, and it pointed out that cracking in the moiles was not allowed to other glass manufacturers. Above all it insisted that cracking in the moiles led to terrible frauds on the revenue which were estimated as amounting to 20% of the total revenue from bottles.

Having thus failed to move the excise through the conventional, more formal, channels the manufacturers were forced to resort to a higher authority and set about reversing the order by Act of Parliament. It was certainly with a view to this that Cookson, accompanied by Oliver Farrer, went to see Pitt in November 1793. In February of the following year Delaval himself had a meeting with Pitt and in March a further and important meeting was held between Pitt, Cookson and Mr. Cholmondly, a secretary to the Treasury. At this meeting Cookson was evidently given an assurance that the manufacturers' grievances would be attended to and he was advised to petition the Treasury once more setting forth the results of an "experiment" he had made at his bottle house. This was duly done but in June Cookson wrote to Pitt once more complaining that not only had no reply been received to his petition but also that the Board had filed an information against him in the Exchequer. In this letter Cookson saw the basic cause of the quarrel between the Board and the manufacturers as the Board's lack of knowledge of the industry, and he contrasted the English Board with its

Scottish counterparts who continued to allow the moiles to be cracked in:¹⁶

The Scotch Commissioners live on the spot where the manufacture is carried on in an extensive manner and well know the injustice of such an order. I should think this alone was sufficient grounds to test the matter on There used to be a Surveyor General of glass, perhaps a fixed one was found unnecessary yet if a person were appointed to inquire into this business of the moiles it would be attended with the best effects. Anything which manufacturers have to advance are seldom credited and any plans coming from them for a better mode of ascertaining the duties are generally suspect.

Quite apart from being a pertinent comment on the relationship between the Board and the manufacturers, this last sentence is interesting as the first mention of a change in the mode of ascertaining the duties. At some time during 1794 the bottlemakers' campaign to reverse the ruling on moiles developed into a campaign to completely alter the method of charging it *by charging* on the weight of manufactured goods not, as hitherto, on the weight of the materials gauged in the pot before manufacture. Exactly who conceived this plan is not known; however there is a strong possibility that it came from the north-east manufacturers. If not actually suggested by Cookson (perhaps his "experiment" had something to do with it), it was certainly brought forward and probably encouraged by Cookson's meeting with Pitt and the assurances he had received there.

The first formal suggestion of the new method came in a memorial to the Treasury of July 1794 from, not the whole English trade, but just the manufacturers of Northumberland and Durham.¹⁷ Essentially this memorial submitted a proposal that if implemented would, in the manufacturers' opinion, provide the Excise with sufficient checks to ensure that new glass was not being added to the pots under the pretence of being moiles. The manufacturers proposed that the manufactured goods should be weighed after annealing and this would act as a check on the gauge. Any goods weighing more than the net gauge would be charged excess duty at a high rate and if the weight was less then the manufacturers would receive no

reduction or abatement on the original duty charged. To ensure that the check was not falsified by the removal of goods from the annealing oven the manufacturers proposed that they be locked with iron gratings and only opened when the officer was present.

The memorial was sent to the Board of Excise which, perhaps inevitably, rejected the proposals as not being sufficiently secure against fraud and being too expensive. The Board admitted that waste did occur in the process of manufacture but maintained that the manufacturers' proposals would enable goods to be removed before being weighed. The Board was also alarmed at the prospect of the whole security of the system being lodged in the hands of one weighing officer "and him of an inferior rank" whereas now there were various checks from the various accounts of different officers. The Board's rejection of the manufacturers' plan was a mistake in that it achieved the opposite effect to that which had been intended. Not only did the manufacturers go on to realise their proposals in an Act of Parliament but they did so without any further consultation with the Board at all. The discouraging report to the Treasury appears to have been the last time the Board had any say in the matter, from then onwards the manufacturers and the Treasury dealt with each other directly. It is quite clear that the Board of Excise had seriously misjudged the situation, both in the real danger which its order threatened to the manufacturers, and the manufacturers' own determination to protect their interests. As a result the Board was to suffer a loss of face in seeing its advice deliberately ignored by the Treasury, and the manufacturers were to gain far more than they had originally intended.

According to evidence given to the 1835 Commission:

The mode of taking the duty on bottle glass in the annealing oven was established by Mr. Pitt in opposition to the Excise ... It was suggested by the manufacturers and was established by Mr. Pitt on the report of two men who were sent to the manufacturers for this purpose.

Who the two men were and what exactly they reported has not yet been discovered, but that the Bill was drafted by George Rose, the secretary to the Treasury, under Pitt's direction, is absolutely certain. Judging from the number of papers concerning the British Plate Glass Company in the Chatham papers it would seem that Pitt had already interested himself in the glass trade. The Company was of course a prestigious undertaking and one which affected commercial competition with France, his concern for that is immediately understandable. His concern for the bottle trade is also perhaps understandable. The manufacturers had given clear indications that if they were not listened to then the manufacture would cease in this country altogether. Besides this, the well being of the bottle trade affected the revenue of the country in another way since it had a direct relationship with the wine and spirit trade. The Excise had offered nothing more than conjecture as arguments against the manufacturers' proposals and Pitt had evidently decided that this was a case where the manufacturers' wishes could be met with adequate safety to the revenue.

The eventual Act of 1795 (35 G3 c.114) gave the manufacturers far more than they had asked for in the memorial of 1794. There they had proposed that the manufactured goods be weighed as a check on the gauge. The Act provided that the duty was to be assessed entirely on the weight of the manufactured goods and the gauge was to be completely dispensed with. That this further development was also suggested by the manufacturers there seems little doubt. From the manufacturers' point of view it was far better to postpone the moment when the duty was taken to as late as possible in the manufacturing process.

The Board of Excise does not appear to have been consulted over the drafting of the Act and there seems little doubt that it did not approve

of the change. Throughout the winter of 1794, in despite of the impending Act, it continued to prosecute the manufacturers vigorously for cracking in the moiles. Most manufacturers had evidently continued to crack in the moiles: Delaval in fact had ordered his men to do so in August 1793 after only a month's trial of not cracking them in. Besides the question of loss, not to crack them in disrupted the work in many other ways: such as reducing the amount of overwork the blowers expected to be able to do. In July John Sime the bottleworks' manager, had written to Delaval on this subject saying that the men were upset because cracking out the moiles meant there was not enough left in the pot for the men to work over their basic rate of 62 dozen. He had tried to remedy this by giving them small sized bottles to make but feared this could not continue indefinitely.

Delaval was not the exception in ordering that the cracking in continue for informations were filed against various other manufacturers for the offence.¹⁸ Most were heard before the local justices and the fines were minimal; Cookson, for instance, was fined one guinea and Fenwick of Sunderland five guineas. In October 1794 however an information laid against the Ayres Quay proprietors was withdrawn from the justices to be entered in the Exchequer. This was followed in January 1795 by strict orders issued by the Board to the supervising officers not to allow the moiles to be cracked in. In view of the pending Bill, all this activity on the Excise's part appears to be nothing more than vindictiveness. The manufacturers were certainly at a loss to see any reason for it: "the matter is now becoming more curious than ever," wrote John Crooks to Delaval in February 1795 telling him of another prosecution "all or most of the bottle houses in the neighbourhood have been prosecuted and some of them two or three times over and some, I believe, are in the Exchequer".

By May 1795 the negotiations between the Treasury and the manufacturers had been completed and Pitt had gathered sufficient information to convince him that a trial of the new method was feasible. A letter to George Rose from the English and Scottish Bottle Manufacturers' Committee expressed joy at his decision and the firm belief that the new mode was the best that could possibly be devised for securing the revenue and would also prove to be the salvation of the bottlemakers. Such was their confidence in the new mode that the bottle manufacturers declared:¹⁹

... if the trial does not succeed we will cheerfully submit to any other plan the government may think fit to adopt but will also, by any additional tax make up any deficiency that may arise from such a trial; as we wish not on any account to lessen the revenue.

Later they nearly had cause to regret this promise. A draft of the new Act was sent to the manufacturers, via Delaval, and it was introduced into the House by George Rose on June 10th. Its passage was swift and it passed its third reading on the 18th.

The greater part of the Act concerned further regulations to prevent fraud: giving the officers extensive powers of search, empowering them to unstop pots to gauge at will and enacting heavy penalties even for stirring the fire to raise smoke whilst the officer was examining the pots. The bottle regulations were contained in sections 7 - 15. Under them a manufacturer could give notice that he desired the duty to be charged on the manufactured goods rather than the gauge in which case he was required to erect an annealing oven of a certain specified construction with only one mouth to which the officer would have the key. The manufacturer had to provide iron gratings, locks and keys and accurate scales and weights at his own expense. The procedure of charging the duty involved a declaration given by the manufacturer before the metal was worked of the number of bottles he expected to make and if the final tally of manufactured bottles varied by more than 5% a heavy penalty was incurred. The duty was charged

on the weight of the manufactured bottles which were weighed by the officer with the help of the bottlehouse servants, and then checked by a re-weighing from another officer. It appeared to be a highly complicated system, involving many notices to be given to the officers in writing and many penalties and fines for even a slight departure from the set procedure. It also involved the manufacturer in considerable expense. Despite this, even though the manufacturers were given a choice whether they adopted the new method or not, the switch to the new system appears to have been universal and immediate which underlines the attractiveness of the new system to the bottle manufacturers. At Delaval's Hartley works the alterations took nearly a month to complete but by the end of August John Crooks was able to inform his employer that they were able to make the declaration that they wished the duties to be charged on the manufactured goods.

The establishment of this method of charging the glass duties was an event of immense importance not just for the bottle manufacturers but for the subsequent development of the excise on glass on a whole. The 1795 Act could clearly be seen as a triumph for the manufacturers, they had directly opposed the Excise's order and had ended up with benefits that far exceeded the limited ones they had originally asked for.

The lessons of the episode were not lost on other glass manufacturers and the establishment of the charge on manufactured goods for bottles heralded the beginning of campaigns to change the method in similar fashion for other types of glass. In every case the manufacturers encountered bitter opposition from the Board of Excise, its main objection always being that the system was conducive to fraud since the manufacturer could either remove goods from the annealing oven or bribe the weighing officer. That certain manufacturers did defraud the revenue is undeniable, frauds had certainly taken place, however it is impossible not to remark on the fact

that whenever the Board of Excise disapproved of a measure it always justified its disapproval by the claim that fraud would thereby be encouraged; fraud was a convenient reason and one which was used frequently, even indiscriminately, by the Board. In the case of bottles, the measures suggested by the north-east manufacturers in 1794, of having the weight of the manufactured bottles act as a check on the gauge, would have provided more checks than the existing system and yet the Board rejected it on the grounds that it was not secure enough. It was not the Board of Excise's task to initiate change, it was entirely concerned with managing the system and therefore a bias towards the existing system was to a certain extent inevitable. Nevertheless its suspicion when presented with a reasonable case for change does not reflect particularly well on its capacity to assess a situation. The fault however was perhaps not so much the Board's intrinsic inertia but, as Cookson had pointed out, its lack of accurate information about the industry it was regulating. The Board acted on the information provided by its officers and this was not perhaps always reliable as might be desired.

The measure introduced by the 1795 Act were a trial, covering a limited period only. At the end of five years the argument about whether the new method encouraged fraud or not was rejoined. Unfortunately for the manufacturers the Excise could now fuel its argument, since the figures for the bottle revenue after 1795 showed a distinct decline "which" as George Rose wrote to Rowland Burdon (the M.P. for Sunderland), "is not an encouragement for the continuance of the measure".²⁰

1794	£48,874	17s	11½d
1795	£47,614	9s	8½d
1796	£47,417	15s	9½d
1797	£46,138	12s	4½d
1798	£33,314	0s	2d
1799	£40,050	18s	7½d

He reminded Burdon of the manufacturers' pledge that if the measure was adopted the revenue should not be . . . decreased. Even allowing for the decrease in imports of wine this had not appeared to be the case. The letter was sent on to Delaval whose comment, presumably echoed by the other manufacturers, was that "the revenue had not thereby been decreased but from other causes" namely the depression in trade caused by war. Francis Blackett and William Carr were despatched down to London to press the manufacturers' case that the Act be renewed, in which they were helped once more by the north-east M.P.s. Their efforts met with success and in April Rowland Burdon wrote to Cookson²¹ informing him that he had the repeated assurance of both Mr. Rose and Mr. Jackson that Pitt had made up his mind to renew the Act "for one year at least". This was done and the Act subsequently renewed for an indefinite period.

The firm establishment of the method of charging the duty on the manufactured bottles was the signal for other branches of the glass industry, the crown and flint manufacturers, to commence campaigning for the same method to be applied to their own particular branches. Before considering these campaigns, another important development in the Excise, along with the further rises in the rates of duties, that occurred during this period, should be considered.

(iii) Pitt and the bounty

The alteration of the method of charging the duty on bottles was the most dramatic alteration in the excise on glass during this period, and certainly the one in which the manufacturers had the largest say. But it was equalled in importance by another development which was to have an equally far-reaching effect on both the industry and the subsequent development of the tax. This was the addition of an extra sum, or "bounty" to

the drawback of duty received when glass was exported. This addition seems to have been introduced largely on Pitt's personal initiative without too much prompting from the manufacturers or much consultation with the Board of Excise. It certainly attracted none of the argument which had surrounded the question of moiles.

Until 1787 the drawback had always been paid at exactly the same rate cwt. for cwt. as the duty had been paid. This, as a petition of 1777 indicates, had always been a source of some grievance to the manufacturers:²²

But by the present Act we are only allowed $\frac{1}{4}$ lb. or 1 penny per lb. whereas the duty is charged on a much greater quantity than can be exported there being great wastage and breakage in packing, weighing and carriage to the place for export. The duty on crown glass particularly as charged is 40s. on 200 lbs., being exported will draw back but 16s 8d.

Whilst the duty remained low this loss was slight and could be absorbed by the manufacturer. But, as the petition pointed out, the rise in the duty meant that some of this loss had to be passed on to the foreign consumer. The manufacturers were only concerned with keeping the prices low in the foreign market and not allowing the internal duty to affect the prices abroad; this rise, the petition maintained, would have to be passed on to the foreign consumers which would not encourage them to buy and would encourage people in America and the colonies to erect glass houses of their own. In order to prevent this it was necessary to make allowances for all the glass on which duty had been paid but which was lost in making the glass fit for export. Besides the loss in breakage, the point the crown glass manufacturers were most concerned about was the loss they sustained in cutting the circular tables into square panes.

Pitt was plainly aware of this argument and when, in 1787 (27 G3 c28) he imposed heavy countervailing duties on French glass imported into England he also made several additions to the various drawbacks on home

manufactured glass which in all cases raised them slightly above the duties. In the case of bottles and broad glass the difference was only slight but for crown, German sheet, flint and plate it was more substantial and was further increased on these latter types in 1794 (34 G3 c.27). This Act made additions to the duties but the additions to the drawbacks were even larger. The duty on flint glass, for instance was increased by 10s 8d, the drawback by 14s 6d. On crown and German sheet the duty was increased by 8s, the drawback by 9s 11d, thus leaving a substantial bounty on the export of these higher qualities of glass. In adding a bounty to the drawback Pitt was doubtless acting on his conviction that foreign trade was an essential part of Britian's prosperity and therefore should be encouraged. The Board of Excise was less happy with the bounty and the issue was to prove one of the most strongly contested between the manufacturers and the Board in years to come. Whilst Pitt remained in power though the bounty remained unchallenged. In 1805 when the duties were increased by 50%, the drawbacks were also increased by 50% leaving, to the Board of Excise's alarm, a substantial difference between the duty that was paid into the revenue and the sum that was taken out by the manufacturer on the export of his goods.

Despite Pitt's, and indeed Lord North's, reluctance to burden home industry with further taxation, the expense of the war years necessitated several rises in the rates of duty during this period. Lord North made three small additions with his three 5% increases on all excised articles in 1779 (19 G3 c.25), 1781 (21 G3 c.17), and 1782 (22 G3 c.66). These made permanent by Pitt in 1787 (27 G3 c.13) bringing the levels to 21s 5 $\frac{1}{2}$ d per cwt. for flint or plate glass, 16s 1 $\frac{1}{4}$ d for crown or German sheet, 8s 0 $\frac{1}{2}$ d for broad glass and 4s 0 $\frac{1}{4}$ d for bottles or vessels made from bottle metal. Pitt's additions of 1794 only affected flint, plate and the better

window glass, articles which in his budget speech, he said, "might fairly be considered as mere articles of luxury". Pitt upheld the view that a distinction between glass the luxury and glass the necessity should be made, and this is confirmed by a plan in the Chatham papers for a proposed tax on glass items that were indisputably luxuries;²³ chandeliers, girandoles, chimney glasses, pier glasses etc. Each house or assembly room would pay according to the number of items of this sort it possessed, on a sliding scale based on class from "nobility in general" down to "shopkeepers and farmers". The arguments for the tax put forward in the plan were that it wouldn't affect the poor and that each man would pay according to his means. The tax does not appear to have got beyond this planning stage which is perhaps a pity as it might possibly have relieved some of the burden of taxation on the other types of glass.

Small additions were made to the duties in 1803 (43 G3 c.69) which nullified the slight bounty on the drawback for broad glass and bottles. This was followed by a substantial rise in the 1805 (45 G3 c.30) when the duty on all types of glass except bottles was increased by 50%. Pitt's original Budget proposals had not included this rise in the glass tax, but it was forced upon him following the rejection by the House of his original proposals. The rejection of the proposed tax on horses used in husbandry and the alteration of the salt duties left him in the difficult position of finding a revenue source to provide £405,000 at short notice. The only solution was to make additions to existing duties including glass which would provide £80,000 of the deficit. The rise included broad glass which had been left untouched in 1794 but it did exclude bottles which remained at their old rate. Presumably Pitt was taking into account the difficulties being experienced by both the wine trade and the bottle trade during the long years of war.

(iv) The duty on the manufactured goods

Once the bottle manufacturers had succeeded in establishing a new method of assessing the duties, it was inevitable that the other manufacturers would follow their example. Although the ruling on moiles had not affected the other branches so severely, there was still considerable loss to the manufacturer from the loss of metal, on which duty had been paid, during the process of manufacture; a loss which of course increased as the duties rose. The first instance of other manufacturers asking for the new system was the British Plate Glass Company which, in a memorial to the Treasury of 1796,²⁴ asked for an increased waste allowance or to have the duty charged "on the actual weight of the saleable goods in the scale in the same manner as now practised with the glass bottle manufacturers". Concerted pressure from the other manufacturers did not start however until the 1800s by which time the method was firmly established.

The first to apply were the flint glass manufacturers who, early in 1803, petitioned the Treasury on the subject of altering the mode of duty on flint glass.²⁵ Right from the start the flint glass manufacturers appear to have acted as a united trade and not as individual firms. The Board of Excise's report on the petition was unfavourable with the result that a meeting was held between Mr. Vansittart of the Treasury, Mr. Jackson - a Commissioner of Excise, and a deputation from the manufacturers. At this meeting Mr. Jackson put forward the Board's main objection to the proposals which were answered by the manufacturers in a further memorial to the Treasury sent in December 1803.

The Board's objections were more or less identical to its objections to the bottle manufacturers in 1794; all based around the firm conviction that the new system would encourage fraud. It pointed out that the whole charge would rest on one, easily corruptible, weighing officer and that

the manufacturer could remove goods from the annealing lear (or the tunnel through which flint glass goods were drawn in order to cool them gradually and uniformly thereby avoiding stresses in the glass). The manufacturers attempted to meet these objections. As for the bribing of officers; "the committee does not presume to contradict the experience of the Board of Excise respecting the probity of their own officers" but they pointed out that a corruptible officer was just as likely to work against the manufacturer's interests - by fabricating prosecutions in order to share in the penalty - as for his interests. To guard against any possibility of collusion they proposed there be two weighing officers, each acting as a check on the other. As for the possibility of removing goods, the manufacturers submitted a complicated plan of locked lears and weighing rooms, and the constant presence of an officer "so that no jealousy can rationally exist on the part of the Excise as to the correctness of the charge of duty". To meet the expense of all this they proposed that the annual licence fee of £10 paid by each glass house be increased to £100 "which would furnish a handsome increase in salary to two officers and enable the government to select men of superior situation and sterling character". The trade offered to supply detailed plans of the proposed lears and weighing rooms and the memorial ended by emphasizing the mutual benefits of the plan. The manufacturer would be benefited by only paying duty on the glass brought to perfect manufacture and by being left at liberty to experiment and improve on the liquid metal in the pot. The revenue would be benefited "to the extent of the extent of the existing frauds and by allowing the bounty on export precisely the same as the duty has been paid." These two benefits to the revenue were, as the manufacturers were probably well aware, matters on which the Excise and the Treasury were becoming increasingly concerned.

The memorial was sent to the Board of Excise which took two and a half years to report back on it. When it eventually did, in 1806, it was clear that the delay had not been occasioned by the further gathering of information. The Report was a curt restatement of the Board's convictions: the proposed mode of ascertaining the duty was highly objectionable and neither to the advantage of the revenue nor the generality of flint glass manufacturers. To deter taking the account until the end of the manufacture would furnish numerous opportunities for fraud and neither the mode proposed by the manufacturers, of the constant attendance of two or more officers to weigh the goods, nor the increase in licence fee would serve as an effective check nor would it answer the enormous expense.

As with the rejection of the bottle manufacturers' proposals, the stubborn opposition of the Excise Board to a change in the system can be seen as slightly surprising. One might have expected the Board to welcome a system that, on the face of it, offered more measures to prevent fraud and which did away with all the uncertainty over waste allowances. The existing system, as the Board itself admitted, was far from secure against frauds. Indeed Richard Russell, a London flint glass manufacturer, claimed in a memorial sent to the Treasury in 1806, that frauds in the industry amounted to £100,000 a year.²⁶ He described the notorious ones as being: glass added to the pots after they were gauged - including moiles which they were supposed to crack out, whole pots being worked into goods unknown to the officers and then refilled with metal, pots being switched round so that pots of large dimension were replaced by pots of smaller capacity. Russell considered that he lost heavily from the competition of those fraudulent manufacturers who evaded the duty, so he proposed a draconian system whereby more or less everything, including the pot lofts and mixing rooms, were under lock and key and an officer's presence was necessary for

every operation. Fortunately for the rest of the trade the Board did not find his system attractive. It admitted that the practices he listed did take place but not to the extent that he claimed. His plan they dismissed as too expensive and too oppressive to the fair trader.

The Board's own method of putting a stop to these frauds was to encourage the vigilance of the officers and prosecute offenders vigorously in the Exchequer. The increase in Exchequer prosecutions did in fact add urgency to the manufacturers' case for an alteration since, although the manufacturer was prosecuted, it was frequently the workman who had committed the offence:²⁷

Prosecutions were instituted against several respectable glass manufacturers who were charged with penalties to the amount of nearly seven hundred pounds on the evidence of discarded servants of profligate and abandoned character, who, for the base purposes of revenge and for the sake of sharing the Penalties, had themselves committed, unknown to their masters, the very offences charged in the informations. And in illustration of the dreadful effects of the system of Gauge it may be observed that a single workman can in One Hour commit offences which would subject his master to the payment of penalties to the amount of five thousand pounds.

Besides frauds, the manufacturers had also claimed in their memorial that the revenue would be benefited by allowing the drawback on export to be paid at exactly the same rate as the duty was paid; in other words to do away with the bounty. This too was an issue over which the Board was uneasy, particularly following the 50% rise of 1805 which had left a substantial difference between the duty paid and the drawback claimed - in the case of flint glass 16s 3d per cwt. It seems highly likely that the prospect of a reduced drawback was one of the most important factors that persuaded the Board into a change of opinion over the flint glass duties. This was expressed in a further Report to the Treasury of June 1810.²⁸

This report is still basically opposed to the manufacturers' proposals but does grudgingly admit that provided certain conditions are met "an

experiment might be made of this proposed mode for a limited time". In this case the Excise too had perhaps learnt a lesson from the bottle manufacturers' campaign and was ensuring that this time it would at least have some say in the final outcome. Had the Excise continued to oppose the flint glass manufacturers then it seems likely that they, like the bottle manufacturers, would have gone on to seek an Act of Parliament on their own account without the Board's approval. The 1810 report gives the impression of being far better informed than the previous report and was ostensibly made after extensive enquiry among the Board's officers well acquainted with the survey on glass. It still maintained that the new system would encourage fraud but that this might be averted by the proposed method of locking the lears and the weighing rooms. It also maintained that the manufacturers would find themselves greatly inconvenienced by the new system, but if that was what they wanted the Board could not be blamed for it. Finally there was the question of the bounty:

"Many officers are of the opinion that the amount of duty will be considerably lessened and therefore we think it necessary to lower the drawback to the rate of duty ... instead of paying a higher drawback as the excise now does."

Despite the grudging tone of the report it was an approval and the manufacturers proposals were incorporated into a Bill which became law in 1811 (51 G3 c.69). This was one of the longest and most complicated of all the acts concerning glass and certainly bears out the theory that the more complicated the act the more in the manufacturer's interests it was. Regulations covered the construction of the lear, the method of pulling the goods through it, the construction of the weighing and re-weighing rooms, the locking of the rooms and the methods of weighing the goods. All the alterations were to be done at the manufacturer's expense and he was bound by law to keep the new equipment in good repair at his own

expense. The officers were given extensive powers of search and the fines and penalties were considerable, ranging from £200 for obstructing an officer in his search, to £500 for removing goods before they were weighed or even for not renewing the yearly licence. This rose, as the manufacturers had suggested, to £100, but instead of being a licence on the glass house it became a licence on the lear, thus if a manufacturer had two lears he had to buy two licences. The Act, which commenced on the 1st August 1811, only covered a trial period of one year. Despite this and despite the considerable expense to which the manufacturer was put, like the bottle manufacturers, the switch to the new method seems to have been immediate and universal.

Between the time the flint glass manufacturers first proposed an alteration in the duty and their success in seeing it established in law, the method of charging the duty on crown glass had been altered in similar fashion to charging the duty on the manufactured goods. Unlike the other two branches of the industry this did not come about as a result of united action but the isolated action of one crown glass manufacturer, James Dixon of Dumbarton.²⁹ In January 1807 the Commissioners of Excise for Scotland were forced to take Dixon to court for refusing to pay the glass duty. His refusal was a protest against the unfairness of the gauge system which, particularly because it made no allowance for the contraction of the pots when they were heated, resulted in his being overcharged; the most widely used gauge system was the "dry dip" which calculated the duty by measuring the total capacity of the pot when cool, plus the dry inches at the top of the pot when the dry materials were first put in. To Dixon's delight the Solicitor General of Scotland instituted a full investigation into the complaint of over charging and found that 15% unavoidable shrinkage and contraction did in fact occur in the pots and

that therefore "the existence of overcharging being proved, a verdict must go to the defendant notwithstanding the prevalence of the system of charge". This result left the Scottish excise commissioners with two alternatives: they could either introduce a "wet dip" or gauging the red hot molten metal, which was not only harmful to the glass but highly dangerous, or they could make the charge on the manufactured goods and it was the latter method that they decided to adopt.

Immediately the charge on manufactured crown glass was introduced in Scotland, the English Board was petitioned, firstly by Joshua Bower a crown glass manufacturer of Leeds and secondly by the crown glass manufacturers of Tyne and Wear, demanding that the same system be introduced in England. Both petitions claimed that the petitioners were at a serious disadvantage in that Scottish crown glass was now able to undersell theirs in the market. The Board of Excise's response was predictable: first it prevaricated and finally, after having sent excise officers to Scotland to examine the new system, concluded in April 1808 that "our best officers are of the opinion that the revenue would be exposed to considerable risk and we cannot recommend altering the law on the subject". This, however, proved to be another occasion when the manufacturers succeeded in enlisting the support of the Treasury against the wishes of the Board of Excise and in May 1808 the Lords of the Treasury wrote to the Board of Excise directing them to prepare a bill on the subject "having taken into consideration the numerous representations of the manufacturers of glass concerning the inconvenience and hardship to which the trade is liable and it appearing that under the present mode the charge is unequal in different manufactories".

North-east manufacturers appear to have again played a decisive role in influencing Treasury opinion and their main argument appears to have been that the unfair advantage enjoyed by the Scottish houses operated as a loss not only to English manufacturers but to the revenue through the drawback system. Since 1805 the drawback had been paid at 7s 10d more than the rate of duty which was supposed to cover loss in manufacture and waste. . . through cutting the tables into squares. Dumbarton, it was claimed, was now able to make a profit from this situation in that as the duty was charged on the manufactured goods, the company lost no glass in the process of manufacturing and furthermore the company's export market consisted of the export of whole tables of glass to Ireland. According to figures produced by the north-east manufacturers, and sent in a personal letter from Sir Matthew White Ridley to the Chancellor of the Exchequer, Spencer Perceval, the amount paid out on drawback plus the expense of collecting the duty came to £600 more than the crown glass duty actually paid into the revenue from Scotland in the year ending 5 January 1808.

The north-east manufacturers were certainly consulted in the preparation of the bill which was drafted by William Huskisson, an under secretary at the Treasury. A draft of the bill was sent to the manufacturers for their comments in November 1808. On the whole they were pleased but certain points were amended and returned to the Treasury via Sir Matthew White Ridley:³⁰

Annexed are . . . all the objections or amendments the Trade at large are inclined to make all of whom wish to meet the ideas of Government as far as the nature of the manufactory will admit, it appears they have consulted those who do not understand the process of working glass metal from introducing clauses that the process cannot accommodate.

The amendments, which mostly concern the placing of the manufactured tables in the annealing arch, all appear to have been incorporated in the final act.

Lamb and Head went up to London in May to try and see Huskisson on certain points they were concerned about, and also to be on the spot to prevent any last minute alterations to the Bill as it passed through Parliament, which they were well advised to do.³¹

Mr. Lamb and I called at Mr. Dorrington's house at the House of Commons where we fortunately met Mr. Jackson making an alteration in the Bill to limit the size of glass squares to be exported not to be less than 12 superficial inches and up to 48; we prevailed on him to name up to 56 inches to Mr. Huskisson who consented.

Unfortunately they were not able to see Huskisson personally so wrote to Ridley begging him to take up the matter. There were two points in particular they were concerned with; the first was the postponement of the date that the Act would come into force, which allowed the Scottish houses further time to take advantage of the English houses in the market, the second concerned the drawback.

In drawing attention to the loss to the revenue through the bounty paid to the Scottish crown house, the north-east manufacturers had overstated their case and now faced the prospect of the bounty being withdrawn *entirely* and not just, as they had intended, to Ireland. Ridley was asked to pass on to Huskisson:

... the anxiety we feel respecting our foreign trade from the bounty being *entirely* withdrawn. We are confident it will lessen the export of glass most materially and as the trade at home is diminishing greatly we fear much we will have to curtail our workmen and manufactories To Ireland we do not wish any Bounty to be granted but to all other places we trust that it will be allowed.

Their argument was that even when the duty was charged on the manufactured tables, there was a further loss from cutting these tables into squares. However the government did not respond and in the Act of 1809 the drawback was reduced to the rate of duty.

The Act (49 G3 c.63) introduced a system, similar to the other branches of locked annealing arches and weighing rooms and a declaration by the manufacturer of the quantity of tables to be placed in the annealing arch. The Act only covered a trial period of 2 years but was renewed in 1811 when further regulations were introduced to tighten up the drawback; namely that no drawback could be claimed unless the tables were undamaged and the panes were regular shapes with each side measuring no less than $3\frac{1}{2}$ " , all other glass was to be deemed waste glass. One other point that must be mentioned is that the 1809 Act raised the duty on broad glass from 12s 3d to 15s. Why this was done is something of a mystery but may have been merely that the duty was considered too low for the article. In the original Bill presented to Parliament, the duty was proposed to be £1, but this was reduced to 15s during the Bill's passage.

The period 1777 - 1811 was, broadly speaking, a period when manufacturers saw their wishes listened to by those in high places and were able to influence the development of the excise on glass to quite a considerable extent. At the beginning of the period the tax was a simple one levied on all branches of the manufacture in an identical way. By the end it had been split into various branches, each with its own slightly different set of regulations designed specifically to accommodate the different manufacturing processes. Though the basic principle of charging the duty on the manufactured goods was identical for all branches (except plate glass) the regulations governing each branch were quite individual based on either the annealing oven of the bottle house, the annealing arch of the crown house, or the flint glass house hearth. These regulations had been introduced at the request of the manufacturers and in the case of flint and bottles the manufacturers had played a large part in planning them. Though apparently an increase in government interference in the

process of manufacture, the developments were almost certainly seen by the manufacturers as welcome improvements.

3. 1811 - 1825

To a certain extent the manufacturers had been spoilt by the liberal and sympathetic treatment they had received under the governments of Pitt and those influenced by him. The period 1811 - 1825 saw an alteration in the government's attitude towards the glass manufacturers to one that was not nearly so inclined to indulge their wishes. Whereas Pitt had understood the delicacy of the balance of supply and demand and the danger of upsetting the balance by over-heavy taxation, his successors adopted the less sophisticated view that the way to increase revenue from a particular industry was simply to raise the rates of duty and increase the regulations to prevent fraud. This period saw only one rise in the rates of the duty but it was a massive one: the notorious "double duties" of 1812 whose effects dominated the industry throughout this period. There is no doubt that this alteration in the government's attitude reflected the severe financial pressure on the country following the long years of war.

The attitude of the Board of Excise towards the manufacturers also underwent something of an alteration. Previously conflicts between the manufacturers and the Board of Excise had generally been won by the manufacturers on their appeal to the Government. Now, perhaps with the knowledge that the manufacturers would receive a less sympathetic hearing from the legislature, the Board began to take the initiative in questioning many of the concessions won by the manufacturers and in some cases seeking to do away with them altogether. The particular issues questioned by the Board were the drawback and the bounty (which was to be reintroduced in 1812). Not only did the Board begin to question the manufacturers' testimony as to the amount of waste they incurred in preparing goods for export but it also began to challenge the whole principle of a drawback.

In many ways, as we shall see, this represented a more realistic attitude on the part of the Board, but it also arose with the benefit of experience. Bounties had been in operation for over 20 years and there were ample statistics available from which to draw conclusions about their desirability from the government's point of view and not just the manufacturers'. All the Board's moves against the manufacturers were enacted under the banner of reducing loss from the revenue, which loss they tended to call "fraud" indiscriminately even though some of the losses were, as we shall see, quite legitimate.

(i) The double duties

The double duties of 1812 (52 G3 c.94) was arguably the Act that had the largest single effect on the glass industry. It affected all aspects of the trade; it affected demand which in turn affected the government's revenue which encouraged the Board of Excise to redouble its efforts to stamp out fraud. The duties were doubled purely for revenue reasons, following, no doubt, the example of Pitt's 50% increase in 1805 which appeared to have had no serious effects on the industry. However the 1812 Act differed from Pitt's in that the rise was that much larger and it included all types of glass, even bottles on which the effect was to be one of the most pronounced. Although ostensibly still adhering to the doctrine of taxing luxuries, glass was, like the other commodities whose duties were doubled, - hides skins and tobacco, - an article whose widespread use was the very aspect which recommended further taxation.

In introducing the budget the Chancellor, Nicholas Vansittart (though it was the work of the late Spencer Perceval), spoke optimistically of the possible consequences:³²

The next article which he should propose was also an Excise duty. It was that of glass. This duty had been considerably increased in the year 1805 but after an extensive enquiry among the manufacturers Mr. Perceval had been convinced that an additional tax equal to the present would not be injurious to the trade. It was not indeed probable that the consumption of this country would be lessened by the increase of price which this duty would occasion as glass was an article in very little use among the lower classes of society; and this was, so far as he could understand, the opinion of the manufacturers themselves, provided they were protected against foreign competition by sufficient duties on importation and by proper drawbacks on exportation. The product of this tax, calculating as before on the average of the last three years, would be £328,000.

Details of this "extensive enquiry" are not available but perhaps the fact that there do not appear to be any petitions to the Treasury against the double duties from the manufacturers indicates that they had in fact given their consent - provided indeed they received protection in the home market and a "proper" drawback on exportation. By "proper" drawback there is no doubt that Vansittart was referring to the drawback plus a bounty, of the type that, for flint and crown, had been abolished when the duty charge was switched to the manufactured goods. However the very evening that the Budget proposals were introduced as a Bill into the House of Commons, a separate Bill concerning the glass duties passed its third reading. This (52 G3 c.77) was an Act for granting additional sums to the drawbacks on flint and crown glass, sums that were exactly the same as those that had been abolished in 1809 and 1811. In other words the bounty was reintroduced. This Bill had been introduced into the House in May by Mr. Lushington of the Treasury and thus was certainly a Treasury Bill rather than a private effort by the manufacturers. There seems little doubt there was a direct connection between the re-introduction of the bounty and the manufacturers' apparently passive acceptance of the double duties. When the duties and the drawbacks were doubled later that year the manufacturers found themselves with an extremely attractive incentive to export; the doubled duty for flint stood at £4 18s per cwt., the

drawback at £6 10s 6d per cwt; the doubled duty and drawback for crown were £3 13s 6d and £4 18s per cwt. respectively.

But if the manufacturers had expected that demand would not be lessened by the rise in price that followed the double duties then they were soon proved over optimistic. There is no doubt that demand was affected and production declined as a result (see Fig. 18). The decline is underlined by the fact that even though the rate of duty doubled, the net revenue from the duties declined (see Fig. 19) Some of the worst effects were felt by the flint and bottle manufacturers who had traditionally supplied wholesale trades, such as apothecaries or soda water manufacturers, which used glass merely as a container. These trades frequently aimed at a popular, cheap market and a price rise of this size was not acceptable. An advertisement from the Newcastle Courant illustrates a typical response to the double duties:³⁵

The Cordial Cephalic Snuff

The proprietors are under the necessity of substituting Tin Cannisters for Glass Bottles. The latter article (in consequence of the double duty) making it impossible to vend the snuff in glass without a very considerable advance on their customers.

Substitutes such as tin or earthenware could easily be found for glass used merely as a container and it was as a result of the bottle manufacturers' complaints of the competition they suffered from the substitution of stone bottles, ^{that a tax was imposed on stone bottles} in 1812. The Excise report on the stone bottle tax of 1834 included a table showing how the duties had affected the price of glass³⁶

Period	Price	Duty
1811 to July 1812	40s per gross	4s 0d per cwt
to Jan 1820	" 52s "	" 8s 1d "
to Jan 1822	" 45s "	" 8s 1d "
to Oct 1825	" 42s "	" 8s 1d "
to Sep 1828	" 44s "	" 8s 1d "
to Aug 1829	" 42s "	" 7s 0d "
to Jan 1831	" 40s "	" 7s 0d "

Figure 18

Glass charged with duty 1805 - 20 (in thousands of tons)³³

	White glass	Bottle glass
1805	9.9	13.6
1806	9.1	13.5
1807	9.3	15.7
1808	9.1	16.7
1809	9.1	16.0
1810	9.1	16.5
1811	9.3	16.6
1812	7.9	15.0
1813	6.2	10.7
1814	7.0	11.7
1815	7.7	13.9
1816	6.9	15.4
1817	5.9	14.0
1818	7.4	15.5
1819	8.4	16.7
1820	6.7	12.8

Figure 19³⁴

<u>FLINT</u>	<u>Duty charged</u>	<u>Drawback</u>	<u>Net payment to the Exchequer</u>
1808-1812:	£852,279	£599,818	£610,469
1813-1817:	£1,241,810	£1,198,820	£599,002
<u>PLATE</u>			
1808-1812:	£135,729	£20,464	£115,263
1813-1817	£213,212	£193,029	£20,183
<u>CROWN</u>			
1808-1812	£801,559	£116,843	£684,716
1813-1817	£1,275,889	£310,112	£959,777

The report in fact concluded that the tax was an unnecessary protection since the major market for glass bottle was the wine and spirit trades which would never contemplate using stone bottles. Whilst it is true that glass did continue to be used for purely utilitarian purposes, it seems clear that the double duties did discourage a substantial part of the existing market, particularly for:³⁷

Those articles which before the imposition of the double duties by the statute of the 52 G3 c.94 were made of an inferior glass and sold to a very great extent but which are now, in consequence of such double duties, rendered unsaleable by the substitution of earthenware tin and other ware at less than one third of the price.

The effects of the double duties were not confined to market demand, they did much to bring both the Board of Excise's and the Treasury's attention back to the bounties and question their acceptability to the government. The doubling of the drawbacks had left the manufacturer with a greatly exaggerated incentive to export and, along with the falling off in demand at home, there is no doubt that many manufacturers lost no time in exploiting the situation with the result that the Board found itself paying out far greater sums for drawback than it had ever done before. This was quickly seen as a loss to the revenue and immediately suspected as fraud rather than the legitimate results of economic and political conditions. There is no doubt that at root the cause was the legitimate effects of the 1812 legislation but there is equally no doubt that certain manufacturers had acted with considerable cunning in exploiting the situation and in particular the generous drawback.

(ii) Ireland and the double drawback

The problem of large scale export to Ireland merely to claim the drawback was, as we have seen, not a new one. It had already come to the Board of Excise's attention in 1809 when the main offenders appeared to be the Scottish houses. This was evidently still the case in 1815 and the

most notorious practioner of the system was the crown house at Dumbarton. Indeed Dumbarton's trade with Ireland appears to have well deserved the description fraudulent even though it kept within the technical bounds of legality. In 1815 Dumbarton petitioned the Treasury³⁸ asking to be allowed to import cullet (broken glass) from Ireland without paying the countervailing duties imposed on imported glass from Ireland.³⁹ In reply to the Treasury enquiry, the Board of Excise reported that it was absolutely necessary to insist on the duties because of the abuses practised by Dumbarton and referred the Treasury to a report from the Scottish Board of Excise sent to its English counterpart in August 1814. This report stated that Dumbarton was in the habit of shipping irregular fragments of crown glass to Ireland for no other purpose than to obtain the drawback, breaking them up in Ireland and then relanding the whole as cullet in Scotland to be re-manufactured - which practice had actually been admitted by the Company in the course of a trial (in which they unsuccessfully tried to sue the Scottish Excise Board for £20,000 damages after an officer had failed to attend the packing of 200 cwts. of crown glass for export). The Scottish Board had thought it right to bring this matter to the attention of the English Board because, though they now insisted that the cullet from Ireland pay the countervailing duties, the English officers were not so strict and the Dumbarton Company had taken to re-importing it via Liverpool. As both the English and the Scottish reports pointed out, there were no crown glass houses in Ireland therefore any imported crown cullet must be English on which a drawback had been given.

The first attempt to remedy this abuse was an Act passed in 1814 (54 G3 c.87) imposing an excise duty on crown, plate and broad glass made in Ireland. Although none of these were actually manufactured in Ireland this measure allowed the imposition of countervailing duties on crown glass

exported from England to Ireland, thus equalising the two countries and abolishing the drawback to Ireland. As the measure only covered window glass it seems likely that this act was a direct consequence of the discovery of Dumbarton's practices. But astonishingly this Act was repealed a few months later at the beginning of the next session (55 G3 c.7). The reason for this sudden repeal appears as an episode in a short biography of Charles Attwood of the Tyne Glass Company.⁴⁰ Immediately after the original act extending the excise to Ireland was passed, in the month before it became law, both Attwood and the Dumbarton Company shipped a three year stock of crown to Ireland from the Clyde having first obtained legal advice that any fiscal bill could not be altered in the same session of Parliament. However, the Irish Treasury minister, Mr. Fitzgerald, introduced a clause into a completely different bill, the Irish Customs Bill, enacting that the glass duties take place retrospectively. This passed unhindered in the Commons and the Irish Customs seized the cargoes of glass. Attwood was furious, not unnaturally, for he stood to lose £20,000 in retrospective duties and remonstrated to Robert Peel, then the Secretary of State for Ireland. This proved fruitless so he sought the advice of a one time Attorney General, Lord Plunkett, who affirmed that a retrospective duty could not be imposed. Armed with this he returned to see Peel who was forced to admit that the duties could not take place retrospectively. However, to Attwoods great annoyance, Peel and Fitzgerald brought in a Bill in the next session to repeal the duties and after lying for many months on the open quay at Dublin the stock of glass had to be disposed of at great loss.

This story is corroborated by the debate in the Commons on the Irish Glass Duties⁴¹ which occurred when Fitzgerald was forced to ask Parliament to repeal an Act he had himself introduced in the last session. His

embarrassment, not only at being put in such a position but also having to admit that a similar Act might be introduced in future, is evident, as is his anger at the unfair speculation of certain manufacturers (he did not mention the offending parties by name but referred to a petition sent to him from Newcastle merchants protesting against the retrospective imposition of the duties). Fitzgerald justified the repeal on the grounds that the duties would now be unproductive, and also on the grounds of public good having heard that those who had accumulated a stock in Ireland intended to charge the full price on it; the price that would have been charged had the glass paid duty. On being questioned and indeed censured on the "extraordinary circumstance" of passing an Act on the 14th July and by a subsequent Act back-dating it to the 6th, Fitzgerald said that the countervailing duty was a customs duty (which was not correct, it was managed by the Excise) and as was usual with Customs Acts should have been dated from the date of the resolutions of the Committee on which the Act was founded. In doing so he admitted:

that the principle duty under this Act, though obviously one of excise, was the countervailing customs duty which was to be levied on importation.

Which only led to further embarrassment as comment was made on the novelty of subjecting to excise in Ireland an article not of Irish manufacture.

Sir Matthew White Ridley raised the question of the lack of consideration the Irish Treasury had displayed towards the English manufacturers "for they would not have imported the quantity they had done except on the faith of the first act.". Which, understandably, provoked a long and rather rancorous outburst from Fitzgerald verging on a personal attack on the honourable baronet whom he obviously considered to be one of the guilty speculators. In reply to a question in a further debate, Fitzgerald

repeated what the gist of this outburst was, that the English manufacturers needed no recompense from the government:

Mr. Fitzgerald thought it was not necessary to attend to the interest of the glass importers who had created a monopoly in the Irish market and who had bought up for that purpose the only glass manufactory in Ireland. Far from suffering loss, the exporters of glass to Ireland had a drawback exceeding by 15s 9d the sum paid by them as duty; and who charged the people of Ireland £7 for the articles which cost them £2.

The government was not to leave the situation as it stood. Throughout 1815 various solutions to the Irish glass problem were brought into Parliament, tried and tested and, after heavy amendments, dropped. The complications of the Parliamentary history suggest firstly that the Treasury was uncertain as to what the best course of action would be, and secondly that there was a body of interest in the Commons able to amend the resolutions as they were presented; after the exposure of the issue in the debate on the Irish glass duties interest was possibly wider than it might otherwise have been.

Almost as soon as the Irish Act had been repealed, a Committee of the House was ordered to consider the drawbacks on glass. Plainly aware of the mood of the moment and the possibility that the bounty would once more be entirely withdrawn, the crown glass manufacturers of the Tyne and Wear (not including, interestingly enough, Charles Attwood) sent a petition to the Treasury⁴². It was sent directly to Lushington by Matthew White Ridley with a covering note telling him that the manufacturers had appointed a deputation to go up to London and see him personally on the matter. The petition restated the desirability of the bounty from the manufacturers' point of view; how it enabled the British manufacturer to meet those of Bohemia and France on good terms, which was especially important following the recent pacification of Europe. It emphasised particularly the importance of the bounty to the American market taking care to point out that the young

American glass establishments enjoyed the positive support of their government, "protective duties give them every encouragement. If the British government withdraws its support as our difficulties increase so establishments in America will prosper."

If these arguments might have swayed Pitt they appear to have had little influence on Lushington or Mr. Brogden, the Secretaries to the Treasury. The resolutions of the committee presented on March 1st recommended the complete repeal of the 1812 Act re-establishing the bounty and the repeal of that part of the double duties act that doubled them. In other words the drawback was to be reduced to the level of the duty. However after the first reading an amendment was made and passed, the addition of the words "to Ireland" which would have limited the reductions to Ireland only. Brogden and Lushington were directed to prepare a bill which they never presented, presumably because they were not happy with the amendment.

On March 13th another committee was ordered, with the wider brief of considering all the duties on glass. These resolutions proposed that the drawback to Ireland be reduced, elsewhere to remain the same. This passed without amendment. Further resolutions presented on 18th May made allowances for the Irish countervailing duties to be reduced to a similar level and, most importantly, that the import of broken glass into Great Britain from Ireland be completely prohibited. Again these passed but no Bill was brought in. In June Brogden presented yet another set of resolutions for the house to consider. These proposed raising the Irish countervailing duties instead of lowering them thus virtually prohibiting any commerce at all in glass between the two countries. These were rejected by the House. More important though were the resolutions concerning crown glass. For the first time a distinction was made between crown glass exported in tables

and crown exported in squares. The resolutions proposed to lower the drawback on the former and retain the bounty for the latter. These resolutions were passed with some small amendments and at last a Bill was brought in.

The resulting Act (55 G3 c.113) effectively reduced all drawbacks to Ireland to the level of the duty (£4s 18s for flint and £3 13s 6d for crown). The bounty was retained for all flint glass exported elsewhere and crown glass cut into squares; crown glass in tables, wherever it was exported, was only eligible for the reduced drawback.

The bounty on crown had always been understood to compensate for the waste incurred in cutting the tables into squares. Tables incurred no such waste and it is at first sight surprising that provision had not been made for this fact before. The explanation is that the export of crown consisted almost entirely of squares rather than tables since squares were less fragile and more likely to survive a sea voyage. This point had been urged on Isaac Cookson jr. by the Bristol crown glass manufacturer Lucas Chance in a letter of December 1814. Chance was alarmed at the recent resolution of the House of Commons withdrawing the bounty completely and urged Cookson to gather the north-east trade and "exert your influence to prevent so ruinous and unjust an act from passing into Law". He encouraged Cookson to make the most of the fact that the bounty was a legitimate allowance for cutting the tables into squares:⁴³

... it is evident that the present excess of drawback is no bounty, it being no more than a bare compensation for waste, to enable the manufacturer to export his glass free of duty... crown glass exported in tables is subject to no other waste than that of breakage in annealing and consequently requires but little excess of duty beyond the rate of duty. It is on squares that the waste principally arises and it is on squares only that glass can be exported into the American states and other distant parts. From the very great liability to breakage and the expense of freight, glass in tables cannot be exported thither.

After the Act separate accounts were kept for crown glass exported in tables and crown glass exported in squares claiming the higher drawback, from which it is quite clear that tables amounted to only one fifth of the total export of crown. Isaac Cookson told the 1835 Commission that his firm only exported tables to the Baltic.

The next drawback to come to the attention of the Board of Excise was the drawback on plate glass. It was brought to its attention by Isaac Cookson following his recent establishment of a cast plate works. Plate glass, since it was confined to two firms one of which - the British Plate Glass Company - operated largely under its own Acts of Parliament, had not seen many alterations in its duty since the eighteenth century. It was the only branch of the glass industry still to pay the duty on the gauge and the proportional rate of drawback to the duty remained that which had been established by Pitt in 1794 which, in 1815, meant that plate glass paid a duty of £4 18s per cwt. and received a drawback of 6s 6½d per square foot. The problem of correlating a duty paid by weight and a drawback paid by area was, of course, considerable but the relationship between the two had been judged fair in 1794 according to the waste that the British Plate Glass Company then produced in grinding and polishing its plates. Even assuming that it was still in 1815 a fair sum for polished plates (though there is no doubt that the Ravenhead Company had improved its techniques since 1794) what it certainly was not fair for, from the revenue's point of view, was the export of "rough plate" which had not been ground or polished. It was this anomaly to which Cookson brought the Board's attention in 1816.

To be fair to the Board the overlooking of such an obvious anomaly was not to be blamed on its short sightedness. Until 1815 when Cookson

adapted his blown plate house at South Shields to manufacture cast plate, the export of rough plate was unknown. The Ravenhead Company was concerned entirely with the polished article, and had long since perfected its techniques and there was no reason at all for it to produce rough plate. Cookson, however, was embarking on a new venture and, as he told the 1835 Commissioners, his original attempts were so poor that he exported plates unpolished merely for the sake of getting the drawback. Thus he discovered that the legislation was unnaturally to the manufacturer's advantage. The Commissioners noted his forbearance in not making greater profits from the affair, but he had evidently got something from the episode. The Surveying General Examiner, William Hetherington, told the Commissioners that Cookson did not realise what was happening "until he had pocketed about £70,000 and then he made the matter known to the government.". Figures for the plate drawback confirm that the revenue paid out a substantial sum under this heading (Fig. 20) during 1816 and 1817.

The anomaly was stopped by a clause tagged on to a Bill concerning the excise duty on beer which was passing through the Commons in June 1816. By this (sections 3-7, 56 G3 c.108) the drawback on unground plate was reduced to £4 18s - the duty rate; on polished plate the duty remained the same. The Act also included provision for the manufacturer to break down plates in the weighing room if he found them unfit, and be allowed the equivalent of the weight in the duty charge. This, one can assume, is something asked for by Cookson since it was the problem of what to do with the substandard plates that had led him to export in the first place.

Unfortunately the details of Cookson's approach to the government are not known. He does not appear to have gone through the usual channels of petitioning either the Excise or the Treasury. In the Ridley papers there is evidence of his involvement in a subsequent amendment to the Act in 1818

Figure 20: Duty received on plate glass and amount drawback 1814-30⁴⁵

Year ending 1 Jan	Quantity charged cwts.	Rate of duty per cwt.	Amount of duty £ s	Quantity exported sq. ft.	Rate of drawback per ft.	Amount of drawback £ s
1814	11,087	£4 18s	54,326	26,496	6s 6½d	8,256
1815	9,254		45,344	37,510		12,122
1816	9,706	"	47,559	138,997	"	45,463
1817	7,509		36,795	190,144		62,192
1818	4,388		21,502	39,195		12,820
1819	8,473		41,517	30,815		10,079
1820	{ 3,923 4,575	{ £4 18s £3 0s	32,951	{ 29,907 646	{ 6s 6½d 2s 9d }	9,870
1821	9,005		27,191	6,671		918
1822	9,986		30,014	6,108		839
1823	10,032		30,226	10,840		1,490
1824	12,106		36,319	10,901	"	1,498
1825	13,922		41,766	8,765		1,136
1826	15,642		40,926	12,222		1,680
1827	12,937		38,913	9,406		1,293
1828	14,807		44,421	13,056		1,795
1829	17,665		53,088	11,910		1,637
1830	14,470		43,480	12,201		1,677

(The figures for quantity charged do not include small amounts of unpolished plate which, after 1819, were charged at the old rate of £4 18s)

(58 G3 c.33) which extended his allowance for broken down plates by allowing 110lbs gauged metal for every 100 lbs weight of plates broken, thus taking into account the slight loss from ladling the cast plate. Cookson was sent a draft copy of this bill for his approval by Ridley⁴⁴ who also sought information from Robert Rough, Cookson's London agent.

Thus by 1818 the drawbacks on the three branches of glass that claimed bounties, crown, flint and plate, would seem to have been altered to the Board of Excise's satisfaction, but this was not so. Bounties were still claimed on glass exported to foreign parts excluding Ireland and on polished plate. In the Board's opinion the system still permitted extensive frauds to be practised on the revenue and its attitude towards bounties was succinctly expressed in a report to the Treasury in 1815.⁴⁶ This report commented on a petition sent to the Treasury by two of the three remaining broad glass manufacturers in England pleading that they too should be given a bounty. The petition claimed that broad glass, like crown glass, incurred unavoidable waste in being cut into squares and this could be fairly met by a bounty of 10s per cwt. The Board was not at all amused by this request and firmly told the Treasury that "the granting of high drawbacks is dangerous to the revenue - as has been fully experienced in crown glass".

This conviction was expressed with even more force in a report presented to the Treasury in April 1818⁴⁷ on the subject of defects in the glass duties along with suggestions for their remedy. In this report further reductions of the drawback and the abolition of the bounty are suggested as a matter of urgent necessity. The whole basis of this report was a comparison between the revenue in each of the three branches of plate, flint and crown, for the five years before and after 1812. These showed that the flint and plate revenue had actually diminished since 1812 and the crown revenue had not increased as much as might have been expected. (Fig. 19)

The Board's analysis of the cause of this diminution was, however, perverse. It refused to acknowledge the one obvious cause, the diminished demand caused by the double duties, but explained the diminution by the over generous drawback and by frauds: in the case of flint glass frauds

directly connected with the charge on the manufactured goods:

we are inclined to attribute it more to an alteration which took place in the mode of charging the duty on flint glass about the time when the double duty was imposed, and to the state of the drawbacks which we are of the opinion are much too high in all the glasses, than to the depressing effects of a double duty on the trade and the diminished consumption of the article consequent thereon.

Perhaps as a result of its experiences with crown and plate glass, the Board's arguments against the drawback on flint appear more sophisticated. It noted that although the bounty on flint was mainly given to compensate for the waste sustained by cutting, "the increased value of the article after cutting more than compensates for the loss of drawback by diminished weight". It also pointed out that in its experience, though not statistically provable, only a small proportion of flint glass exported was cut, most of the export trade consisting of plain undecorated articles. The Board recommended that the bounty be completely withdrawn from flint glass and the drawback reduced to the level of the duty.

A similar recommendation was made for crown and plate glass. With crown the Board noted that the increased value of the article after having been cut into usable squares more than compensated for the loss of duty. With plate the problem was more complicated since the duty was levied by weight and the drawback on polished plate calculated by area, yet the Board was in no doubt at all that this was the most scandalous of all the bounties, "in the attempt to adjust the relative equality of these two different measures, the revenue would appear to have been greatly imposed on". As proof it enclosed a calculation suggesting that 48 polished plates twelve inches square would be charged £6 13s 9½d duty but would receive a drawback on export of £15 14s. The Board's argument against the plate glass bounty were, however, over hasty, as was its erroneous calculation. In comparing the sums paid out on drawback before and after the double duties,

the Board had failed to take into account the large sums unintentionally paid out to Isaac Cookson on unpolished plate, which fault had been remedied in 1816. The Board itself recognised its oversight in a further report on plate sent to the Treasury in May 1819.⁴⁸ This report gives the impression of being far better informed on the subject and had indeed been made after consultations with the two plate glass manufacturers. According to this report both manufacturers and the Board had come to an agreement on the best way to reform the plate glass duty and both sides had made some concessions. For its part the Board recognised that the major defect in the plate glass duty, the drawback on unpolished plate, had already been repaired but it still believed that "the drawback on polished plate is higher than warrants and furnishes the temptation to fraud". The manufacturers conceded that the drawback was indeed unfairly high and both sides agreed that 4s 6d per square foot was a more realistic rate. The most surprising concession came from the Board in that for the first time it admitted that the double duties were in some degree responsible for the diminished revenue:

The duties (on plate) are not large and the manufacture is greatly diminished since the double duties (in 1812 11,707 cwts were charged, in 1817 5,396 cwts.) therefore the trade might be encouraged and the revenue eventually benefited by reducing the duty to £2 9s and the drawback to 2s 3d per square foot.

This was a remarkable compromise in view of the Board's suspicions of the other branches of glass and its refusal to admit the effects of double duties on them. It perhaps can only be explained by the fact that at this period there were only two plate houses in England and there was evidently a high degree of personal contact between the manufacturers and the Board.

The subsequent Act of 1819 (59 G3 c.115) reduced the duty on the materials used in the manufacture of plate glass "in sheets $\frac{1}{8}$ " - $\frac{5}{8}$ " thick made for the purpose of being ground and polished" to £3 per cwt. and the

drawback was fixed at 2s 9d per square foot, slightly more than the Excise's original proposal. This Bill also included a clause that was to prove a useful resort for manufacturers wishing to improve optical glass. "It shall be lawful for the Lords of the Treasury to alter the whole or part of the regulations as they may judge necessary for the better selection of glass adapted to the making of optical instruments.". From the excise returns (Fig. 20) this measure was a highly successful one; production increased, the revenue eventually increased and the amount paid out on drawback was reduced.

(iii) Flint glass and the gauge

The Board of Excise had never really accepted the loss of the gauge in flint glass. Although the Report to the Treasury of 1818 was the first official resurrection of the issue, the Board had been pursuing it with vigour through the Court of the Exchequer ever since 1811. The 1811 Act which had established the duty on the manufactured goods brought in its wake a series of prosecutions against flint glass manufacturers who were accused of removing goods from the weighing room before they were weighed. During these trials the Board made ample use of the opportunity to denounce the new system which had, it maintained, opened the door to fraud. This firm conviction added zeal to its efforts to seek out fraud in these years indeed it may have led it to see fraud where none had occurred (see section 5iii). The evidence against the manufacturers in many cases rested on a comparison between the quantity of metal gauged before manufacture and the weight of manufactured goods that paid duty. The 1811 Act had specifically said that gauging of the metal was not un-lawful and the Board had directed that gauging continue and the quantities be entered in the books to act as a "check". As the manufacturer was no longer compelled to use all the fluxed

metal - he could use only the best metal from the middle of the pot and re-flux the rest if he wished - the gauge was useless as a check, but this did not deter the Board from using it in trials as positive proof that fraud had occurred and manufactured goods had been removed without paying duty.

The Board's campaign against the new system culminated in its report to the Treasury of 1818 in which it maintained that the system had resulted in a considerable loss of revenue. It repeated the earlier arguments: the trader had greater facility to remove goods from the weighing room before they had paid duty, there were more opportunities for collusion with the officers ("and glass houses are frequently under the care of inferior officers") and that not all goods needed annealing so some were removed before they even got to the weighing room. The Board compared the total gauge figures for the years following 1811 with the figures for the quantity of glass that had paid duty. If the duty had been on the gauge, it claimed, the government would have received an extra £513,746 in duty. It pointed to the diminution of revenue as a direct consequence of the new system, firmly denying that the double duties had had any part in it at all: "We think there is no need to lower the duties because the loss to revenue comes from other causes, the drawbacks and evasions". As we have seen the Board also recommended that the drawbacks be reduced.

The 1811 Act was to expire at the end of March 1818. The flint glass manufacturers were not unaware of the danger that it would not be renewed and their apprehension increased when the nature of the Board's report to the Treasury became known. The main protest from the manufactures took the form of a printed leaflet⁴⁹, and this was supplemented by a petition⁵⁰ of the flint manufacturers of Tyne and Wear to the Treasury in March 1818.

Both mention the manufacturers' dismay and concern at learning of the Excise's recommendations in the report of 28th February. The printed leaflet restated at length the "dreadful effects" of the system of gauge and described the new system with its extensive checks against fraud. The brief argument consisted of countering all the points raised in the Excise report. In particular it denied the justness of the comparison between the gauge figures and the manufactured goods. It ended with an eloquent plea for the retention of this "just and equitable" system and a dire prediction of the consequences if the "injurious and oppressive" one should be re-introduced:

The manufacturers feel it incumbent on them explicitly to state that if the renewal of the system of gauge should be again resorted to, they will be driven to the Painful Necessity of abandoning a Trade so surrounded with Difficulties and so Pregnant with Ruin and Destruction to their Fortunes Happiness and Characters.

The petition from the north-east manufactures (which seems to be the only one from a particular area) contained similar arguments but argued far more strongly for the retention of the high drawback. It claimed that despite its apparent high rate, the drawback only just covered the losses which were sustained on export. These they listed as breakages, cutting, loss of interest on the duty from the time it was paid until the time of receiving the drawback, annual licenses, customs duties and duties on raw materials. All of these were expenses that would have to be passed on to the foreign consumer if the drawback was reduced.

The interest of the manufacturers seems to have won the day for in April 1818 the Parliamentary Commission under Brogden recommended that the flint and window glass Acts be continued. This continuation was only for a further year and in 1819 the issue came up again. A further Excise report of 1819⁵¹ recommended once again that the gauge be re-introduced for flint glass and that the drawback be reduced. There was however a

slight modification of its position since it was suggested that if it proved impossible to re-introduce the gauge, weighing the waste might provide a check on the manufacturer and discourage fraud. This suggestion was taken up as a suitable compromise and an Act (59 G3 c.104) passed in July 1819 provided that the manufacturer had to collect all the waste metal and skimmings from each weekly making. The officer was to pick over and weigh the waste metal and if the total of waste plus manufactured goods did not amount to 98% of the gauged metal the deficiency below 98% was to be charged with duty.

This Act added a further twist to the already over-complicated life of the flint glass manufacturer but it was perhaps bearable as an alternative to the complete re-introduction of the gauge. As a compromise it appears to have worked well. There are no petitions from the manufacturers complaining about it and the Board of Excise appeared to have relaxed its campaign to re-introduce the gauge as a result of this Act. However in 1825 the duties on flint glass were completely remodelled and the gauge system re-introduced.

The re-introduction of the gauge in 1825 appears to have been accomplished with the consent of the manufacturers. If they were so opposed to it in 1818 why were they not in 1825? The answer seems to lie in a comment of the 1835 Commissioners which speaks of the manufacturers' willingness to submit to the regulations for the sake of the security they are supposed to provide against competition from fraudulent traders. By 1835 competition from fraudulent traders was the predominant preoccupation of the manufacturers and there is every indication that this was already a problem in 1825. Fraudulent competition was something that all fair traders faced but it was more of a problem for flint glass than for any other branch. There was competition from illegal "cribs" who melted down

glass and manufactured small moulded articles and there was competition from licensed manufacturers who somehow managed to evade the duty. The extent of both these frauds was such that in 1825 the manufacturers and the Board of Excise seem to have united to work out measures that would tighten up the control of fraud.

The 1825 Act (6 G4 c.117) was similar to that of 1818 in that it enacted a combination of the gauge and the weighing of the waste and the manufactured goods. Whereas the previous Act had used the gauge as a check on the manufactured goods, now the goods acted as a check on the gauge and the duty was charged on the gauge. It was in effect a re-introduction of the gauge but it was a very different and far more complicated system than the previous one. The complications were largely the result of trying to meet the manufactures' old objections to the gauge and this Act is perhaps the prime example of legislation that was terrifyingly complex because the manufacturers had had a hand in framing it. For every 1,000 lbs gauged the charge was £12 10s with no deductions or waste allowances. Instead the manufacturers were required to work out all wares by 6 o'clock on Saturday evening, lade out all the waste metal which would then be gauged and the total deducted from the gross gauge. The wares would be weighed in the annealing rooms as before with the same regulations about locking and unlocking the weighing rooms and lears. Every 6 weeks a comparison of the gauge and the weight of the manufactured goods was made and if the goods exceeded the gross gauge by an amount greater than 50% then the manufacturer paid an extra 6d per lb on the surplus. This complex system was usually summed up as in effect a charge of 6d per lb. The regulations accompanying this basic plan were legion and included strictly laid out procedures for a variety of situations such as making coloured glass, improving the colour

of the glass in the pot and recharging pots. Many of these regulations must have been introduced by the manufacturers and their influence is also seen in a clause whereby any workman maliciously adding material to a pot after it had been gauged was liable to conviction and three months' hard labour: one of the manufacturers' chief complaints about the previous gauge system had been their own liability for the actions of their workmen. The drawback was fixed at £29 3s 4d per 1,000 lbs. (this was usually summed up as 7d per lb.) with two important provisos that the glass was not entitled to drawback unless it was of a specific gravity of 3,000 and unless it was worth at least 11d per lb. in the home market. This was obviously intended to put a stop to the export of inferior glass. In practice it was to give rise to a lot of confusion, particularly whether "the home market" meant the London market where standards of quality were high or the glass manufacturers' home town market. This became a problem when glass was exported, as it frequently was, via London.⁵²

One of the most important aspects of the Act was that it extended the flint glass duties to Ireland. This too was seen as a measure against fraud for smuggling of duty free glass from Ireland to England had become an enormous problem both for the Excise and the English flint glass manufacturers. The problem was highlighted in the Report of the Commissioners of Excise Inquiry into the Scottish Excise, published in 1825.⁵³ Briefly, the situation described in that report was that the Scottish flint manufacturers were finding their home market severely threatened by increasing quantities of cheap glass smuggled from the Irish flint glass houses, particularly the ones in the northern provinces "which only exist by the facility they have in smuggling their goods into Great Britain and are chiefly set a-going for this purpose to the ruin and destruction of the fair trader here". The report strongly recommended the extension of the duty to Ireland and

it was acting on its recommendations that the 1825 Act was brought in.

The 1825 Act was not as successful as might have been hoped. By the time of the 1835 Commission it was clear that the measure had not succeeded in suppressing evasions and that the minuteness of its regulations was proving a considerable inconvenience to the fair trader. This will be described in more detail in section 4.

(iv) Crown glass and Ireland

The 1825 Report which had drawn attention to the smuggling of flint glass from Ireland, also drew attention to the Irish situation as respects crown glass. Crown glass was being smuggled from Ireland to England but as there were still no crown houses in Ireland the glass was originally English which had been exported on drawback. The Report therefore had recommended not the extension of the crown duties to Ireland but the complete abolition of the drawback to Ireland. This would deter English manufacturers from exporting to Ireland and would thus solve the smuggling problem.

Nothing was enacted until 1828 but there are a number of letters in the Ridley papers⁵⁴ which indicate that the Treasury was working out its proposals in 1825 and seeking the manufacturers' opinion on them. The letters contain the manufacturers' opinions on various proposals put to them by George Dunn, Matthew White Ridley's manager, to whom the proposals had been sent by the Treasury via Sir Matthew White Ridley. Dunn reported back to his employer to be passed on to the Treasury. It is an interesting example of the informality of the channels of communication between the manufacturers and the government. It seems likely that similar letters were exchanged over other issues, if so it is unfortunate that these too have not survived. On 14 March, Dunn told Ridley that he had had a meeting with Cookson, Cuthbert, Mr. Waldie of the Northumberland Glass Company,

Richard Shortridge and Mr. Dixon of Dumbarton who was passing through the area on his way to London. Dunn was afraid that the latter two "who are the greatest exporters to Ireland" would have been against the measures he proposed to them but as it turned out they were all in agreement. These measures were the abolition of the drawback to Ireland and a reduction of the duty to 60s per cwt.:

We were quite unanimous in thinking that the minister might reduce the duty to 60s per cwt. which is now 73s 6d per cwt, charging the same sum in both countries and no drawback to Ireland. The general opinion is that no more than two fifths of the glass imported into Ireland is used, the other three fifths all smuggled back into England and Scotland; although the price of glass in Ireland would in this case appear high - little of that would be felt by the lower orders of people and it would completely put an end to smuggling and give the fair trader a chance.

Dunn wrote again on the 23rd March after having put an additional proposal to the manufacturers . They, and Dunn himself, were not so favourable to this which was ^{the} reduction of the duty to 40s per cwt. and no drawback to any foreign parts at all:

They are decidedly against the measure of discontinuing the drawback to all foreign parts - the exports from our works have been very little for many years but we reap the benefit by others who do a great deal in that way by leaving us the home market for our inferior glass called CC which is generally exported. If the measure is adopted the export trade will probably be little for at least one year therefore large stocks of that quality will be on hand.

Dunn himself was against the measure and calculated that if the drawback was discontinued it would mean a price rise from 38/- per crate (exclusive of freight) to 80/- per crate in those places which now enjoyed the drawback. He felt unable to predict what the consequences of this would be:

But the question is, can either the Irish or the Canadians or the merchants in the Baltic supply themselves in any other manner with so good an article and so reasonable as that from England if the duty was reduced to 40/- without drawback? This will be for the consideration of the ministers. No doubt it would suppress smuggling.

The ministers evidently decided that this measure would do unnecessary harm to the export trade and the proposal was never put forward.

Dunn's letter of the 25th^{also} contained some gossip about Dixon of Dumbarton which indicates that despite all the measures taken against him he was still thriving on his trade with Ireland and was still stockpiling glass there. Dixon had given evidence to the 1825 Commission on the Revenue in which he admitted that a lot of what they exported to Ireland was cut up and smuggled back into England "but think the quantity is over-rated". His evidence also confirmed the poor quality of the glass that was shipped from the Irish market "the Irish CC is of such coarse quality that it is seldom used in Great Britain". This was another reason why export to Ireland was so popular with English manufacturers, not only did it furnish them with a quick and easy drawback but it enabled them to make the fullest use of their materials by working out the poor metal in the bottom of the pot; metal that was not usually fit for manufacture. Dunn confirmed this by a comment on the effect of abolishing the drawback on the new Lancashire crown houses:

I have reason to believe that the large crown glass house at Warrington near Liverpool would never have been built two years ago but for the Irish trade for both these two other houses send all their coarse glass to Ireland, by such a means they are enabled to send the cutters in London and elsewhere a finer assortment, nor such as we can. Although the young houses won't want too large a capital (if the duty is reduced) they won't be able to work their pots so low as they now do and therefore won't benefit much. I am confident that it is the best thing that can happen for us.

Though Dumbarton was the most notorious exporter to Ireland there is no doubt that every English and Scottish manufacturer made use of the system when the opportunity presented itself. Even Dunn, who told Ridley that they had about 130 crates of export glass on hand at the present time "but the moment I can get a ship will ship it for some port in Ireland and will use extraordinary exertions to reduce our coarse stock of glass as low as possible".

Despite all this consultation with the manufacturers in 1825, no alteration was made to the crown glass situation until 1828 (9 G4 c.48). In this Act none of the measures previously proposed to the manufacturers were adopted. Instead, following the example of flint glass, the duties on crown, broad, bottle and plate glass were extended to Ireland. No alteration was made to the rates of either duty or drawback except for a small provision restricting the drawback to the Channel Islands to those articles whose drawback was low; neither polished plate nor crown glass squares were permitted to claim drawback. As with the previous attempt to extend the window glass duty to Ireland it was solely a measure to abolish the drawback claimed by English manufacturers when exporting to Ireland since neither crown, broad or plate glass were manufactured in Ireland.

4. 1825 - 1845

If the years following the imposition of double duties saw a tightening up of the Excise's regulations on drawback and frauds, the years after 1825 could be described as ones of relaxation. Much of the financial pressure on the Treasury had been lifted and this was even sufficient to allow some reductions in the rates of duty during this period; the bottle duty was reduced in 1828, the flint duty in 1835 and 1844. The easing up of pressure was reflected in the relationship between the manufacturers and the Board of Excise. This was a period that seems to be characterised by mutual understanding on both sides, with far less suspicion of the manufacturers displayed by the Board. Most of the discordant points had by this time been fought over and compromises achieved; the industry had completely adapted to working within the confines of the excise regulations and the Board appeared satisfied with the system. The few major alterations that did occur during this period were largely the result of new technical developments and were largely accomplished with the minimum of disagreement. The one exception to this harmonious state of affairs was flint glass where the re-introduction of the gauge in 1825 had resurrected all the old problems of waste allowance and this necessitated quite substantial amendments to the legislation.

However during this period it was not solely the various relationships between the Board of Excise, the Treasury and the manufacturers that brought about changes in the glass duties. For the first time in its history the tax found itself the subject of considerable attention from a relatively disinterested body of opinion, political economists, and it was the opinions and activities of the political economists that proved to be perhaps the major influence on the glass duties during this period.

In many ways the glass tax was the ideal target for the political economists who saw the artificial and distorted system of taxation established during the long years of war as a millstone weighing down the exertions and industry of the country. Not only did the glass duty restrict the home industry by a most spectacular set of "vexatious regulations" but statistics existed to prove that the tax was affecting consumption in an adverse way. Brougham pointed to this in 1817:

The duties on glass were nearly doubled in ten years; the produce of these duties has not sensibly increased at all. Here then is a destruction of the glass trade to the amount of one half its whole bulk without any direct gain to the revenue and with a very certain loss to it in other branches connected with the diminished consumption.⁵⁵

The glass tax provided real examples of more or less every objection the political economists had to restrictive taxation. It encouraged monopolies by preventing small capitals from entering the trade, it halted the free progress of invention and improvement, its regulations used up unnecessary amounts of capital, it distorted the natural price of the article, it checked consumption, its high rate furnished a motive to fraud, the cost of management was high and therefore a loss to government. It offended in every way. Although taxes on luxuries were theoretically approved of the glass tax could no longer shelter behind this defence since glass, like windows which were originally taxed as a luxury, increasingly was seen as a necessity. The duties thus had a pernicious effect on the health of the people by discouraging both adequate ventilation and the use of hygienic containers for food and medicine. According to McCulloch, the glass duties were the "most questionable" of all those under the management of the Excise.⁵⁶

There seems no doubt that it was the adoption of these economic doctrines by those in power that lay behind the denunciation and eventual repeal of the glass duty. It was certainly not the result of a manufacturers'

campaign nor indeed of the Board of Excise suggesting that the amount of revenue the tax yielded was no longer worth the trouble of managing it. The point at which the changing political and intellectual climate brought repeal of the glass duty into the political arena as a real possibility can perhaps be fixed at 1830 for by this date it was clear that the tax had been adopted as an issue by those in the Whig opposition party associated with a Ricardian economic policy. The publication of Henry Parnell's Financial Reform in the spring of 1830 and its expression in Parliament by Poulett Thomson in his speech on injudicious taxation made this quite clear. Poulett Thomson singled out the glass tax along with the taxes on paper and printed calicos as "peculiarly oppressive and peculiarly deserving of inquiry"; and of these three the most devastating disapproval was reserved for glass.⁵⁷

A miserable duty, amounting to only £500,000 and upon which a charge of 10% is made for collecting is allowed to impede our native industry and to put a stop to all improvements and be a source of endless fraud.

Poulett Thomson's denunciation of the glass tax was impressive and it is hardly surprising that when, the following year, the Whigs came to power and Thomson was installed at the Board of Trade, expectation that the duty would soon be repealed ran high. Before looking at the prolonged attempts to repeal the duty, however, the various alterations made in the tax during this period must be described.

(i) Flint glass

Flint glass was the only branch to see alterations in both the regulations and the rates of duty during this period. The re-introduction of the gauge in 1825 had created many difficulties and the Act was considerably modified in the light of experience in 1832 (2 & 3 W4 c.102). The modifications were largely suggested by the manufacturers and the 1835 Commission makes it clear that there had been considerable consultation between the Board

and the manufacturers. The main alteration was that the proportion of manufactured goods required to be manufactured from the gauged metal was reduced from 50% to 40%. The rate of duty was also altered and slightly reduced to 20s per 100 lbs gauged metal. Among the other provisions, the most important was a clause that gave the manufacturer the right to break down any goods he considered imperfect in the weighing room, remelt and remanufacture them. This allowed him far more scope to experiment and the significance of this measure also lies in its direct connection with the adoption of pressed glass - perhaps the most important nineteenth century development in flint glass. This connection is made clear in the evidence given to the 1835 Commission:

We have since manufactured it (pressed glass) in this country. It was the invention of the Americans but the manufacturers have got into the mode of making it now in consequence of the allowance made to break down the glass in the weighing room by the act of 1832.

Despite the modifications of 1832, the evidence to and report of the 1835 Commission of Enquiry paints a dire picture of the present state and future prospects of the British flint glass industry. The respectable manufacturers had accepted the re-introduction of the gauge with the regulations that surrounded it for the sake of preventing fraud yet now they had the worst of both worlds. Competition from fraudulent manufacturers had not abated and the regulations were proving a burden almost too great to bear. Perhaps the most pertinent evidence on both these issues came from Apsley Pellatt, a London flint glass manufacturer who had recently relinquished the business because the difficulties proved insurmountable. As a manufacturer of high quality goods he did not suffer so much from fraudulent competition but he found the regulations and the prohibition on any experiment or improvement unacceptable. In particular he mentioned the impossibility of adopting the French method of manufacturing and the barriers against developing a satisfactory scientific glass. Pellatt told

the Commissioners bluntly that he deeply regretted having to quit the trade but would only return if the duties were totally repealed (which in fact he did). The flint manufacturers' plight was also explicitly stated in a deputation sent to see Robert Peel, the then Home Secretary, in March 1835.⁵⁸ The deputation, (Thomas Hawkes and Thomas Badger of Dudley and R.T. Shortridge of South Shields), again had a blunt message; the trade was now "totally unrenumerative". This state of affairs they blamed on competition from fraudulent houses which lowered the prices of all basic articles with the result that honest manufacturers had to sell at a loss in order to stay in the market. The deputation pleaded that the government "either totally abolish the duty or repeal the part that would diminish the temptation to fraud" and it was suggested that this part reduction might be to one third of the present duty or 2d per lb.

The Commissioners took note of the flint manufacturer's plight and recommended a reduction. Very soon after the report was published the government acted on its recommendation and in 1835 an act (5 & 6 W4 c.77) reduced the duty to 6s 8d as the manufacturers had suggested. This afforded some respite but the situation remained grave and a further reduction was made in 1844 (7 & 8 c.25), only a year before the duties were repealed.

(ii) Cylinder window glass

The act of 1835 which reduced the duty on flint glass also reduced the rate of drawback claimed by German sheet glass. This was also something that had been recommended by the 1835 Commissioners in their report. German sheet, as we have seen, was flat glass manufactured by the cylinder process. Unlike crown glass ^{hardly any} waste was involved in cutting the flattened cylinder into squares and yet it was still eligible for the high drawback which made some allowance for cutting the circular tables

of crown glass into squares. German sheet had been experimented with in a small way during the eighteenth century and had been mentioned along with crown in all the flat glass acts since 1777 but it had not been manufactured in Britain to any significant extent until 1832 when it was "introduced" into this country by R.L. Chance and James Hartley. In their report the Commissioners had agreed with Chance that the manufacture had great potential because of the large size panes that were able to be obtained but they had also recognised that the high drawback needed to be revised. They recommended that the drawback be reduced from £4 18s per cwt. to £4 2s 8d which still left sheet with a slight bounty on the rate of duty. These recommendations were enacted in the 1835 Act. Although the terms were reasonably generous Chance petitioned the Treasury against any reduction at all pleading that although the waste in cutting squares was not very great, the bounty had offset other expenses such as the annuity of £200 he paid to the French manufacturer Georges Bontemps.⁵⁹ Understandably the Board of Excise had no truck with this and pointed out to the Treasury that Chance had embarked on his experiment at a time when he thought repeal was imminent and therefore cannot have been relying on the drawback as a source of finance. Indeed the expectation that the duties would indeed soon be repealed may have been one reason why the Board of Excise did not move with more speed to reduce the drawback on sheet.

The provisions of 1832 which had allowed Chance to embark on his German sheet experiment by permitting him to construct an annealing arch with two mouths led indirectly to the final alterations in the regulations surrounding flat glass. These again concerned window glass produced by the cylinder method but not sheet glass. The alterations concerned broad glass, a branch of the glass industry that was considered more or less dead by the 1830s. Thomas Dunn of the Newcastle Broad and Crown Glass Company, one of the two surviving manufacturers of broad glass in

the country at the time, told the 1835 Commissioners that, in consequence of the cheapness of crown, broad glass was going out of use "the demand is now so small we cannot keep the house at work the whole year; we lie idle three months"; the principal markets were Norfolk and London where broad glass was used for glazing out houses and coach houses. Despite the relative insignificance of broad glass an Act was passed in 1839 (2 & 3V c.25) concerned entirely with the methods of manufacture of broad glass and this was followed in 1840 by a further Act (3 & 4V c.22) which raised the duty on broad glass to the level of the crown and sheet duty. What was the reason for this sudden concern with a branch of the industry that had apparently long ceased to be of any importance either to the public or the revenue?

The reason given by the Chancellor of the Exchequer to Parliament for the 1839 act was that it was a measure to prevent fraud; the export of a new improved kind of broad glass under pretence of being German sheet and claiming the sheet drawback.⁶⁰ The prevention of fraud was the main justification for both these acts and yet the real reason seems to have been quite different. Both acts in essence protected the majority of window glass manufacturers from an ingenious patent taken out by James Hartley in 1838 which threatened to disrupt the whole home flat glass market.

Hartley, as we have seen, was a crucial figure in the introduction of sheet glass into this country in 1832. He understood the cylinder process thoroughly and embodied his understanding in a patent of 1838 for an improved method of manufacturing broad glass.⁶¹ The method he patented was indeed an improvement on the traditional broad glass process but taken as a whole it closely resembled the recently introduced sheet glass process mainly in that broad glass had traditionally been blown in an elliptical or cone shaped bulb and Hartley's broad glass, like sheet and like blown plate, was blown in a cylinder. Hartley recognised the similarities with sheet

and took care to point out in his patent that there were distinct differences between his broad glass and sheet glass and that these were clearly defined by the existing legislation . Hartley claimed that the provision of 1832 permitting the annealing arch used for sheet glass to have two mouths had created a legislative distinction between the modes of manufacturing broad glass and sheet glass. This distinction, he noted, had been preserved in the 1838 act consolidating and amending the glass laws and furthermore this act had made the additional distinction that broad glass should be split and spread whilst hot and "if allowed to become cool before the same is cut and opened it shall be deemed and taken to be German sheet and charged duty accordingly". Hartley therefore argued that any glass that was split whilst hot and annealed in an arch with one mouth, whether or not it was blown in a cylinder or a cone, was technically broad glass and should be charged the low broad glass duty.

It was an ingenious but quite valid argument and one which at first the officers supervising his house at Sunderland accepted. However in January 1839 Hartley received notice from the Board in London that a surcharge was to be imposed on his broad glass which would bring it up to the level of German sheet, and in future it would be charged as such. In a virtual repetition of the 1750 conflict over an improved broad glass, Hartley appealed to the local magistrates who decided that he had not technically manufactured German sheet and discharged him of the surcharge, presumably echoing the feelings of the justices in 1750 that to do otherwise would be to discourage ingenuity. The only resort for the Board of Excise was to remove the issue from the magistrates and try Hartley in the Exchequer, which they were encouraged to do by a powerful re-inforcement to their case against Hartley which came in February 1839.⁶² This was a memorial signed by all the other window glass manufacturers in the country; Cookson, the

Newcastle Company and all the north east firms, the Chance Brothers, Pilkingtons, Dumbarton, Lucas Coathupe of Nailsea and the three Lancashire crown firms. All noted with alarm the Sunderland magistrates' actions and claimed that the admission of Hartley's glass at a low rate of duty was a serious threat to the revenue. Their main concern was ostensibly the fraud that would arise when Hartley's glass was exported as German sheet for they claimed that it was "equal to German sheet and could be sold as such and not be distinguished if offered for export". It seems far more likely that their real concern was the competition that they were bound to suffer if Hartley's glass entered the market at a lower price. The difference in price was substantial; compared to 2 shillings per foot for German sheet, Hartley sold his glass at 9d per foot or 8d in squares. If it really was equal to German sheet then there is no doubt that it would have swept the market and both crown and German sheet manufacturers would have suffered greatly.

As a remedy the manufacturers suggested an Act of Parliament be brought in with the following clause:

that no glass shall come under the description of broad or spread glass unless it shall be made as broad or spread glass was usually made previously to 1838, that is blown in conical form, opened whilst hot on sand, spread on sand and immediately put in an annealing arch with one mouth, nor unless the narrow end of the sheet when spread shall be less than $\frac{2}{3}$ of the width of the broad end.

The Excise did not recommend this clause to the Treasury "from its tendency to check improvements in the manufacture and also from the facility which attempts to regulate a scientific process by minute legislative definitions are in many cases evaded". Nevertheless this was almost word for word what was put in the 1839 act. As the Excise predicted, Hartley did manage to get round this legislation with the result that in 1840 the duty on broad glass was raised.

A judgement on this episode - whether it was Hartley being unfairly cunning, or the other manufacturers being unfair in using the excise to protect their own personal interests- all hinges on the question of whether Hartley's glass was in fact German-sheet. Hartley insisted that his glass was not equal to German sheet, it was inferior, and the evidence of the excise returns after 1840 indicate that this in fact was the case. Hartley claimed that because his glass was inferior, if the duty was equalised German sheet would easily drive him out of the market which is exactly what happened. The broad glass duty was raised in 1840 and in 1842 production ceased completely.

With the benefit of this hindsight the whole episode seems to be another case where the Board made an error of judgement. The united opposition of the other manufacturers to Hartley is perhaps understandable but the Board's attitude is less so. Even before the other manufacturers had made their feelings known, the Board seems to have acted on the intuitive feeling that if the glass was as good as the more expensive types then it should pay the higher duty. But this was quite contrary to the whole history of the glass excise. The whole tax was based on artificial divisions between the various categories which, over the years had developed into clearly defined legal distinctions. Within these distinctions the manufacturer was, in theory, free to alter and improve his product as he wished. Hartley was within the prescribed limits, and in ignoring these limits and seeking to charge him with the higher duty, it was really the ^{? Board} Board of Excise which was not acting by the accepted rules; as Hartley was well aware:

It is fallacious to pretend that if it is as good as german sheet it should be charged as german sheet. It frequently happens that a manufacturer can manufacture better than another, it has never been considered that his superiority subjects the article to a higher duty instead of giving the fair benefit to the manufacturer.

(iii) The 1835 report and the repeal of the glass duties

What is perhaps most surprising about the repeal of the glass duties is why it took so long. As we have seen the beginning of the process can be set as far back as 1830 when the duties were firmly denounced as one of the most objectional taxes in the financial structure of the country. The Whigs came to power in 1830 and in their first administration the Parnellites were given prominent positions; Poulett Thomson was made vice-president of the Board of Trade, and Lord Althorp, who was also sympathetic towards Parnell's ideas, became the Chancellor of the Exchequer. It was inevitable that financial reform should soon be attempted and highly likely that this would include the repeal of the glass duties and this came in the budget of 1831 which was an ambitious attempt to realise the theories of Financial Reform, indeed Althorp credited Parnell in his budget speech. Under Althorp's original budget proposals the taxes on tobacco, newspapers, small coals, auctions, printed cottons, candles and glass were all to be substantially reduced. This would leave a deficit of £3,170,000 which was partly to be made up the imposition of taxes on the transfer of property, steam boats and Canadian timber. Unfortunately the magnitude of these proposals proved too much for Parliament to accept. Such was the strength of the opposition to the proposed changes, in particular the tax on the transfer of property, that after three days of stormy debate Althorp was forced to revise his budget by dropping the property tax and the reductions on the tobacco and glass duties.

The 1831 budget highlighted the formidable gap between the theories on which the budget was based and the political reality in which it had to stand. Looking at the debates on the budget with the glass tax in mind it is impossible not to remark on how little attention was paid to glass and how great a comparison this was to the attention it had attracted from the

theorists. To judge from Thomson and Parnell the glass tax was one of the most oppressive and offensive in the country yet judging from the debate on the budget this view was not widely shared. Virtually the only mention of glass in the initial debate came from Mr. Goulburn, the M.P. for Armagh.⁶³

With respect to the repeal of the tax on glass he should say nothing more than that he took it that whatever was gained by the people in glass would be lost in timber.

This was hardly an approval. The only explanation for this apparent lack of interest in that the glass tax was not an issue on which disinterested M.P.s felt strongly and there was no body of support for its repeal in the House. Thus in view of the positive feelings from various interests on the property tax and the tax on timber, the proposals for its repeal could be said to have actually lacked support.

This general lack of support is corroborated by a speech of Matthias Attwood against the Budget on 14th February. Although this was the very day that Althorp dropped his glass proposals, the speech had evidently been prepared beforehand and was delivered unaltered. As Attwood's two brothers Charles and Benjamin were glass manufacturers in Newcastle and Sunderland, it is perhaps possible to see in this speech some reflection of the attitude of the manufacturers themselves towards repeal:

The noble Lord said he meant to take the tax off glass - did that manufacture then labour under any serious oppression? He believed not, nor did he believe that any immediate benefit would result from taking off the tax. It was one of which no individual complained. Glass, it was now expected, was to be exported in large quantities; but that would be at a distant period. The stream of prosperity would not flow quite so fast as the right honourable member, the Vice-President of the Board of Trade (Poulett Thomson) supposed.

Attwood also attacked the government for not making up its mind sooner, which had thrown the glass trade into confusion. He said he knew for a fact that manufactories had been forced to stop whilst they awaited a government decision

on whether the tax was to continue or not. This is confirmed by several petitions to the Treasury from various glass manufacturers during 1831 and 1832 all asking to be allowed to bond glass in warehouses and pay duty as it is sold rather than as it is manufactured.⁶⁴ One of the most urgent came from the Edinburgh and Leith Company which petitioned^{on} the matter several times:

For the last twelve months your petitioners have found it to be prudent and even necessary in anticipation of the abolition of the duties imposed on that article to suspend the manufacture entirely since it became known that the alteration and probable abolition of these duties was intended it is impossible to effect sales in proportion to the make.

It has already been mentioned that the government's uncertainty over repeal caused considerable problems for glass manufacturers throughout the 1830s.

What were the reasons for the long delay between the abortive attempt at repeal in 1831 and the actual repeal in 1845? The duty had been soundly condemned by the prevailing economic doctrine, and the government of the day had expressed its desire to see that doctrine put into practice, but after 1831 no further attempts were made by the Whigs substantially to reduce or abolish the glass tax even though, thanks to surpluses in the revenue until 1836, many other excise taxes were repealed. The only apparent explanation is simply that the pressure for repeal was not there, either in Parliament or the electorate. Without this positive pressure repeal was not feasible since the Whigs had no wish to introduce controversial measures which might alienate or divide the House and threaten their more important reforms. The reductions made on the excises on soap, starch and candles all enjoyed positive support. Besides which, as these other excise duties were reduced so the importance of the glass duties to the Treasury increased (Fig. 21). This point was made quite clearly, with perhaps some embarrassment, by Althorp in 1832:⁶⁶

Figure 21: Net glass duty as a % of total excise returns, 1813 - 42⁶⁵

	<u>Glass Excise</u> £	<u>Total Excise</u> £000,000	<u>Glass as % of total</u>
1813	500,850	25.9	1.93
1814	530,791	27.5	1.93
1815	473,780	29.5	1.60
1816	353,188	29.5	1.20
1817	461,849	26.9	1.72
1818	584,399	23.2	2.52
1819	606,176	24.4	2.30
1820	500,595	26.5	1.89
1821	521,075	29.6	1.76
1822	599,029	29.9	1.87
1823	607,378	29.1	2.09
1824	728,342	27.2	2.68
1825	772,303	28.5	2.70
1826	720,920	22.6	3.19
1827	699,726	20.8	3.64
1828	752,097	20.0	3.76
1829	609,406	22.2	2.74
1830	542,261	21.0	2.58
1831	531,718	20.0	2.66
1832	558,423	17.5	3.19
1833	645,781	17.9	3.61
1834	664,391	17.7	3.75
1835	640,149	16.1	3.98
1836	663,162	14.4	4.60
1837	608,993	15.7	3.88
1838	667,998	14.6	4.57
1839	691,467	14.8	4.67
1840	724,343	14.6	4.96
1841	613,588	14.9	4.12
1842	563,347	14.8	3.80

Mr. Dixon asked if the noble Lord intended to reduce ^{the} duties on glass. Some time ago he had stated that he did not mean to reduce them immediately but many people were anxious to know and hoped at least a year's warning would be given. Lord Althorp said he had not the least intention to meddle with the duty on glass. He believed it would be a great advantage to get rid of that duty, but unfortunately the revenue could not bear the loss of the sum it produced.

Why was the demand for repeal not there? It seems unlikely that even had the manufactures been passionately opposed to the duties they would have been able to interest sufficient M.P.s to force the issue in Parliament but, from the evidence of the 1835 Commission, the manufactures - with the exception of the flint glass manufactures - were not passionately opposed

to the duties. They were certainly not opposed to the general principle of an excise on glass.

The Report of the Commission of Enquiry into the Excise on Glass of 1835, is an interesting document quite apart from the factual information it contains. The Commissioners appointed by the government were Henry Whickham, Henry Berens and Henry Parnell and there is no doubt that they embarked upon the enquiry with strong theoretical convictions and a pre-disposition to find the tax objectionable. Their report is unashamedly partisan with much talk of the tax's "objectionable nature", "injurious effects", "evil consequences" and "artificial obstacles". Indeed they dwelt so heavily on its injurious effects that it was obviously felt to be prudent to forestall any criticism of this:

It may perhaps be objected that we have dwelt upon arguments which may be urged against the very existence of the tax instead of confining ourselves to the suggestion of modifications or improvements in the manner of its collection.

They had evidently been made aware that the government's intention was not to repeal the tax and to make their recommendations accordingly. This they did and presented the government with suggestions for altering the tax; however they could not resist making their real recommendation quite clear:

The recommendations which in former pages we have submitted for a reduction of these duties have been so submitted solely on the grounds that circumstances may at present exist to prevent the concession of a total repeal; and we therefore conclude by urging the expediency of that repeal at the earliest possible period and by expressing our opinion that no tax can combine ^{more} objections or be ^{more} at variance with all sound principles of taxation than this tax on glass.

Although the commissioners themselves had no hesitation in condemning the glass duty, what is interesting about the 1835 report is that their views were evidently-not shared by many of the glass manufacturers from whom they took evidence. The evidence of the glass manufacturers threw up a mass of practical details which quite overwhelmed and in some cases

confounded the commissioners' theory of injudicious taxation. In trying to reconcile the reality to their theory the commissioners occasionally resorted to a rather patronising tone towards the manufacturers. For instance, on the subject of vexatious regulations:

The proprietors of the highest class of establishment become from habit so much reconciled to the interference with their business occasioned by the Excise regulations as not to appear sensible of the disadvantage and inconvenience which they actually suffer by those means.

The regulations had, in fact, been described as "unexceptionable" and "of no annoyance" by all the manufacturers almost without exception and their unanimous opinion was that whilst the duty remained they were an invaluable part of the system; they were essential as a guard against fraud.

The main way in which the Commissioners did manage to fit the details to the theory was to draw most of their conclusions from the flint glass trade where the evidence did tend to corroborate their ideas. The duties did oppress flint glass far more than any other branch and it was the only branch where the manufacturers were pressing for total repeal - on practical rather than theoretical grounds it should be said. In concentrating on the flint glass trade, the Commissioners often tended to ignore contradictory evidence from the other trades. For instance on the question of experiments and improvements, much evidence had emerged from the flint glass examinations on how impossible it was to experiment with possible improvements under the strict excise regulations. This was not complained of by the other branches and when R.L. Chance was asked to confirm the flint manufacturers' evidence he was sceptical of their claims:

I am very incredulous about that, because we are equally surrounded by excise men yet we make experiments of which they are as ignorant as the man in the moon.

Nevertheless the prevention of improvement was one of the heads under which the glass tax as a whole was condemned by the Commissioners.

The difficulty facing the Commissioners was basically that they and the manufacturers shared little common ground. The manufacturers were entirely concerned with the practical, only a few showed any inclination to frame their answers in language that would lend itself to theoretical conclusions or to be consistent in their views. This is well illustrated in the evidence of a manufacturer such as R.T. Shortridge who worked in more than one branch. As a flint glass manufacturer he was for total repeal and considered the duties a real check on consumption, as a crown glass manufacturer he didn't find the duties oppressive nor did he think that consumption would be increased if they were reduced. None of the crown glass manufacturers thought that the duties checked consumption and all mentioned the window tax as more depressing in this respect. Nowhere is there any indication that the manufacturers shared the Commissioners' views on taxation, and only in the evidence of the flint glass manufacturers Thomas Hawkes, Thomas Badger and Apsley Pellat is there even an awareness of wider arguments about the nature of a country's taxation; but even with these men the practical outweighed the theoretical.

The Commissioners' task was to generalise and arrive at definite conclusions, and they cannot fairly be criticised for the inevitable selectiveness that this involved. It would certainly be perverse to suggest that, in order to confirm their existing opinions, the Commissioners distorted the evidence put before them to an unacceptable degree. However it is worth pointing out firstly that their existing opinions did affect their questioning of the manufacturers, and secondly, that their report gave greater prominence to evidence from the flint glass trade than any other branch of the industry.

The strongly critical report was published in 1835 and resulted not in the repeal of the tax but in modifications which were consolidated in an

Act of 1838 "to consolidate and amend the laws on glass" (1 & 2V c.44). This Act enacted many of the commissioners' recommendations including the reduction of the bottle duty and the repeal of many old and obsolete regulations. At the second reading of the Bill Mr. Fitzstephen French renewed the call for the total repeal of the tax.⁶⁷ Denouncing the tax as "unjust in its principles, vexatious in the details of its operation and pernicious in its effects upon the health of the people" he was at a loss to explain the government's reluctance to embrace total repeal considering that both the President of the Board of Trade and the Commissioners that the government had itself appointed had strongly condemned the tax. In reply the Chancellor, Francis Baring, avoided an explanation of the government's lack of action over repeal but made it quite clear that the tax was to continue and this was why the Bill had been introduced, to make the duty "as little as possible vexatious to the trader". He made no mention of the possibility of future repeal. The 1838 Act was, and was certainly seen at the time as, a clear indication from the Whigs that the glass tax was not to be repealed in the immediate future; that despite its unsatisfactory nature it was indispensable as a source of revenue. By the late 1830s the surplus in the revenue that had enabled several other excise duties to be repealed during the first half of the decade had become a deficit and repeal of any further taxes was out of the question.

In view of the Whig's initial espousal of the cause of repeal it is ironic that the glass duties should finally have met their end under Peel. Peel had come into contact with the excise on glass at various times during his career: in 1834 he had voiced his dislike of the tax in Parliament.⁶⁸ In 1835, as Home Secretary, he had received the deputation of flint glass manufacturers. There is no doubt that his move to repeal the glass tax stemmed from his conviction that the internal tax was a particularly harmful

and restrictive one, but he was almost certainly encouraged by the fact that it also affected the customs duties on imported glass and thus concerned a policy of free trade. William Huskisson had already encountered the effect of the excise duties on the customs duties in 1825 when his Customs Consolidation Bill had proposed a considerable reduction on the duties on imported glass, in particular on glass bottles which at that time were subject to a duty amounting to more than half the value of the wine they contained. Huskisson was reluctantly forced to drop this measure, in order to continue the protection of the home manufacturer, and admit that "foreign bottles must still be taxed in reference to the excise duty".⁶⁹ In 1840 the connection between the excise and customs duties on glass was also mentioned by the Select Commission on the Import Duties in the evidence of J. McGregor who, predictably, concluded that the customs duties were an unnecessary protection. His evidence included a comment on the attitude of the British glass manufacturers themselves towards protective duties:⁷⁰

The glass manufacturers are among the very few who ask for the protective duties ... most of them, as far as it appears to me, ask for protection from ignorance of the matter.

In fact, as we shall see, British glass manufacturers were quite correct to feel apprehensive about the possibility of sudden competition from glass industries which had developed a quite different character to their own.

Free trade was an integral part of Peel's vision of commercial prosperity and must have influenced his attitude towards the internal glass duties. But the mainspring of repeal was certainly his conviction that in themselves they were oppressive to the home industry and indeed the country's prosperity as a whole. Repeal was announced in the budget of 1845 and the revenue deficit that would result was to be made up by direct taxation, namely the continuation of the Income Tax and the Property Tax. Peel's attitude towards taxation was made quite clear in his budget speech:⁷¹

although direct taxes were unpleasant they were less onerous on the community and on the country than taxes such as the glass tax which oppressed industry, restricted consumption and damaged the country's prosperity. Indeed Peel optimistically envisaged that the boost to the country's prosperity that the repeal of indirect taxes such as the glass tax would produce would enable the direct taxes to be dispensed with within a few years. A Bill to repeal the glass duties was brought into the House in April 1845. It passed in May 1845 but the provisions were not to take effect until May 1846 leaving the trade ample time to make the necessary adjustments.

5. The Effect on the Industry

The image of the glass tax that has come down to posterity is almost entirely that of the political economists, through the writings of Parnell and McCulloch and the Report of the 1835 Commissioners. The phrase from the Report "No tax can combine more objections or be more at variance with all sound principles of taxation than this duty on glass" is the most frequently quoted when the duties are mentioned. The unqualified condemnation of the political economists is perhaps inadequate fully to do justice to the real effects of a complex and double-edged tax. However it is inevitable that a discussion of these effects will be based on the specific criticisms they made. The 1835 Report summed up these criticisms under four heads. The tax was objectionable, firstly, because it operated as a direct tax on industry. Under this head they included the effects on labour and capital, the artificial addition made to the price and the check on consumption. They also mentioned the hardship suffered by the manufacturer because of the regulations and the fear of prosecution. The second head was that it prevented the free progress of improvement and invention. Thirdly, it was not lucrative to the government because the costs of management were high and a substantial proportion of the duties was drawn back. Fourthly, its high rate drove capital into fraudulent channels which again constituted a loss to the revenue. The last two heads concerned the revenue more than the industry but the first two provide as good a framework as any for considering the way in which the industry was affected by the imposition of the excise.

The Commissioners admitted that their Report concentrated only on the later years of the duty and ignored the earlier period. They justified this on the grounds that to discuss the earlier period would take too long.

It is inevitable however that any such discussion will concentrate on the later period. This is the period for which most information is available and furthermore it is arguable that the effects of the duty on the industry intensified in direct relation to the increases in the rates of duty. From 1745 to 1777 the effects appear to have been minimal - slight inconveniences to the manufacturer and a slight increase in price passed completely on to the consumer. From 1777 the effects developed more complex and unpredictable aspects but it was certainly the period following the imposition of double duties that saw the greatest distortion to the industry from the duties; it saw the industry having to adapt to an economic context that was largely of the duty's making.

(i) Finance and Capital

A contemporary criticism of taxes on manufacture was that when a tax was raised a larger capital was required which thus tended to exclude small capitals from entering the trade. There is evidence of a tendency towards large capitals in certain branches of the glass trade but whether this was a direct consequence of the excise is debatable. The tendency was more pronounced in flat glass than flint glass or bottles but this was fundamentally a reflection of the different natures of the different branches rather than something for which the duties were directly responsible. The existence of the duty had the effect of emphasising certain already existing features of the capital structure of the industry but does not seem to have been, in itself, extraordinarily significant. It certainly did not cause the complete exclusion of smaller capitals from the trade. It did though have the effect of creating larger capital requirements than the nature of the various branches of the industry would otherwise have demanded.

There were two main ways in which the duty did create larger capital requirements. Firstly, and most importantly, money for the duty had to be paid to the crown every six weeks (four weeks in London) which placed a permanent demand on the circulating capital of the manufacturer. Secondly, capital was required to conform to the statutory regulations. The regulations demanded that the manufacturer provide locks, weighing rooms, iron gratings, scales etc. at his own expense. They also increased his wage bill by making it necessary to hire extra hands to weigh and pack the glass.

Of the two demands on capital the first was certainly the greater. It was not made any easier to meet by the traditional marketing structure of the trade which depended on long credit being extended to the glass merchants and wholesalers. Charles Mulvaney, a Dublin flint glass manufacturer, told the 1835 Commission of this difficulty.

We make a constant and heavy advance to the Crown of a considerable capital; in our own individual case most usually of £2,000 or more. From the nature of our trade we are obliged to allow six, nine and twelve months credit whilst we are under peremptory obligation to pay to the government in specie every six weeks the duty charged on the objects disposed of.

As the firm expanded so this difficulty increased in size. Cookson, for instance, was by the 1830s having to advance £70,000 a year from his various concerns to the government for duty. When trade was brisk this was manageable but in periods of slackness it could be a severe problem as the petitions to the Treasury in the early 1830s asking to bond glass attest. These petitions make it clear that the problem of finding duty could not be overcome simply by cutting back the production as the cost of manufacture was related to the quantity produced. To cut back would increase the proportional cost and therefore the manufacturers felt forced to continue manufacturing at their full capacity even when the glass was not selling and thus faced the problem of finding sufficient cash to pay the duty.

In a normal state of trade it is easy to see that the problem of advancing cash in duty would weigh less heavily on a large, well established firm with a large capital behind it, than on a smaller one. The well established firm would almost certainly have a more stable marketing structure, perhaps supplying one or two well established merchants who could be relied on to remit payments regularly. John Delaval's Northumberland Bottle works, for instance, sent most of the production to a single bottle warehouse in London. In the early years of this arrangement Delaval solved the problem of bridging the gap between payments from the merchant and payment to the Excise by paying the duty with drafts on his London merchant, Charles Broughton. The Excise accepted this method of payment until Broughton went bankrupt and then it appears to have required payment to be made in cash at the bottle works itself. This factory was a large one and payments from London were regular; yet there were periods, for instance when bad weather prevented the bottle ships from returning to the North, when cash was low at the factory and the excise payments became a problem. In these situations the advantages, not so much of being a large firm but being a firm owned by a man of extremely large capital, can clearly be seen. Because of his wealth Delaval was able to choose from a number of options available to him to overcome the cash problem. He could use his estate rents to pay the excise bill; he could send up bills from his London bank into which his rents were usually deposited; he could get short-term credit from the local banks or indeed any local source of available cash. Thus in 1783 Delaval's agent wrote to him:⁷²

The excise is due and we are not provided for it. The collector will not wait till I come from Ford (with the estate rents) on the 25th, however as the time is so short Mr. Surtees on his own account will do it independent of the bank if your Lordship approves and gives him directions to do so which I can repay him the money, or any way your Lordship directs or if it please your Lordship to send up a bill.

A firm of large capital was also favoured by being able to make use of the services of a bank. During the nineteenth century the problem of filling the gap between remittances and duty payments could be overcome by a bank agreeing to enter into a bond with the Excise to remit the duties for the manufacturer. But this was only undertaken when, as one Newcastle bank described it, "the risk of trusting the manufacturer complied with that of a sufficiently large deposit with our London bankers and the necessity of a gentleman of large property being bound for the due performance of our engagement to the Excise". This⁷³ was written to the Board of Excise in 1830 in an effort to persuade them against reducing the time in which the bills were payable from the usual thirty days. The bank discounted the manufacturers' bills on the London dealers and accepted his cheques to the Excise on which it gained 20 days interest. The profit was not large; on a bill of £2,000 which was the weekly average of the bills to the Excise, the profit, deducting stamps and the London bankers commission, was only £2 7s which "is sufficiently small that no bank of respect ought to undertake it for a smaller remuneration". It was in the Bank's interest to promote the interests of the excised manufacturers but it felt that a reduction of the credit period to twenty or even ten days date would leave it so little profit that it would have to charge the manufacturer for providing the service; at present it was free. This was suggested as a reason for not reducing the 30 days date.

We could remit the bills at 20 days nay even 10 days but we should be obliged to indemnify ourselves by our charges to the manufacturers. By the present system he is not only exempt from any such expense but actually receives a bonus of 10 days interest upon all his London bills and this chiefly because the Excise duties are drawn from here in bills payable at 30 days date. Were they drawn at any date shorter he would lose that advantage, but whether the government would be more benefited by a reduction of the dates of the Excise bills than injured in any way by pressing upon the manufacturers at a period when diminution of the duties is a proof of their present depression is a question on which we do not venture to express an opinion.

It is hard to put specific figures on the amount or proportion of capital that was diverted into paying the duty but in his evidence to the 1835 Commission William Cuthbert mentioned more than once that the English manufacturer had to employ three times the capital of his foreign counterpart. Abroad, he maintained, they could carry on trade with £10,000 as well as could be done here with £30,000. He specifically mentioned the duty on timber and bricks as contributing to the high cost of building in England; but also pointed out "it is not only in the buildings but the capital involved in payment of duty". In the same report Apsley Pellatt put a figure on the amount of capital taken up by the extra servants and equipment called for by the duty. The extra servants alone cost him £1,000 a year and the total cost of the regulations he estimated as 5% of the total capital employed; this was in addition to the capital employed in paying the duty. Pellatt was in no doubt that "capital for duty is employed uselessly and worse than uselessly recently in as much as the honest trader has been selling at a loss through the competition of the fraudulent manufacturers". The extra demand on capital was obviously there but how significant was it in restricting the trade to large capitalists only? One would imagine that the tendency towards large capital undertakings would be most pronounced in the flint and plate trades since these were the two branches that paid the highest rates of duty. Though the exclusion of small capitals does appear to be the case with plate it certainly does not in flint. If one can take the figures of duty paid in 1832 (Appendix I) as some indication of the size of the various flint glass firms then it is clear that single houses with small productions were the rule rather than the exception. This is confirmed in the north-east where the flint glass houses were not, as a rule, undertaken by men of large capital - as the window glass houses were. The owners were men of middling social status;

George Stevenson of the Carr Hill works had been the manager of Joseph Lamb's larger Northumberland Company and George Sowerby had also come to own his New Stourbridge house after being the clerk under its previous owner. Neither Joseph Price of Gateshead nor William Booth of Sunderland appear to have had any other large capital interests and they were certainly not members of the coal owning aristocracy. The comparatively modest means of the men who entered the flint glass trade is perhaps also borne out by the fact that flint glass houses tended to change hands far more frequently than other glass concerns. Even with plate glass it seems unlikely that the duty had a significant effect, for plate glass was by nature an undertaking that required an exceptionally large capital. Even the 1835 Commissioners recognised that:

From the nature of the manufacture of plate glass it can be carried on successfully only in extensive establishments and by the application of large capital; and we should add that in this instance the natural tendency of the trade to remain in few hands is not artificially increased by the regulations of the Excise relating to the manufacture, as was the case until a recent period with respect to the manufacture of British spirits.

It seems fair to say that the excise did create an extra demand on capital but that this was not significant enough to alter the basic capital requirements of the various branches of the industry; that it did not act as a discouragement to comparatively small capitals to enter branches such as flint and bottle which by nature were accessible to smaller capitals. Where the trade was carried on by comparatively few concerns, for instance with plate and crown glass, this was more a reflection of other factors rather than the duty, though the duty did perhaps emphasise them. Crown glass, like plate, could only be carried on profitably in extensive establishments with large productions, therefore the initial capital requirement was high. Because of the importance of the quality of the materials glass houses tended to stay concentrated in well established areas and therefore prospective entrants were to a certain extent limited by the capital available in that

area. New entry into the industry was also limited by the shortage of skilled workmen and managers. It seems more likely that it was these more basic tendencies that concentrated the flat glass industry in a few large scale enterprises rather than the artificial effects of the excise.

If the excise was not extraordinarily significant in affecting the basic capital requirements of the glass industry could it be argued that it did have an effect in limiting growth in the industry? There are two ways in which one can see that it might have had an effect. Firstly by discouraging investment in fixed capital and secondly by reducing the level of profits that should theoretically have been ploughed back into the firm. The demands that the excise made were entirely on the manufacturer's circulating capital, therefore one can see an obvious tendency not to transform circulating to fixed capital and thus not to expand by building more glass houses as quickly as he might otherwise have done. It is perhaps significant in this respect that many of the large glass manufacturers, the ones that did expand their works, had alternative sources of capital. As for reducing profits, if the evidence to the 1835 Commission is to be believed, many of the manufacturers were being forced to pay the duty with money they considered should have been their profit, partly as a result of low prices established by fraudulent manufacturers who evaded the duty. The most memorable evidence in this respect was that of Alexander Turnbull of the Edinburgh and Leith Company who told the Commissioners that on their capital of £135,000 there had been no dividend for the past 80 years.

However, although the duties did perhaps have some effect in limiting growth in the industry, the idea that they were extraordinarily significant should again be approached with caution. The basic nature of the glass industry was not one that suited or permitted fast growth. This was due to factors already mentioned, the shortage of skilled workmen and managers,

the few suitable areas, the difficulty of entering the industry from scratch because of the notorious unpredictability of newly built glass houses. The most usual way for new capital to enter the industry was to take over an existing house with an existing workforce. Returns of licences taken out by glass manufacturers (Figure 22) give a useful indication of growth in the industry from 1785 to 1837. It can hardly be said to be spectacular but this almost certainly reflects its basic nature rather than the weight of the excise duties it dragged with it. The industry could not produce a fast growth and this is to some degree confirmed by a comparison with the glass industry of Prussia. Prussia was a country of approximately the same size as Great Britain with an equally well established glass industry going back many centuries, and during the 1830s the number of glass houses was roughly the same; 96 in 1831 and 107 in 1834.⁷⁵

(ii) Articles, price and consumption

The excise had a direct and an indirect effect on the type of article produced by the manufacturer. The direct effect involved the definition of the type and size of the glass by certain statutory regulations. These were usually designed to protect one branch of the industry from another that paid a lower rate of duty. For instance bottle metal was not permitted to be made into bottles of less than "a reputed half pint" (6 ounces) interior capacity, to protect the flint manufacturer's trade in phials; this was called an "unnatural" trade for bottles. Crown or plate glass was not permitted to be made thicker than $\frac{1}{8}$ ", again to protect flint glass; on the continent wine glasses and cheap articles were made from the cheap soda window glass. When Cookson tried to make thick glass "bullseyes" for ships from his plate glass he was stopped on the complaints of the flint glass manufacturers. German sheet was not permitted to be made thicker than $\frac{1}{8}$ " to prevent it being polished and exported as plate claiming the higher plate drawback.

Figure 22: Glass houses licensed by the Excise, 1785-1837 and types of licensed glass houses, 1829-1832.⁷⁴

	<u>England</u>	<u>Scotland</u>	<u>Ireland</u>					
1785	61	8						
1786	61	8						
1787	64	10						
1788	69	8						
1789	69	11						
1790	72	16						
1791	77	16						
1792	76	14						
1793	76	11						
1794	73	15						
1795	78	13						
1796	78	13						
1797	80	16						
1798	77	13						
1799	80	9						
1800	82	13						
1801	81	13						
1802	87	15						
1803	93	17						
1804	96	-						
1805	95	12						
1806	93	11						
1807	93	9						
1808	105	12						
1809	96	14						
1810	93	14						
1811	102	16						
1812	89	15						
1813	88	16						
1814	97	11						
1815	101	11						
1816	95	14						
1817	94	12						
1818	94	15						
1819	94	15						
1820	94	11						
1821	87	11						
1822	84	11						
1823	89	14						
1824	100	12	8					
1825	107	14	9					
1826	109	20	11					
1827	111	18	12					
1828	111	18	12	Broad	Crown	Flint	Plate	Bottle
1829	107	17	10	2	28	54	3	42
1830	101	13	8	2	25	54	2	39
1831	102	10	9	2	24	55	2	36
1832	102	8	8	2	28	59	2	39
1833	109	9	8	(England and Scotland only)				
1834	107	8	7					
1835	111	11	6					
1836	128	15	8					
1837	131	15	9					

These regulations were artificial yet ^{as} seen necessary by both the Board and the manufacturers. Fear of competition from other branches was frequently expressed by the manufacturers to the 1835 Commission, particularly in connection with the possibility of the repeal of just one branch of the duty. If the flint glass duty was repealed, for instance, the window glass manufacturers were convinced that the flint manufacturers would turn their attention to making window glass. The flint glass manufacturers predicted disaster for them if the bottle duty was repealed. The artificiality of the strict legal distinctions was frequently emphasised by a comparison with the continental industry, but they were not something that the manufacturers complained of or found difficult to comply with.

The indirect effects of the duty were perhaps more difficult for the manufacturers to cope with. Most pressing was the fact that the duty weighed far more heavily on the cheap goods than on the more expensive articles. Poor quality goods bore an extremely high proportion of duty in their final selling price which had to be kept appropriately low. With more expensive goods the price was higher, the duty was easily absorbed, and a profit was left for the manufacturer. This was emphasised over and over again in the 1835 Report, particularly by the flint glass manufacturers who produced a wide range of goods and felt the effects on their cheap products more acutely:

The disadvantages we labour under press far more heavily on the plainer articles than on a richer cut article which sells for a higher amount. (Joseph Price of Gateshead)

The duty is heavier in fact on articles of necessity than on those of luxury. (Mulvaney and Irwin of Dublin)

Since 1826 upon the cut glass we have made a handsome profit, this has been swallowed up upon our loss on the plain. I venture to say we have not made 2% on our capital. (Thomas Badger of Dudley)

The reference to 1826 points to the way in which the flint manufacturers were doubly hit by this effect of the duty. Since the re-introduction of the gauge in 1825 they were compelled to manufacture poor quality goods

by not being able, as they had been when the duty was on the hear, to make only the best material from the pots into goods and to reflux the rest. In other words they were compelled to produce poor quality goods which were most vulnerable to competition from tin or earthenware and on which profits would be small or non-existent. From the 1835 evidence it is clear that most manufacturers, like Badger, had to resort to selling certain goods at a loss and hoping to make up the profit on other items. This frequently led to the suspicion of fraud. Joseph Price accused a Birmingham manufacturer of selling stem wine glasses at a price far beneath the rate of duty they paid but Shortridge pointed out that this did not necessarily mean fraud had occurred:

It is a rather peculiar kind of trade, there is such a variety of articles and perhaps one manufacturer has a different mode of calculating the cost therefore it does not absolutely follow that because articles are sold low there is fraud. Many manufacturers will perhaps sacrifice the price of an article to obtain an order for other articles.

Besides tending to make life difficult in general for the flint glass trade, there are two specific areas where this particular effect of the duty could be said to have had a significant role. The first is the collapse of the Irish flint glass industry after the extension of the duty to Ireland in 1825. From the evidence it seems certain that before 1825 the Irish flint glass houses were producing comparatively coarse articles for which, because of their low price, there was a ready market both in Ireland and, as smuggled goods, in England; their attraction was in their cheapness rather than their quality. According to Martin Cream, a Dublin glass manufacturer, this poor quality was intrinsic to Irish glass because of the poor quality of the materials available to them. He particularly mentioned the coal from Swansea, which was not able to heat the furnace sufficiently to cause the metal to be in a perfect state. Thus the Irish glass houses had grown up to meet a demand for cheap glass and they were

hit inordinately hard by the imposition of the duties in 1825 which took away their products' main attraction. By the time that the Excise Commissioners gathered their evidence, the results of this were quite apparent, at least to the manufacturers themselves:

There being, generally speaking, no opulence amongst us, the great demand was for ordinary glass: the duty has so enhanced the price that the great bulk of the people have substituted common English ware and tin articles of all description. A great class of consumers has been swept away; the few consumers of a better description of glass, being for the greater number an impoverished gentry who still reside amongst us, are supplied from England and Scotland where capital is so assisted by cheap fuel and all the other materials used in the manufacture.

Edward Ronayne of Cork

The duty is much felt, particularly on the low-priced articles which the Irish manufacturer makes, for generally speaking all the rich-cut decanters and very heavy articles come from England

Martin Cream of Dublin.

The producers of poor quality goods suffered doubly from the duties for not only did their market diminish as their prices rose but they were the ones that encountered the most competition from the unlicensed fraudulent manufacturers; the "cribs" who melted down glass to fashion cheap tumblers or glasses. Charles Mulvaney, the Dublin manufacturer, gave evidence that they suffered enormously from such competition in their "leading articles" i.e. articles in daily consumption. There was not the same competition with decanters or articles of luxury on whose profits they were only just able to save themselves. At the moment the leading articles formed the bulk of their trade but he told the Commissioners that "if the Excise goes on we cannot continue to make these common articles". They were presumably experiencing the same combination of factors that had driven the coarse manufacturers out of London.

The second area where the duty could be said to have had a significant effect was the slowing down of the adoption of pressed glass in England. The early pressed glass articles were designed as imitations of cut glass

and were intended to be bought by those who could not afford the real thing. But because of the duty the price was still high and this limited consumption by the class for which the glass was intended:

The higher classes here will not buy our pressed or moulded goods and the lower class cannot afford to purchase them on account of the duty, although smuggled pressed salts have a ready sale at country fairs.

Apsley Pellatt to the 1835 Commission

The technique had been able to be practised in England since 1832 but it was not until the 1840s that glass manufacturers were enabled to take full advantage of the possibilities that it offered; it was a step towards mass production but this was not one worth taking until the removal of the duty brought a mass market into existence.

Pressure on the cheaper end of the market can also be seen in other branches of the industry. Crown glass, for instance, was produced in four qualities of which "CC" was the worst. This was usually the quality that was shipped to Ireland to ^{claim the} draw back ("The Irish CC is of so coarse a quality that it is seldom used in Great Britain" said Dixon of Dumbarton), but there seems little doubt that had it been cheaper in Great Britain it would have found a market. Curiously enough this distortion of the cheaper end of the market probably had the effect of creating a demand for broad glass which was of an even worse quality than the crown CC. Broad glass, because it paid a lower duty, was priced more realistically and was thus able to continue in the market well into the nineteenth century when it should perhaps have been replaced with the better quality crown; broad glass was essentially a seventeenth century window glass. Thomas Dunn told the 1835 Commission that if the duty were repealed he would go out of business because crown would then be just as cheap, implying that its present cheapness was the only thing that kept it in the market.

The duty did distort the production of cheaper articles by reducing the profits on them and diminishing the consumption by raising the price above that to which the quality was appropriate. Did it then leave the production and consumption of the better quality glass unaffected? With crown it appears to have had very little influence on the general trend towards increased consumption and increased production. The manufacturers attributed all checks on consumption to the window tax rather than the glass tax. William Cuthbert, for instance, predicted that the repeal of the window tax would increase consumption by 30-40% whilst taking off the glass tax would only increase it by 5%. R.T. Shortridge agreed that consumption would not increase "so long as there is the burden of the window tax about our necks", and R.L. Chance was quite adamant that "nothing has affected the consumption of glass so much as the builders always aiming at bringing all houses for the lower and middling classes within the limits of seven windows". The Commissioners tried to argue with him that the window tax only affected a small proportion of his potential custom but Chance maintained that it was a very substantial check on consumption and far greater than any check connected with the glass duty. He did not think the glass duty affected consumption materially except perhaps at the cheaper end of the market - the use of glass for hot houses.

The simple explanation of why the glass duty did not check consumption of crown glass is that there was no real alternative to it as a window glass. This held true throughout most of the period when the duty was levied, only in the final few years of the duty did cylinder window glass, either in the form of polished German sheet or polished plate, become a real alternative. But the fact that there was no alternative itself needs an explanation. Why was cylinder window glass not adopted in England at an earlier date? We have seen that in the case of German sheet it was because from 1809 there

was a statutory bar to its production in the ruling on annealing arches, but that does not explain why polished plate, particularly blown plate, did not develop as a common window glass in the same way that it did on the continent. There is no doubt that blown and cast plate did have the potential to be window glass and indeed were used as such to a limited degree. We can find evidence of their use in the mention of plate in builders' handbooks, and in advertisements of glaziers for large plates for shop windows. The development of cast plate was limited by the enormous capital needed to establish a new works but in the case of blown plate the capital requirement was not so high (though still higher than crown glass because the glass needed to be polished). What then was the reason for the failure of the blown plate industry to expand and to fill the demand for window glass of large dimensions? McCulloch addressed himself to this question in Taxation and the Funding System and decided that:⁷⁶

It is difficult to believe that there could be any cause other than its high price occasioned by the duty, for the quantity of plate glass used in the fitting-up of the houses of the middle and more opulent classes in this country being so much below what is used by the same classes in most part of the continent.

In other words the duty was acting as a check on consumption of plate glass as a window glass by raising the price to an inappropriately high level. Other causes certainly affected the slow growth of the blown plate industry, most notably the lack of workmen sufficiently skilled to blow the large cylinders, but the importance of the high duty in discouraging the use of plate glass is underlined by the events surrounding the introduction of German sheet in 1832 by R.L. Chance. Even after the reduction of the plate glass duty in 1819 the duty^{was} still sufficiently high to encourage manufacturers of cylinder glass to name their glass in such a way as to avoid the rates and regulations of the plate glass duty.

The effects of the glass excise on the type of articles produced, their price and consumption can be summed up as follows. There were certain direct regulations limiting the size and thickness of various types of glass, designed to keep each branch in its "natural" trade (though a comparison with the continent indicates that these distinctions were more artificial than natural). The duties had a substantial effect in diminishing the consumption of cheap or poor quality glass by raising the price to an unacceptable level. The excise also affected the consumption of plate glass, particularly its use as a window glass, by putting a bar on a reduction of price. Thus it retarded the adoption of cylinder glass as a common window glass and, again using a comparison with the continent, this can be seen as an artificial retardation: England was the only European country to retain the essentially eighteenth century crown glass, with its small panes and slight optical distortion, as the common type of window glass until the middle of the nineteenth century.

(iii) Vexatious regulations

The 1835 Commissioners included in their report an extensive summary of all the statutory regulations surrounding the manufacture of glass, the quantity and detail of which make this outburst from Charles Mulvaney quite understandable:

Our business and premises are placed under the arbitrary control of a class of men to whose will and caprice it is most irksome to have to submit and this under a system of regulations most ungraciously inquisitorial. We cannot enter into parts of our own premises without their permission; we can do no single act in the conduct of our business without having previously notified our intention to the officers placed over us. We have in the course of the week's operation to serve some sixty or seventy notices on these, our masters, and this under heavy penalties of from £200 to £500 for every separate neglect.

Under the excise system the excise officer was the most important person in the whole manufacturing process for without his presence or notification being given to him nothing could happen. R.L. Chance told the Commissioners that

he had notices printed by the thousand, which was also the case with the north-east houses, some of whom had their notices printed by Thomas Bewick's workshop.⁷⁷ But how great a hindrance was this system to the manufacturer in the daily running of his glass house? Was it in practice less fearsome than it appeared on paper?

The Commissioners' main complaint against the system of regulations was that it was far too strict and interfered far too much in the process of manufacture. Yet there is evidence to show that the regulations were enforced on a remarkably arbitrary basis and it was this arbitrariness, their laxness rather than their strictness, that caused the most harm to the manufacturer. The arbitrary enforcement could work to the manufacturer's benefit. At the root of the system was the individual excise officer and where there was good will between him and the manufacturer he surveyed the harsher aspects of the system could be mitigated. Apsley Pellatt, for instance, described how, when the waste allowance was inadequate and the waste had to be weighed each week, evasion with the officers' consent had to be resorted to,⁷⁸

... loss would have accrued to the manufacturer, unless he had evaded the law, by bringing as many casks of cullet from other parts of the premises, or weighing as much cullet twice over as was necessary to make up the requisite weight. Excise officers permitted the evasion - certainly a questionable fraud - it being impossible to carry out the Act of Parliament, with justice to the manufacturer, without his resorting to self-defence.

Isaac Cookson told the Commissioners that even though he had been prosecuted for using crown cullet in his bottle metal, he continued to use it and believed other bottle manufacturers did so too. All the north-east crown manufacturers agreed that the regulations were not enforced strictly where the manufacturer was known to be honest.⁷⁹ The goodwill of the officer on the spot could even operate as a positive bounty to the manufacturer. At John Delaval's bottle works an officer was given accommodation at the

works and, not unnaturally, the agents were anxious to preserve his good will by providing him with a good house,

George Allen and I did yesterday examine the glass house books and find that Mr. Burrell's gauge is very favourable to the works and as a great deal is left to the excise man in the gauging the weight of mettle in a glass house, more than in a Brewery, we would therefore wish to have a good house for him.

On a later occasion, when it was heard that the officer was to be transferred elsewhere, the agents wrote to Delaval asking him to use his influence with the Board in London to prevent the transfer.

The authority of the officers could, however, work both ways: when the relationship between the manufacturer and the officer was less than cordial the manufacturer could suffer. There are many examples among the petitions to the Treasury and the evidence to the 1835 Commission of manufacturers suffering loss as a result of the slackness, misconduct, or non-attendance of their officers. A typical example is the petition of the Sunderland bottle and crown manufacturers in 1831⁸¹ complaining that they had given notice to the two officers, Joseph Marshall and Joseph Stonehouse, to come and weigh the manufactured glass on the 4th July 1812 the day before the double duties were to take effect - and as they had not come the glass was weighed on the 5th July and charged the double duty. The Sunderland manufacturers' complaint centred around the fact that although the 4th July had been a Sunday, the officers on the Tyne had weighed goods that day for the manufacturers at Newcastle and Shields.

On that occasion the manufacturers had only suffered a loss from the arbitrary conduct of their officers but there are instances of a manufacturer suffering injustice from the same cause. A memorable example of this is the case of Thomas Pemberton, a bottle manufacturer of Sunderland, who suffered not so much from the inattention of his officers but from his enmity. Thomas Pemberton took over one of the bottle houses at Ayres Quay

from his father in 1818. Right from the beginning he evidently made an enemy of the officer appointed to survey his house, Richard Ridley, with the result that Pemberton was charged with a series of small nominal offences and fined before the local magistrates. Eventually, in 1824, he was prosecuted in the Exchequer and found guilty. Pemberton felt that he had been the victim of an iniquitous persecution on the part of "his old enemy" Ridley and in 1824 took out a large advertisement on the front page of the Newcastle Courant to give his version of the true facts.⁸²

This is a useful record of the kind of petty charges that could be levelled at a manufacturere; useful because they were frequently dealt with unofficially by the local J.P.s and records are few. The mediation of the J.P.s had traditionally been seen as a welcome way in which the system was made less severe, however Pemberton was unfortunate enough to have fallen out with the local magistrates over another dispute and in his case the system was certainly not relaxed. He was fined the maximum penalties for offences that were trifling.

The first "offence" occurred when a pot from which a man had been working suddenly broke. To save the metal he worked it out hurriedly in small octagonal half-pint bottles but because of the hurry too much glass was put in some moulds and a few of the bottles were made with an interior capacity less than 6 ounces. This was an offence and Pemberton was charged the maximum £50 penalty for it even though he pointed out that the revenue had not suffered because of it, the only sufferers were the workmen who were paid by the piece, and him because he was left with an unsaleable article. A short time later he was fined another £50 for the same offence although the six bottles in question were this time exactly 6 ounces in capacity which Pemberton maintained, rightly, was within the "reputed half pint" fixed by law. Four days later he was fined another £25 for giving a false declaration.

This happened because his declaration had listed 103 bottles and 240 utensils to be deposited in the annealing arch. "Utensils" were jars, made in the same moulds as the bottles but with wider mouths and shorter necks. When the officer came to remove the articles he decided that, although the total quantity was correct, there were 288 utensils and 55 bottles. In December 1823 he was again fined for "an inadvertant misnomer" and this time he was annoyed enough to commence an action of trespass against the magistrates which, because of a procedural point, was not able to continue. The following year he was fined another £50 for throwing away the broken fragments of seven bottles.

Pemberton knew that the offences for which he was being convicted were committed by other manufacturers daily. The reason why he alone was prosecuted for them was nothing more than hostility between him and the officers.

Mr. Pemberton is unable to account for this unfair and extreme conduct - this species of persecution on the part of the excise officers, unless it has been occasioned by his refusal to treat them with drink which they have often applied for and which he has always denied.

The culmination of the feud came in 1824 when Pemberton was charged in the Exchequer with a far more serious offence - having false beams and weights and obstructing an officer in the course of his duties. According to Richard Ridley, one of the arms of the beam scale was shorter than the other which made a difference of 4lbs. The faulty beam was sent away to be altered and Pemberton borrowed another beam from the neighbouring Ayres Quay house of Laing and Hubbard. However when this was ready to be used, Ridley seized Pemberton's weights as also being faulty. Pemberton's patience had already been severely tried for when Ridley tried to stop the weighing and take away the weights, "Pemberton prevented me, he shoved me from my place called me a scoundrel and said I was no worse than a highway robber". The

prosecution's case sounded most convincing but Pemberton was able to make an equally convincing defence. He pointed out that the scales in question had been in use in the glass house for the last twenty years without being complained of, and as the weighing was entirely the excise officers' concern it was up to them to check them. He had acted correctly in sending them to be adjusted when the fault was pointed out to him. He also maintained that they were accurate when empty and it was only when 150lbs. was placed in them that it turned 1lb. Above all, he maintained that because the crown had the turn of the scale the fault would have operated to the crown's advantage. Despite this, he was found guilty and fined £600. After applying unsuccessfully for the verdict to be put aside, Pemberton put up the manufactory for sale later that year.

Pemberton had evidently been prosecuted as a guilty man in the excise's eyes; a character with a string of convictions who deserved to be prosecuted. This was not an isolated case, indeed it almost appears to be a matter of policy. William Cuthbert had told the Commissioners that when he had asked Mr. Carr, the Excise Solicitor, why they continued to have all these regulations that were not enforced, Carr replied that the Board "do not carry them into effect unless we find a man cheating". In other words that prosecution depended as much upon the character and the previous record of the glass manufacturer as his actual offence. There is quite a lot of evidence that the Excise frequently undertook a prosecution with wider issues than the immediate offence in mind; for instance that the man deserved to be prosecuted, or that a particular point in law needed to be made absolutely clear, or to support a strongly held policy of the Board. Pemberton is an example of a manufacturer being prosecuted because he was a marked guilty man. Another is perhaps John William Bell whose protracted trial and re-trial in 1828 may well have resulted from his guilty reputation gained

when he was a flint glass manufacturer in Newcastle.⁸³ It is very noticeable that the same names occur regularly in lists of Exchequer prosecutions and, although there is no doubt that some of these manufacturers were indeed habitually fraudulent, at the same time it is highly likely that once they gained a reputation for fraud they were more likely to be prosecuted for small infringements of the regulations that would have been overlooked with men of better reputation.

Prosecutions to clarify or emphasise a point of law were not uncommon. A good example is the trial of Apsley Pellatt and John Green in 1814 for having a lear with two mouths.⁸⁴ There was no evidence at all that the manufacturers had actually defrauded the revenue and throughout the trial there was no question that a manufacturer of Pellatt's reputation had behaved improperly. The trial was being brought to settle a particular matter publically rather than privately which, as there had been no fraud, might have been more appropriate. The matter was something which had already caused the Board some trouble. By the terms of the 1811 Act the flint glass lear could only have one mouth yet some manufacturers, particularly those who made a variety of articles, put a partition or screen into their lear to regulate the temperature. Pellatt and Green had put up such a "regulator" and a prosecution was brought against them, even though the Board was undecided as to what their offence actually was. They were charged with constructing a lear with two mouths and with using a lear without a licence (i.e. that the regulator made it into two lears) and the jury was left to decide which was the most appropriate charge. Despite overwhelming evidence from Pellatt himself, furnace builders, other flint manufacturers, surveyors and workmen that the regulator was "nothing more than an expedient contrivance for making his wares rather more perfect than another" he was found guilty and subjected to a penalty. Another example of a trial being brought to emphasise a point

of law is the trial of a firm of "glass toy manufacturers", Moore and Bowley of Birmingham,⁸⁵ for not entering their premises as makers of glass. Again, the revenue had not been defrauded as the glass toy manufacturers bought lumps of glass on which duty had already been paid from flint glass manufacturers. The Board, however, wished to make an example and although there had been no fraud, a verdict was found for the crown "for form's sake".

Where a prosecution was brought merely on a point of law and no fraud was involved the fines and penalties were not large and the manufacturer not unduly harmed. However the Board was capable of bringing prosecutions in support of its policies from which the manufacturer could suffer quite considerably. There are examples of this among the many prosecutions commenced against flint glass manufacturers in the years following 1811, all intended to add weight to the Board's intractable claim that the system of charging the duty on the manufactured goods had opened the door to fraud. Undeniably, the majority of the prosecutions were founded on cases of real fraud, but in some cases there were considerable grounds for doubt; in some cases the Board's zeal to prove itself correct overwhelmed the true facts of the case.

In 1816, for instance, George Sowerby and John Lowery, who owned a flint glass house in Gateshead, were prosecuted and found guilty of not having a secure weighing room, for which the penalty was £200.⁸⁶ The prosecution was brought on the information of one James Snitch, the Surveying General Examiner of Excise, who had been in the North on a visit of general inspection. Snitch maintained that when he had inspected Sowerby's house he had found an iron grating to the weighing room which could easily be removed by taking out some loose bricks at the side of it. He claimed that this was being used to remove goods from the weighing room and in support of this brought forward the figures of the gauged metal for the previous two months which were far higher than the figures of the weight of manufactured goods charged

with duty. This, he claimed, proved that fraud had occurred. His case did not stand up well to cross-examination. It transpired that in order to remove the "loose" bricks from the side of the grating he had had to get the foreman to force them out with an iron bar, the opening was only 9 inches wide and in constant view of all the workmen, the weighing room had been constructed under the supervision and with the approval of the local excise officers (as a result of the incident the supervisor at Gateshead was discharged and the officers transferred to other surveys) and he had nothing except the gauge figures to prove that glass had actually been removed. Sowerby and Lowery were found guilty but they felt sufficiently wronged to petition the Treasury⁸⁷ after the verdict protesting their complete innocence. Their workforce were ready, they said, to come forward to a man and swear that the opening had never been used improperly. Above all they challenged the "evidence" of the gauge figures, of which the prosecution had made a lot in the trial. It was impossible, they maintained, to relate the weight of the gauge to the weight of the manufactured goods for there were so many variable factors; what type of articles were being made, what quality of articles were being made, what the quality of the metal was (for if it was bad it needed many skimmings) and what the skill of the workman working it was. The Treasury passed the petition on to the Excise who, inevitably, recommended that the verdict not be set aside though they did admit the weakness of their case, "although no positive act of fraud was proved there was the strongest presumption that the opening had been made for no other purpose".

A similar case was that of James Seager, again of Gateshead, who was prosecuted in June 1814.⁸⁸ It was similar in that Seager strongly protested his innocence, in that the Excise's case rested on conjecture and the gauge figures, and in that the Excise used the opportunity to underline the

disastrous consequences of giving up the gauge which "lays the door open to fraud of which this case furnishes so gross an example". Seager was charged with having an insecure weighing room, and with a more serious offence - removing glass, the combined penalties for which were £900. He was found guilty and forced to sell up his glasshouse to pay the fine. The charges were brought on the evidence of the supervisor at Gateshead, Thomas Wilkinson, and the surveying officer, Isaac Sewell. Their suspicions of fraud had been excited on two separate occasions; once when Sewell had seen pans going into the lear filled with tumblers stacked in nests and had found them in the weighing room in single layers; the second time when he had counted 403 tumblers going into the lear and seen only 100 emerge in the weighing room. To substantiate their suspicions they had both gone into the glass house one Sunday when it was empty and, on examining a room above the weighing room, found a floor board which they were able to take up and thus discovered what they maintained was the space through which glass could be passed up from the weighing room. As in Sowerby's case it sounded most convincing until the cross-examination. Then it appeared that it had taken them from 10 in the morning until after midnight to discover this loose floorboard, that they had had considerable difficulty in getting the floor board up and had had to use an iron bar and cleaver, that it was highly likely that the pans ^{Sewell} had seen stacked with tumblers in nests were not the same as the ones he had seen in the weighing room the following day, that the day on which Sewell claimed to have counted 403 tumblers his own gauge figures showed that such a quantity could not possibly have been made, above all that in order to pass glass from the weighing room to the room above someone would have had to crawl down the lear into the weighing room which was impossible during the week because of its great heat. Wilkinson admitted that when he had tried to do it on a Sunday, when the lear was cool, the experiment had nearly cost him his life, Despite the defence's insistence

that all was conjecture and the "decisive fact" of the gauge figures, which again the prosecution made much of, were nothing of the sort, Seager was found guilty.

It is impossible to say with certainty that a miscarriage of justice had occurred in both the above cases. It is also impossible to claim that as a rule, the Board of Excise abused the power to prosecute. However the zealous pursuit of certain objectives by the Board and the arbitrary conduct of its officers may have resulted in a miscarriage of justice in certain areas. This affected the industry as a whole by discouraging certain manufacturers from continuing in the trade and even, perhaps, in discouraging prospective entrants to the trade. Prosecutions certainly affected people within the trade. There are many instances of manufacturers being forced to sell up because of fines imposed after prosecutions.

The whole effect of the system of regulations on the trade and the manufacturers was thus a double edged one, with a good and a bad side. To a well established, honest manufacturer, the regulations were undoubtedly a good thing for they protected him against unfair competition and yet they were flexible enough to allow him to infringe them in small ways in order to proceed with minimum inconvenience. To a manufacturer whose character was less firmly assured they were potentially dangerous. Their arbitrary enforcement left him uncertain as to what exactly constituted fraud and he could not rely on the example of his neighbours for he was quite likely to be prosecuted for an evasion others committed without repercussions. A manufacturer who had already been branded as fraudulent stood to be prosecuted for every small, minor infringement. This meant that the system did not weigh as heavily upon the trade in general as the 1835 Commissioners had supposed, which is underlined by the fact that the regulations were not, in general, complained of by the manufacturers to the Commissioners. The system

of regulations did however have an effect on the industry and its growth by causing some manufacturers to leave the trade and perhaps by dissuading others from entering it; it could be said to have slowed down growth and, in a small way, acted as a protection to those well established manufacturers who enjoyed a sympathetic relationship with the Excise.

(iv) Invention and improvement

The 1835 Commissioners criticised the excise for "halting the free progress of invention and improvement". There is no doubt that improvement was made more difficult by the existence of the excise regulations. Any new device - such as the Lear "regulator" - had to pass the test of acceptability to the Excise before it could be adopted. Any substantial improvement ran the risk of being prohibited because it made the article "unnaturally" good and brought it into competition with another branch of glass; thus Cookson was not permitted to improve his bottle metal by adding crown cullet to it, Hartley was not permitted to improve his broad glass to the standard of German sheet. There was thus a direct bar against certain improvements. However, although the excise did not make improvements easy, there is no doubt that it was not strong enough to overcome the natural inclination of every manufacturer to improve and make more attractive his own particular product. The quantity of patents connected with glass bear witness to the fact that the excise did not halt invention. The period of the excise saw many improvements to the manufacture on the technical side and in the general standard of quality. Many of the general improvements, such as the substitution of soda for kelp and improvements in furnace or glass house design, were not directly prohibited by the excise regulations but the difficulties surrounding any experimentation made their development more difficult. The main difficulty was almost certainly financial in that the Excise insisted that duty be paid on all glass that went through the

manufacturer's hands whether it was saleable or not. A further difficulty lay in having to conform to the regulations. When R.L. Chance embarked on his German sheet experiment, he made a bold but reasonable proposal to the Board, that he pay a standard yearly payment of duty to the Board and in return be left completely free to experiment in his house; this payment he suggested as £10,000 based on the size of his furnace, (9' x 8'), and the average payment for a crown glass furnace of that size. This was not agreed to.⁸⁹

The excise, therefore, whilst not halting the free progress of invention, made it considerably more difficult than it otherwise would have been. This is seen quite clearly in the history of attempts to produce a good achromatic glass for optical purposes. Glass used for lenses had to be as near perfect as possible, uniform in texture and with no striations or distortions. These requirements were not fulfilled by ordinary flint glass and, because of the importance of lenses to scientific work, various scientists and glass manufacturers addressed themselves to the problem of improving flint glass to make it suitable for lenses. The most well known of these attempts was that initiated by the Royal Society in 1825.⁹⁰ A committee was appointed to seek means of improving the quality of optical glass, especially for telescopes, and a subcommittee of Michael Faraday, John Herschel and George Dolland, a practising optician who had already made experiments in the field, was appointed to carry out the practical work. The committee had the approval of the Board of Excise and the ^{members} carried out their experiments in Apsley Pellatt's glass house and later with a small furnace of their own without interference. However less distinguished experimenters had not been so fortunate. It was partly as a result of the Excise's hinderance of previous experiments that by 1825 England had not managed to produce a suitable optical glass, in contrast to the continent, despite the fact that English

lead glass was the most suitable base for such a glass. Quite apart from the restraint on scientific enquiry that this lack of optical glass meant, it also impeded the ordinary optician. A petition to the Treasury in 1822⁹¹ asking for leave to make experiments with optical glass spoke of the whole optical and scientific instrument trade being at a standstill because of the lack of suitable glass.

The major difficulty the Excise created was a financial one, by insisting that duty be paid on all the glass involved in the experiments. During the 1780s Josiah Wedgwood and James Keir attempted some "Experiments with a view to remedy the imperfections of flint glass for achromatic instruments.". These were made at the flint glass house in Whitefriars and Mr. Knight's house at Liverpool. In recording the experiments, Wedgwood noted that disputes with the excise officer had prevented the experiments being continued. Keir referred to the same difficulties in his "Dictionary of Chemistry" and noted that,⁹²

"The expense of making experiments on a large scale must be very considerable not only on account of the large quantities of materials employed but especially from the heavy duty of excise which is rigourously extracted whether the glass is made into saleable wares or not .

The same problem is voiced in a petition to the Treasury in July 1820 from Joseph Lamb of the Northumberland Glass Company and George Dolland.⁹³ They complained of serious inconvenience in manufacturing glass for optical purposes because the thick crown glass they were using was charged at a high rate of duty. Crown glass was not permitted to be made more than $\frac{1}{8}$ " thick. The Excise had permitted them to make thick slabs for lenses as long as they paid the flint glass duty on it. This made it impossible for them to continue because the whole pot was charged with the higher duty even though out of an 18 cwt. pot only 1 cwt. was suitable for lenses and the rest was manufactured into ordinary crown glass tables. The petition asked

that the Treasury intervene with the Board of Excise to permit them to pay only the crown glass duty on the lenses. This, as Dolland wrote in a covering letter, was not an unreasonably large demand "I have asked for as little as possible, although I could have wished for more but my wishes did not appear to fall into the views of my friend Lamb ". Presumably Lamb had a more realistic view of what the Excise would be likely to allow them. This is an interesting and apparently unique example of crown glass being used for lenses; most experiments were based on flint glass with its high proportion of lead.

There are a number of petitions to the Treasury during the 1820s and 1830s asking for warrants to be relieved from the regulations in order to make experiments with optical glass. Most, especially in the later period, were granted but it is clear that the Excise still managed to impede the experiments by insisting that they be kept under its surveillance. One of the most active experimenters was Joseph Price of Gateshead who in 1830 had applied directly to the Duke of Wellington to permit him to carry on experiments.⁹⁴ Permission was granted but the regulations that the Excise insisted on were so impractical that Price was forced to abandon the whole project. Price provided glass for opticians with his "Imperial Sheet Glass" which was flint glass blown in a cylinder and flattened "by a peculiar process" and used for picture framing or spectacle eyes. In 1840 Price applied again to the Treasury but insisting that this time the Excise surveillance be less rigorous. His suggestions were rather optimistic for he demanded not only no restrictions on unstopping the pots or the thickness or specific gravity of the glass, but also that he be completely free from any duty and that the government pay one sixth of his expenses (about £10 a week he estimated). He was allowed to dispense with all the regulations but not to

avoid the duty and he was not allowed a subsidy. His suggestion that the government pay some of his expenses was not as unreasonable as it appeared. In 1849, after the excise had been repealed, Apsley Pellatt was still able to attribute Britain's failure to manufacture a good achromatic glass to the lack of Government support. He claimed that even if the manufacturer were to supply all the opticians in Britain it would still be unremunerative for him:⁹⁵

Working a large pot of glass for optical purposes not only retards general operations, but usually spoils the greater part of its contents whilst the quantity of optic plate produced is comparatively small, and uncertain in its results; and if unfit for the optician, it becomes valueless to the manufacturer for other purposes. As an affair of science and merit, especially were a Government premium offered for a uniformly certain process, which had not yet been accomplished at home or abroad, it is anticipated that English manufacturers would rival foreigners in this field of honourable competition.

Most experiments to produce a satisfactory optical glass centred on flint glass with its high proportion of lead and a high specific gravity. Plate glass with no lead and a low specific gravity was also suitable for this purpose but experiments with plate seem to have concerned attempts to find a satisfactory reflective lense for use in light-houses. --In-1819-Augustus Fresnel had developed an annular lense composed of rings of polished plate glass which was successfully installed in a lighthouse in 1823. The Commissioners of the Northern Board of Lighthouses approached Isaac Cookson soon after this enquiring if he could make a similar one. Cookson and Cuthbert were enthusiastic for they considered their glass to be more brilliant than the French and maintained they could produce a lense that would refract the light so strongly as to be seen through fog from 14 miles away. They began the lense but unfortunately were not able to complete it because of ^{the} opposition of the Board of Excise. Since the reduction of the duty on plate in 1819. plate had not been permitted to be made thicker than normal as a supposed protection to flint glass. Despite protests to the Board from the Commissioners of the Northern Lighthouses, and Robert

Stevenson who described the episode as "a very great disappointment", the ruling stood. The affair came to public notice as an appendix to the 7th Report of the Excise Commissioners in 1834.⁹⁶ As a result of this, as Cookson told the Commissioners in 1835, the Board had changed its mind and allowed them to manufacture thick plates for lenses, but only on condition that they paid the higher flint duty of £4 18s ^{per cwt.} on the glass. This was not an incentive to continue, especially in view of the fact that by 1835 the flint glass duty had been reduced yet thick plate was still having to pay the £4 18s duty. According to a later account, Cookson and Cuthbert succeeded in manufacturing a number of lighthouse lenses, among them the dioptric light on Inch Keith (1835) and the light on the Isle of May (1838), but with evident difficulty and financial loss; "Messers Cookson, after producing several lens apparatus excellent for that day were forced to abandon the undertaking with considerable loss."⁹⁷ The Chance brothers at Spon Lane were the only firm to continue in the manufacture of lighthouse apparatus. Like the development of optical glass the difficulty of such an undertaking was fundamentally its commercial unrenumerativeness. The excise had doubled this difficulty but even after the repeal of the duties it was still unprofitable. What was needed, in both cases, was positive government aid.

There was evidently no lack of manufacturers willing to experiment in glass, either from a spirit of scientific enquiry or from the pursuit of a commercial advantage. The excise did not completely prevent such experiments but it placed considerable difficulties in their way. It did not halt the progress of invention and improvement but slowed it down both directly, by putting a bar on certain improvements, and indirectly, by increasing the financial loss the experimenting manufacturer would suffer.

(v) Summary

The most general way to sum up the effects of taxation on the glass industry is to repeat Adam Smith's comment that "such taxes always alter, more or less, the natural direction of national industry and turn it into a channel always different from and generally less advantageous than that in which it would have run of its own accord".⁹⁸ Whether the natural direction of glass would have led it into a more advantageous position is an almost impossible speculation, however it is undeniable that the direction it did take in this crucial period was heavily influenced by the excise. Generally speaking, this direction seems to have been a conservative one. The industry tended towards the refinement and improvement of the well-established, standard products, producing them by the well-established methods. There were no radical departures from tradition, no significant development of labour or cost saving methods of production (as there were on the continent), and no introduction of new types of glass - such as cheap soda table glass. Th conservatism could be directly attributed to the excise which acted as a restraint and a discouragement to any radical change. In some cases, particularly as we have seen the case of cylinder window glass, this conservatism could be said to have been a bad thing; Great Britain did not keep abreast of continental developments in glass technology. However, in other ways it could be said to have strengthened the industry. By its general emphasis on improving the existing products the tax encouraged a trend towards producing glass of a high quality. This was emphasised in the export trade where the Board of Excise laid down strict standards - the specific gravity of flint glass the thickness and regularity of crown glass - with the result that English glass established a reputation for quality that no other European country was able to match. This is particularly so in the case of flint glass. The luxurious, refractive English lead glass, heavily cut "a la facon d'Angleterre" was as much envied on the

continent as that other peculiarly English manufacture, Wedgwood's cream-ware.

Glass had originally been taxed in England as a luxury and perhaps inevitably it seems to have grown into this category. During the years of the excise duties the English glass industry grew strong in the production of high quality finely crafted glass. It maintained methods of manufacture more suited to a craft rather than an industry; methods that compared to the continent seemed laborious and expensive. At the same time it grew weak in the production of cheaper glass and thus developed a character ill-suited to meet the demands of the mass market.

Although the character the glass industry took on was heavily influenced by the excise duties, it was the customs duties on imported foreign glass that enabled an industry of this character to survive. In many ways it was the customs duties not the excise duties that had the most significant effect on English glass during this period. Without protection against foreign glass English manufacturers almost certainly would have been forced to pay more attention to cheapness, ^{large scale} production and modern improvements. But the excise without the customs was inconceivable. Whilst the government continued to draw revenue from the consumers of glass it was bound to protect this revenue by ensuring that the consumers had no alternative. The full effects of the customs and the excise duties on the glass industry were not seen in real terms until after the repeal in 1845, and it certainly could be argued that the greater effects were felt as a direct result of the loss of the customs duties. The repeal of the excise opened up new markets and new opportunities for the English glass industry but the repeal of the customs duties snatched these opportunities away by making them equally available to foreign manufacturers who were far better equipped to exploit them.

The repeal of the excise duties in 1845 and the subsequent confusion has perhaps tended to cast the duties as worse than they actually were; the rapid and not entirely successful change of direction that the industry experienced immediately after 1845 has overshadowed the hundred years of solid if slow growth that it saw under the excise. From the manufacturer's point of view the restraining influence of the excise must have been seen as not altogether a bad thing. It regulated and standardised the industry and to a certain extent provided protection against unforeseen competition in the form of new improvements or developments. It gave all manufacturers a stable common ground from which to work in "fair" competition. The excise was especially agreeable to those manufacturers who enjoyed the confidence of the Board of Excise. As we have seen the working of the duties depended on a degree of collusion between the Board and the manufacturers, and the manufacturers were allowed a substantial say in the drafting of legislation. Those manufacturers whom the Board did consult and listen to were obviously well placed to make the most of the economic situation the excise was creating. Furthermore they were well placed to take the initiative and use the excise as an instrument to protect their own particular interests; Isaac Cookson for instance used the excise to fend off competition from German sheet; the crown glass manufacturers used it to crush Hartley's attempt at broad glass; the flint glass manufacturers used it to protect their trade in phials. To manufacturers who were not so well placed to influence the Board and manipulate the excise, the duty held out less potential benefits. For the ordinary manufacturer it was not an instrument to be used but an inescapable fact of life; a fact that was neither wholly bad nor wholly good but which powerfully affected his daily business, even to the point of putting him out of business. As had been remarked of another group of excised manufacturers, the brewers, "considerations other than the economic had a high stake in their fortunes"⁹⁹

This was certainly so for glass manufacturers; success and failure in the glass industry from 1745 to 1845 depended as much on personality and the peculiar effects of legislation as identifiable commercial factors.