

Industrial Growth in Ireland;

c. 1790-1910.

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ABSTRACT

This thesis examines growth and decline trends in the Irish industrial sector between 1790 and 1910. It challenges existing perceptions of industrial decline in the nineteenth century; instead it argues that industrial output experienced growth during the period in question. Chapters have been written on brewing, distilling, engineering, shipbuilding, woollen, cotton and linen. An additional chapter has been written to cover some of the remaining industries (milling, food processing, tobacco, glass, tanning, paper). Each of these chapters provides a synthesis of research in each industry, in addition to some new research which has been done by the author on the business records of a number of industrial companies. Part of the research task was to bring together the available statistics in each industry; these have been extensively used to gain some idea of trends in each industry. A more macro perspective has been taken in the conclusion which contains two new estimates of industrial output in 1840-5 and 1907. The former is the first estimate of industrial output to be made for nineteenth century Ireland.

A second objective of the thesis is to identify the major economic factors which led to the industrialisation of east Ulster while most of the remainder of the country failed to achieve significant industrial development during this period. This theme in particular is explored in the chapters on linen, shipbuilding, engineering and in the conclusion. A further objective of the thesis is to identify how much the extent, location and nature of each industry changed during the period in question.

Earlier research on the Irish industrial sector has either concentrated on one region (particularly Ulster), or has only concentrated on one industry. This thesis is the first attempt to look at almost all of the industries which created added value on the island of Ireland.

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Introduction

I

This study examines growth trends within the Irish industrial sector between 1790 and 1910, a period when the economy of Great Britain was radically transformed by industrialisation. The paucity of research on the subject, creates many problems for a project of this nature. It is not yet possible therefore to write a comprehensive overview of Irish industrial history during this period, as this task must wait until further research has been undertaken in a number of industries. But since it is the first attempt to look at all the industries which created added value on the island of Ireland, it is more comprehensive than anything else which has yet been written on the subject.

It is not for any political reasons that the whole island of Ireland has been chosen as the unit of analysis, but simply because the statistics of this area lend themselves better to the purpose of the study than if a more disaggregated regional approach was taken. Earlier work in this sphere has been more regionally oriented, or alternatively, has concentrated on specific industries. By taking the whole industrial sector on the entire island as the focus, Ireland's economic relationship with the rest of the UK becomes more apparent; this perspective also provides a clearer picture of the regional disparity and diversity of industrial development across the island.

The thesis has three main objectives; the first is to challenge and qualify existing perceptions of industrial decline in nineteenth century Ireland¹ by demonstrating that industrial output actually experienced growth during this period. This will be achieved by identifying growth and decline trends in each industry and in the industrial sector as a whole; available statistical data will be used, but for much of the period and for many industries no quantitative material is available. It has therefore been necessary to make a qualitative assessment of growth and decline trends

¹ O'Malley, E. 'The Decline of Irish Industry During the Nineteenth Century', *The Economic And Social Review*, xiii (1981), pp. 21-42. Green, R. 'Industrial Decline in Ireland During the Nineteenth Century', in Cullen, L. (ed) *The Formation of the Irish Economy* (Cork, 1968), pp. 89-100. O'Brien, G. *The Economic History of Ireland from the Union to the Famine* (London, 1921), pp. 283-450. Mokyr, J. *Why Ireland Starved* (London, 1985), pp. 12-15.

from primary sources and by reviewing the research undertaken by other historians in each industry.

The second objective of the thesis, is to identify how much the extent, location and nature of each industry changed during the period in question. The final objective is to single out the major economic factors which differentiated the north east from the rest of Ireland in terms of industrial development. This question will be explored in the chapters on linen, engineering, shipbuilding and in the conclusion.

To decipher trends of growth or decline, each industry will be discussed in separate chapters which will synthesise the secondary material, adding whatever statistical data is available, and incorporating some new primary research. This approach will facilitate a re-assessment of the historiography of each industry, which will collectively provide a more solid basis to make some generalisations in the conclusion about growth and decline trends in the industrial sector as a whole.

A second line of evidence to support the thesis of industrial output growth will use a more quantitative approach; an estimate of total industrial output for 1840-5 will be compared to a revised estimate of the Irish section of the 1907 UK Census of Production. Because of the lack of data in many industries, some of the output estimates involve a certain degree of speculation (or in Hudson's words, an element of 'guesstimation'). Therefore they need to be considered cautiously, in conjunction with the qualitative evidence provided in the rest of the study.² The methods used to generate these estimates can be found in the appendices.

In contrast to the agricultural sector, the historiography of the Irish industrial sector during the nineteenth century is fairly limited. O'Malley, has briefly surveyed the historiography in a synoptic article, 'The Decline of Irish Industry During the Nineteenth Century'. As the title suggests, he takes a fairly pessimistic view of the performance of the industrial sector during the nineteenth century, which he reiterates in his book 'Industry and Economic Development'.

² Hudson, P. *The Industrial Revolution* (New York, 1992), p. 3.

O'Malley argued that 'by the early nineteenth century Ireland had a fairly substantial industrial sector by the standards of most countries at that time, except Great Britain'. He goes on to argue that industry experienced widespread decline during the remainder of the nineteenth century.³

Green has also argued that the act of Union in 1800, which cleared away all the duties on Anglo-Irish trade by 1824, led to 'rapid industrial decay'. This decline was further increased by steam navigation, and later by the development of the railway network.⁴ It is argued in this section of the thesis that decay was not as extensive, widespread and so immediate as Green suspected. Green's article does not look at decline in the context of the entire economy, instead he focuses on specific examples of regional decline, like textiles in Bandon and Drogheda, or the provisions trade in Cork. There is no disputing these instances of regional decay, but Green's article has subsequently been cited as the main evidence for widespread industrial decline all over Ireland. This is misleading; a more macro-economic approach will be adopted in this study which will take account of available statistical data and a wider range of sources than have previously been used.

O'Malley and Green broadly represent the orthodox view taken by most historians. The evidence given for this argument is usually the fall in manufacturing employment; the labour force engaged in textile manufacturing in Ireland (as returned in the census) fell from 27% in 1841 to 17% by 1891.⁵ These statistics need careful interpretation as most of those returned as engaged in manufacture in 1841 were merely part time domestic hand spinners who produced very little yarn. If we take this census data at face value (700,000 occupied in textiles) then we could assume Ireland in terms of industrial development was only marginally behind Great Britain where 883,000 people were returned as employed in textiles in 1841.⁶ This was quite patently not the case. Falling employment in manufacturing between 1840 and 1900, resulting

³ O'Malley, (1981), pp. 21-42. O'Malley, E. *Industry and Economic Development* (Dublin, 1989), pp. 32-52.

⁴ Green, (1968), p. 94.

⁵ Daly, M. *Industrial Development and Irish National Identity 1922-1939* (Syracuse, 1992), p. 3.

⁶ Crouzet, F. *The Victorian Economy* (London, 1982), pp. 123-5.

from the demise of hand spinning has often been misinterpreted as an index of 'industrial decline'. 'De-*proto*-industrialisation' is perhaps a more appropriate term as the linen industry was certainly not in decline; the majority of these rural hand spinners were displaced by the mechanisation of flax spinning which was becoming more concentrated in east Ulster. Crotty even goes so far as to argue that declining employment during this second half of the nineteenth century in non-agricultural industries was accompanied by a decline in industrial output (although he provides no figures for industrial output).⁷ In general, the consensus within the historiography seems to support the view that overall the Irish industrial sector experienced decline during the nineteenth century. This position must logically be based on the assumption that the Irish industrial sector was larger at the beginning of the nineteenth century than at the middle or the end of the century.

It is probably the rapid decline in employment in the textile industry from the 1840s, and the decline of the milling industry during the last quarter of the nineteenth century, combined with emigration which created this popular perception of general industrial decline. In 1905, Horace Plunkett observed that 'the people have an extraordinary belief in political remedies for economic ills: and their political leaders, who are not as a rule themselves actively involved in business life, tell the people, pointing to ruined mills and unused waterpower, that the country once had diversified industries.'⁸ The view that the Act of Union reversed Ireland's rapid industrial development in the second half of the eighteenth century gained currency among nationalists, who argued that independence and control over Ireland's fiscal arrangements and natural resources would once again lead to more impressive industrial development. The arrival of independence soon exploded this myth. However, the perception that Irish industry declined during the nineteenth century is still strong.

This thesis challenges O'Malley's view that Ireland had a substantial industrial sector by the beginning of the nineteenth century. Instead it argues that industrial development had been fairly limited up to the beginning of the nineteenth century. In contrast to O'Malley, it also

⁷ Crotty, R. *Ireland in Crisis, A Study in Capitalist Colonial Underdevelopment* (Dingle, 1986), p. 44.

⁸ Daly, (1992), p. 4.

argues that the industrial sector by the end of the nineteenth century had experienced limited growth, and was therefore larger in 1900 than it had been in 1800 or 1850. Cullen has reached a similar (though more optimistic) conclusion, arguing that industrial decline during the first half of the nineteenth century was confined to the cotton and woollen industries. He identifies the mid-1870s as a critical turning point for many industries as imported manufactures began to compete more effectively; this undermined the milling industry and a number of craft based industries. However he identifies a period of recovery following the 1880s, particularly in export based industries like linen, shipbuilding, brewing and distilling, in addition to a growth in food processing, tobacco and woollen manufacture.⁹ More recently, Johnson has also expressed some doubt on the decline hypothesis, pointing out that pre-partition Ireland compared favourably with most European countries in terms of the percentage of the economically active population employed in industry and construction. Ireland only appeared to fall behind when compared to Britain and the other most advanced European nations.¹⁰

Although much work still needs to be done before a comprehensive overview can be written, some good work has been done on individual industries and a few regional studies have also appeared. But with a few notable exceptions, most of this work lacks any quantitative analysis.¹¹ Consequently it is difficult to get any idea of the relative importance of different industries, or the exact periodisation of their growth or decline over the course of the nineteenth century. The estimates of industrial output which have been made in this thesis for 1840-5 and 1907 will contribute towards filling the large gap in this sphere.

Each chapter will be divided into two sections, one dealing with the period between 1790 and 1845, and the other dealing with the period between 1845 and 1907. The division of each

⁹ Cullen, L. *An Economic History of Ireland since 1660* (London, 1972), pp. 124-61.

¹⁰ Johnson, D. *The Inter-War Economy in Ireland* (Dublin, 1989), p. 20.

¹¹ The most notable exception in the quantitative sphere is. Solar, P. 'The Irish Linen Trade, 1820-1852', *Textile History*, xx (1990), pp. 57-85. For a bibliography on Ulster industry see Ollerenshaw, P. 'Industry 1820-1920', in Kennedy, L. and Ollerenshaw, P. (eds) *An Economic History of Ulster 1820-1939* (Manchester, 1985), pp. 102-8. For a broader perspective see O'Grada, C. Industry and Communications, 1801-45, in Vaughan, W. (ed) *A New History of Ireland*, V (Oxford, 1989), pp. 137-157.

chapter in this way will facilitate a critical re-assessment of growth and decline trends in both periods. More work has been published on the Irish industrial sector for the former period than for the latter, and some controversy has emerged within the historiography on the impact of the removal of the Union duties between 1800 and 1825 and the whole question of growth or decline.¹² The separate treatment of the pre-Famine period will facilitate a re-assessment of this controversy. The Famine acts as a watershed between the two sections of the thesis. This will not pose problems for most Irish economic historians, since it marked the major turning point in the social and economic history of nineteenth century Ireland. The second period roughly coincides with an acceleration of European industrialisation. Although very little work covering the industrial sector in the post-Famine era has been published, the quality of the statistical evidence improves dramatically, which makes it easier to identify growth trends during this period.

A recurring theme throughout the thesis is the connection between Irish and British industry. Ireland's economic relationship with Britain intensified with the introduction of free trade. Proximity to the most advanced industrial country in the world brought advantages and disadvantages; on the one hand, English technology could be transferred with ease to Ireland and the British market and those of its colonies which were open to Irish manufacturers. But the policy of free trade and the integration of the Irish and British market after the transport revolution, exposed Irish manufacturers to competition from British manufacturers who traditionally served larger markets and utilised superior technologies. Ireland therefore began to concentrate in industries where it had comparative advantage; in linen it had built up human capital over generations and the cost of labour was cheap (including the cost of labour in the cultivation of flax); in brewing, distilling, provisions (and in milling during the first period at least) the supply of raw materials were cheaper than in other parts of the UK because of the lower cost of agricultural labour. Those industries where British producers had advantages, notably cotton and woollen manufacture, began to decline in Ireland from the mid-1820s. The dominant centres of production in the UK derived cumulative advantages from external

¹² For a synopsis of this debate see Geary, F. *The Act of Union, British and Irish Trade, And Pre-Famine De-industrialisation in Ireland* (unpublished paper).

economies, economies of scale, and an early technological lead; these will be discussed separately in the chapter on each industry.

Productivity levels in the industrial sector were largely determined by the types of technology used. The ability of a number of Irish industries to compete with British competition depended to a large extent on how capable they were in adapting British technologies to local conditions. Bruland has studied how new technologies were transferred to the Norwegian textile manufacturers who purchased plant from specialist British machine makers from the 1840s. This study provides some useful analogies with the diffusion of British technologies into Ireland. Artisans were the main agents of technological diffusion at the beginning of the nineteenth century, which placed limitations on the acquisition of the necessary knowledge and machinery to establish new production methods. By the mid-nineteenth century a specialist British machine industry had emerged which exported the state of the art in textile machinery; Irish entrepreneurs with sufficient commercial and marketing skills, who lacked the technical and engineering skills, could import all the machinery and relevant technical expertise from Britain. Many companies absorbed and adapted the new technologies successfully to local conditions. After the beginning of the mechanisation of flax spinning, the Irish linen industry achieved sufficient critical mass to give rise to a specialist mechanical engineering industry servicing its needs, which developed an extensive export trade during the second half of the nineteenth century. The thesis will examine to what extent this development of a capital goods sector was replicated in other industries, as in the long run heavy industrialisation in Europe generally depended on the development of this sector.¹³

The thesis traces the radical shift in the structure of the Irish industrial sector during the nineteenth century, including the changing composition of total output between 1845 and 1907. It looks at changes in the capital, raw material, energy and labour inputs into the industrial sector. As in neighbouring Britain, there was a major transformation in the way industrial

¹³ For a case study in this sphere on Norway see Bruland, K. *British Technology and European Industrialisation* (Cambridge, 1989). On the diffusion of British textile technology to America during the first phase of industrialisation see Jeremy, D. *Transatlantic Industrial Revolution* (Oxford, 1981).

goods were produced in Ireland during the nineteenth century, but in contrast to Britain, industry remained relatively much smaller than the service and agricultural sectors. Though Ireland remained an agricultural economy, its industrial sector experienced very slow growth during the nineteenth century. Production became more centralised in more highly capitalised larger units of production, using greater energy inputs and employing fewer people in national terms.

II

During the eighteenth century, the lack of mineral wealth in Ireland and the predominance of agriculture within the economy, strongly influenced the nature of the country's industrial development. Agriculture provided the bulk of the raw material inputs for most industries. Flax was grown and spun extensively in the northern half of the country, providing yarn for linen manufacture, Ireland's premier industry, which accounted for over 56% of total exports by 1796-7. Both linen and to a lesser extent woollen goods were manufactured extensively by rural households. Cattle provided the second mainstay of the commercial economy after linen, accounting (in 1796-7) for over 34% of total exports when its derivative industries are included; cattle provided the raw materials for the transatlantic provisions trade, butter production and tanning, lard and candle-making. Although corn was not so significant in terms of exports, it was highly significant within the domestic economy; the growth of commercial tillage farming provided the raw materials for the extension of milling, brewing, distilling, malting and baking. These industries were widely dispersed across the country. Grain milling had increased dramatically since the 1760s, notably in east Ulster, south and west Leinster and east Munster. The linen bleaching trade, predominantly located in Ulster, had also witnessed a significant extension in scale, output and capital formation.¹⁴ But the industrial sector remained small.

¹⁴ Dickson, D. *New Foundations; Ireland 1660-1800* (Dublin, 1987), pp. 100-15.

Industries dependent on foreign trade (like sugar-baking) or imported coal (like glass) were clustered in the larger ports, which also provided the largest markets for consumer goods (like silk, furniture or carriages) and the exit point for exported manufactures (like linen or provisions). Major concentrations of industrial activity therefore developed along the rivers close to these ports; notably water-driven paper, textile and corn mills and iron works. In the ports, manufacturers and processors (who were often merchants) had access to credit facilities, particularly in Dublin and Cork. The largest industries in these cities were construction and food processing. By the end of the eighteenth century, small scale artisanal workshops with low levels of fixed capital investment still predominated in most production processes.¹⁵

III

Between 1790-1845, it is argued that the decline of the cotton, woollen, glass and tanning industries in Ireland were more than offset by the growth of other industries. This resulted in very limited growth within the Irish industrial sector during the first half of the nineteenth century. Linen production, food processing, milling, brewing, distilling, paper and iron founding and engineering, all expanded during this period, while smaller industries like mining, shipbuilding and tobacco manufacture also held their own.

The changing demography, income and external trade of Ireland during this period can provide some clues on the changing size of industrial output. Between 1791 and 1841, the population of Ireland rose from around 4.4 million to about 8.4 million.¹⁶ Mokyr and O'Grada suggest that average income rose during this period, despite the poverty endemic in the poorest half of the Irish population.¹⁷ Although no estimates of income have been made for this period they reached this conclusion from looking at tobacco, tea and sugar consumption, the height of military recruits, literacy and various other indicators. They concluded that average income rose

¹⁵ Ibid, pp. 116-24. Cullen, L. 'Economic Development 1750-1800', in Moody, T. Vaughan, W. (eds) *A New History of Ireland*, iv (Oxford, 1988), p. 182.

¹⁶ Mokyr, J. O'Grada, C. 'New Developments in Irish Population History, 1700-1850', *Economic History Review*, xxxvii (1984), p. 475.

¹⁷ Mokyr, J. O'Grada, C. 'Poor and Getting Poorer? Living Standards in Ireland Before the Famine', *Economic History Review*, xxxxi (1988), pp. 229-231.

marginally. Rising population combined with even a small rise in average income would have resulted in a growth in demand for industrial goods during this period, both in absolute and per capita terms. Assuming this was the case, it seems probable that the Irish industrial sector experienced limited growth during this period, unless there was a significant rise in manufactured imports from Britain. Irish trade figures suggest that British competition was not highly significant in the half century before the Famine, with the exception of the woollen and cotton industries.

Imports into Ireland of textiles and other manufactured goods averaged about 2.5 million pounds between 1804-6, and they were still under 5 million in 1835 (current prices). Exports of manufactured goods from Ireland, which were almost entirely made up of linen, rose from 2 million to 4 million during the same period; so Britain's Industrial Revolution was not leaving Ireland with a substantial trade deficit in manufactured goods, as conventional wisdom often suggests. By 1835, the total balance of all traded goods was running in Ireland's favour.¹⁸ This was because of the growing British demand for Irish foodstuffs, (which if processed, yielded further added value to the Irish industrial sector). But apart from linen and some processed foodstuffs, the bulk of the output of the Irish industrial sector was oriented towards the home market.

Limited industrial development had taken place, despite the poverty which afflicted at least half of the Irish population which Mokyr has examined in 'Why Ireland Starved'.¹⁹ If Mokyr has focused overwhelmingly on the bottom half of the Irish population in income terms, it seems that Cullen in 'An Economic History of Ireland Since 1660' has focused more on the top half, which undoubtedly enjoyed rising living standards.²⁰ They participated in the more dynamic sector of the Irish economy, and it was this group which provided the rising demand for manufactured goods and processed food and drink on the home market, which were only partly met by British imports. The development of the Irish linen industry, however, was predominantly export led; it had been strong in Ulster since the late seventeenth century, and

¹⁸ O'Grada, C. 'Industry and Communications 1801-45', in Vaughan, W. (ed) *New History of Ireland*, v. (Oxford, 1989), p. 156.

¹⁹ Mokyr, J. *Why Ireland Starved* (London, 1985).

²⁰ Cullen, L. *An Economic History of Ireland Since 1660* (London, 1972).

with mechanisation from the 1830s, it became more concentrated in the east of the province. Milling, food processing, brewing, distilling, foundry work and engineering, in addition to a host of smaller industries were more widely dispersed with concentrations in the larger cities.

The extent of industrial development (or decline) between 1790 and the Famine has led to the emergence of conflicting opinions in the historiography. The classic nationalist position on Irish industrial history was put forward by O'Brien as early as 1921. He argued that during the period of Grattan's parliament (1782-1800) Irish industry flourished because the Irish parliament was able to use protective tariffs and encourage industrial development. But with the Act of Union and the subsequent introduction of Free Trade, he argued that most Irish industry went into decline in the period leading up to the Famine, the north-east being an insignificant exception to the general rule.²¹ This was essentially an argument for protectionism which was widely accepted in the south of Ireland until the 1960s. Since then this view has been widely discredited.²² However, there is still not a great deal of consensus on what occurred within the industrial sector between the Union and the Famine.

Cullen's 'Economic History of Ireland since 1660' was the most significant refutation of O'Brien's hypothesis that the Irish industrial sector experienced decline between the Union and the Famine. Cullen took a more optimistic view, arguing that many industries were successfully re-organising within a smaller number of larger and more mechanised units. He argued that crisis within the industrial sector during this period was restricted to the textile industry.²³

Recently, Cullen's position has drawn strong criticism from Mokyr who takes a more pessimistic view of the Irish industrial sector. Mokyr argued that de-industrialisation was widespread and not confined only to textiles.²⁴ O'Grada notes that the period is generally

²¹ O'Brien, G. *The Economic History of Ireland in the Eighteenth Century* (London, 1918), pp. 173-305. O'Brien, G. *The Economic History of Ireland Between the Union and the Famine* (London, 1921), pp. 283-450.

²² For a critique and discussion of O'Brien's views see Johnson, D. Kennedy, L. 'Nationalist Historiography and the Decline of the Irish Economy, George O'Brien Revisited' Hutton, S. Stewart, P. (eds) *Ireland's Histories* (London, 1992), pp. 12-35.

²³ Cullen (1972), p. 124.

²⁴ Mokyr, J. *Why Ireland Starved* (London, 1985), p. 13.

regarded as one of industrial decline, although he concludes that industry's record was mixed, some failing to keep pace with British competition, notably the cotton and woollen industries; others made a successful transition, notably linen and the industries ancillary to agriculture.²⁵ No consensus has yet emerged on the extent of Ireland's industrial development during this period between 1790 and 1845. The performance of the industrial sector during this period will therefore be re-examined in the conclusion, in the light of the evidence presented in the chapters that follow.

IV

The nature of the sources available between 1845-1907 differs to those between 1790 and 1845; there is less secondary material, but the statistical data improves significantly, and more business records have survived in the latter period. In general, more emphasis will therefore be placed on interpreting the statistical material; notably on two estimates of industrial output in 1840-5 and 1907. The methods by which these estimates have been arrived at can be found in the appendices.

The structural conditions for industrial development had improved during the first half of the nineteenth century, and they improved further during the second half of the nineteenth century. Kane (who was by far the most objective and well informed contemporary observer of the condition of the Irish industrial sector in the mid-nineteenth century) isolated four major factors which had retarded Ireland's industrial development; poor communications, a lack of industrial raw materials, a lack of education and a want of capital.²⁶ Many of these problems were overcome during the second half of the nineteenth century. The communications infrastructure was further developed, with the construction of the railway network and improvements to the road system and to ports and harbours. Education improved considerably, literacy levels rising from 47 per cent of the population in 1841 to 88 per cent in 1911.²⁷ Lee has pointed out that

²⁵ O'Grada, C. *Poverty, Population and Agriculture, 1801-1845*, in Vaughan, W. (ed) *A New History of Ireland*, V. (Oxford, 1989), p. 109.

²⁶ Kane, R. *The Industrial Resources of Ireland* (Dublin, 1845), p. 69, 387, 402-426, cited by Royle, S. 'Industrialisation, Urbanisation and Urban Society, c. 1850-1921' in Graham, B. Proudfoot, L. *An Historical Geography of Ireland* (London, 1993), p. 260-1.

²⁷ Lee, J. *The Modernisation of Irish Society 1848-1914* (Dublin, 1989), p. 13.

recent research has not substantiated the once fashionable belief that lack of capital frustrated industrialisation. Capital was readily invested in land, railways, gas companies, insurance and shipping firms, government bonds and municipal loans or was simply left in banks in sterile deposit accounts; much of this could have been invested in industry.²⁸ The lack of raw materials therefore, was the only remaining hindrance by the end of the nineteenth century, which Kane had mentioned in 1845. But improved transport often made it more economic to import foreign raw materials at the end of the century which had previously been acquired in Ireland (flax and wheat for example).

The risks of establishing industrial enterprises in Ireland were not greater than in Britain; the Sun Fire Insurance Company significantly increased the volume of its business in Ireland during the first half of the nineteenth century without charging a higher premium on its policies than in other parts of the UK.²⁹ As Ireland gradually recovered from the crisis Famine years, the prospects for the industrial sector were not unpromising, despite a drastic fall in population from 8,175,000 in 1841 to 4,381,000 in 1911. National income (according to the most recent estimates) rose from about 80 million pounds in 1845 to about 150 million in 1913. Population decline during this period was accompanied by a significant rise in per capita income,³⁰ which increased the propensity to consume industrial goods. The railways gradually opened up the interior to competition from industries based in the larger towns. They also made British competition more intense. However, the growth of trade with Britain was vital for the expansion of a number of industries including linen, shipbuilding, engineering, food processing, drink, tobacco, rope and a host of others. Industrial exports increased during the second half of the nineteenth century (see conclusion). But many industries like milling, baking and railway engineering and foundry work depended more on the home market.

This study will demonstrate how each industry in Ireland responded both to changes in demand and British competition. Overall, the thesis argues that despite some significant decline in

²⁸ Ibid., pp. 11-12.

²⁹ O'Grada, C. 'Industry and Communications 1801-1845' in Vaughan, W. (ed), *New History of Ireland*, V. (Oxford, 1989), p. 145.

³⁰ Kennedy, K. Giblin, T. McHugh, D. *The Economic Development of Ireland in the Twentieth Century* (London, 1988), pp. 12-20.

certain industries, the Irish industrial sector as a whole responded reasonably well to the market changes brought about by the transport revolution. This is evident from an increase in industrial output between the 1840s and the 1900s. Irish industrial output growth during this period was higher than it had been between 1790 and 1845.

Chapter One

THE BREWING INDUSTRY

I

Between 1790 and 1845, the Irish brewing industry became industrialised. Retail brewing died out and the number of breweries declined as larger and more highly capitalised commercial brewers located in the major towns began to dominate the industry. This chapter will trace these transitions in the structure and scale of the industry.

Despite population growth, beer production in Ireland fell between the 1760s and 1790s, largely because of the growing popularity of whiskey and poteen. The declining quality of Irish beer also seems to have contributed to falling consumption, especially as imports of good quality London porter rose between 1760 and 1790. Beer, was expensive which confined its market to the larger towns.¹

Dublin was the main market, accounting for 45% of the beer brewed in Ireland in 1790. At this stage there were 61 commercial brewers operating in the city and county of Dublin. Retail brewing had died out in most of the bigger towns where larger commercial breweries had been established. The number of retail brewers in Ireland was falling dramatically at this stage from 646 in 1790 to 484 in 1791, while the number of commercial brewers rose from 291 to 319. In areas where commercial brewing had not become established (particularly in Connaught), publicans still made their own beer,² but in most of the country they were increasingly being supplied by commercial brewers. From the 1790s, some of the larger commercial brewers began to adopt the methods and techniques pioneered within the London industry.

The London brewing industry began to industrialise in the 1740s, which was earlier than other industries; from this time it was possible to introduce production on a large scale. The major

1 Malcolm, E. *Ireland Sober, Ireland Free* (Dublin, 1986), pp. 22-6.

2 Cullen, L. *An Economic History of Ireland* (London, 1972), p. 42. *Number of Brewers in Ireland*, Irish Commons Journal, 1792-4, xv, app., p. cxcl.

limitation was the size of markets. It is no coincidence that in England and Ireland, London and Dublin emerged as the major centres of the industry.³ Beer is heavy and awkward to transport over long distances; it is therefore more economic to produce it close to its consumers. There were cost advantages which could be achieved by large scale production in the largest centres of demand. These advantages and improvements in quality, enabled the London brewers to extend their markets at the expense of the provincial brewers. The effects of this development reached Ireland, particularly Dublin, Cork and Waterford into which porter could be shipped at reasonable costs. Exports of British beer to Ireland rose steadily during the second half of the eighteenth century, to a peak of 123,000 barrels in 1793. Between 1790 and 1794 registered exports from Britain were the equivalent of about 21% of the beer produced in Ireland. The London brewers could compete, despite freight charges of up to 15.5% in 1791. Apart from exploiting the economies of large scale production, the London brewers marketed a higher quality beer because of their superior manufacturing techniques (in both brewing and malting) and the better quality barley they used.⁴

The success of the London brewers in the Irish market was restricted largely to Dublin, Cork and Waterford. The brewers in Dublin and Cork responded to London competition. The industry in both cities experienced something of a transformation in the decades after 1790. Men with the necessary skills to up-grade production techniques to London standards were brought over. Samuel Madder for example, a working brewer from London who subsequently set up his own brewery in Dublin, introduced the more common use of the thermometer in Ireland.⁵

³ Lynch, P. Vaizey, J. *Guinness's Brewery in the Irish Economy 1759-1876* (Cambridge, 1960), p. 42.

⁴ Vaizey, J. *The Brewing Industry* (London, 1960), p. vii. Mathias, P. *The Brewing Industry in England 1700-1830* (Cambridge, 1959), pp. 151-5. Mathias estimated that Irish brewers at this time had a 6s per barrel advantage over their London rivals in the Dublin market in 1791, after transport costs and duties had been paid.

⁵ Lynch and Vaizey, (1960), p. 90.

Table 1:1

NUMBER OF BREWERS IN IRELAND 1791

	STRONG BREWERS	SMALL BREWERS	RETAIL BREWERS
ARMAGH	8	-	35
CAVAN	6	-	11
COLERAINE	4	-	1
LARNE	2	-	-
LETTERKENNY	-	-	7
NEWRY	6	-	4
LISBURNE	10	-	1
STRABANE	2	-	47
STRANGFORD	4	-	11
LONDONDERRY	3	6	1
DONAGHADEE	3	-	-
DUBLIN CITY	30	18	-
" COUNTY	13	-	-
DUNDALK	7	2	6
DROGHEDA	6	2	9
TRIM	12	-	10
MARYBOROUGH	16	-	28
NAAS	22	2	5
WEXFORD	6	1	33
WICKLOW	9	-	***
KILKENNY	9	-	**
ATHLONE	8	1	***
FOXFORD	-	-	***
LOUGHREA	-	-	***
GALWAY	-	*	37
SLIGO	3	-	44
KILLYBEGGS	-	-	20
BALTIMORE	4	-	2
CLONMEL	12	-	3
CORK	20	9	1
MALLOW	5	2	-
KINSALE	8	1	-
LIMERICK	8	3	-
ROSS	3	2	-
TRALEE	-	-	1
WATERFORD	6	4	-
YOUGHAL	6	1	13
TOTAL	261	58	484

Source; *Number of Brewers in Ireland*, Irish Commons Journal, 1792-4, xv, App., p. cxci.

Irish brewers were ably assisted by the Irish parliament which wished to encourage brewing at the expense of distilling, as they considered beer was a healthier beverage than spirits. In 1795,

an act was passed which abolished the excise duty on beer; other legislation regulating the brewing trade was simplified minimising state intervention in the industry. The cost of Irish beer was reduced and the quality of the product improved. The larger breweries in Dublin and Cork began to extend their markets into their rural hinterlands. The dramatic contraction of English imports into Ireland after 1793 was one manifestation of the improved competitiveness and quality of beer in Dublin and Cork. London porter was losing its reputation for high quality by the turn of the century. With improvements in the quality of Irish barley and malting, a growing home demand, and a supportive legislature, Irish brewers had gained distinct advantages over their British rivals in the Irish market.⁶

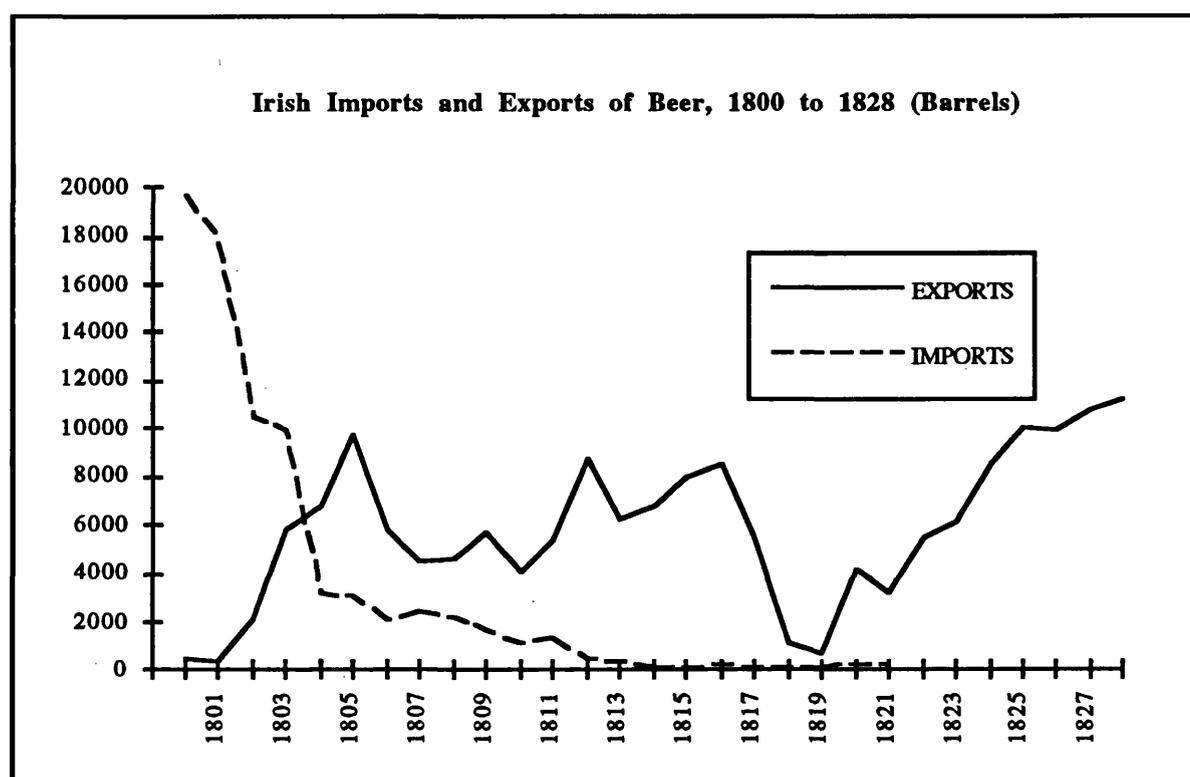


Figure 1:2. Source; O'Brien, G. *The Economic History of Ireland between the Union and the Famine* (London, 1921), p. 345. *Beer Exported from Ireland BPP 1828*, xvii (440), p. 2.

⁶ Mathias (1959), pp. 154-170. see Bielenberg, A. *Cork's Industrial Revolution* (Cork, 1991), pp. 50-60. for details on the growth of the Cork brewing industry.

By 1804, Ireland had become a net exporter of beer, and over the following decades net exports increased. The bulk of these exports were to foreign countries, but after the mid-1820s, England became the main market and the trans-Atlantic trade declined. This marked the beginning of Guinness's expansion into the British market (see figure 1:2.). Exports during this period only accounted for a tiny part of total output. Official figures indicate that beer output in Ireland was increasing significantly from 449,790 barrels in 1800, to 960,300 in 1809.⁷

Since all the tax in brewing was levied on malt, housekeepers and retail brewers found little incentive to brew their own beer (as in England). This further encouraged the growth of commercial brewing in Ireland. By 1812, there were large public breweries in Cork, Fermoy, Limerick, Waterford, Roscrea, Dublin, Belfast, Navan, Armagh, Donoughmore, and Dungannon. Dublin and Cork emerged as the major centres of the industry because they were the largest markets for porter. They were also located close to the most significant barley growing counties of Cork, Offaly, Laois, Tipperary, Louth and Kildare, which were all counties with low soil acidity.⁸

By 1810, Beamish and Crawford of Cork were the largest brewers in Ireland with an output of about 100,000 barrels; in 1805, they accounted for two thirds of Cork city's total output.⁹ But Dublin dominated the industry at this time accounting for about one-third of national output. There were nine breweries in Dublin in 1810; Guinness was the largest with an output of 70,000 barrels, followed by Connolly and Somers with an output of 50,000. Smaller brewers in the city included Trevor and Keogh with an output of 27,500 barrels, Grange Leeson with 27,500 barrels, and Egan with 26,000 barrels.¹⁰

The larger brewers enjoyed economies of scale; Beamish and Crawford's malting manager noted that the 'charge of manufacture [of malt] is greatly reduced as the quantity made

⁷ O'Brien, G. *The Economic History of Ireland from the Union to the Famine* (London, 1921), p. 343.

⁸ Wakefield, E. *An Account of Ireland* (London, 1812), 1, pp. 744-5, Lynch and Vaizey (1960), p. 40.

⁹ Bielenberg (1991), p. 51.

¹⁰ Mathias (1959), pp. 166-7.

increases'.¹¹ The costs of making and selling a barrel of beer also fell with rising output; Guinness for example between 1813 and 1818 noted that on a trade of 35,570 barrels the costs were 10s and 1d per barrel, while on a trade of 53,360 barrels they were 8s and 4d.¹² Savings were made on fixed costs like rent and fire insurance, and when output increased these fixed costs fell as a proportion of total costs. This gave larger brewers advantages over their smaller rivals.

The output of most of the breweries located in rural towns was quite small. The larger public breweries which had emerged since the 1790s, began to displace smaller producers. The number of licensed brewers fell slowly from 319 in 1791 to 216 in 1832. Judging by duty paid on malt, the output for the Irish industry in 1832 was not much greater than it had been at the beginning of the nineteenth century. Although these figures may not have reflected output trends fully because of evasion, they do provide some clues. The growth in output in the early part of the nineteenth century ended at the termination of the Napoleonic war. The industry experienced a slump after this from which it only began to recover towards the end of the 1820s.¹³

In more remote regions small concerns survived as the transport system was still too inadequate to enable the larger city breweries to compete with them. Their remoteness enabled many of the rural brewers to avoid paying tax on malt which could reduce the final cost of a barrel of beer by almost a third.¹⁴ Their larger urban rivals in contrast found it more difficult to avoid paying the malt tax.

The average size of breweries increased dramatically between 1790 and 1815, particularly in Dublin. Edmund Grange of Dublin was the biggest with a joint stock of £48,000 in 1810.¹⁵

¹¹ Bielenberg (1991), pp. 56-7.

¹² Lynch and Vaizey (1960), p. 127.

¹³ *Number of Brewers in Ireland*, Irish Commons Journal, 1792-4, xv, App., p. cxci. Lynch and Vaizey, pp. 80-4.

¹⁴ Bielenberg (1991), p. 53.

¹⁵ The growth in the size of breweries is evident from the Anonymous Partnerships registered at the Registry of Deeds in Dublin. Between 1788 and 1802, 21 brewing partnerships were registered with an average joint stock of £4272. Between 1803 and 1816, 38 partnerships were set up with an average joint stock of £9342. Registry of Deeds, Dublin. Anonymous Partnerships.

The amount of capital invested in the larger city breweries was rising; By the early 1830s, Beamish and Crawford, the premier brewers in the country, claimed that their fixed capital investment amounted to not less than £250,000. But investment in brewing declined dramatically after the end of the Napoleonic War. Recovery only becomes evident from the rise in output in the mid-1830s (see figure 1:3). The number of breweries registered also rose from 216 in 1832 to 247 in 1835.¹⁶

The tax on malt is the only guide that can be used to gauge the output of the industry. Because of extensive evasion of the malt tax this is not a completely reliable index, but it is useful nonetheless. Judging by this, the output of the brewing industry in Ireland remained fairly stable in the 1820s, rising slowly in the 1830s until the end of the decade when the industry's output was drastically cut back by the Temperance movement and depression in England which was becoming an important market for Irish porter. But this downturn was short lived and the industry began to recover by the mid-1840s.

¹⁶ Madder invested £40,000 in the Phoenix Brewery between 1796 and 1804. The Anchor Brewery on Usher St. was purchased by John Darcy for £35,000 in 1818. Lynch and Vaizey (1960), pp. 80, 91-2. Bielenberg (1991), p. 56.

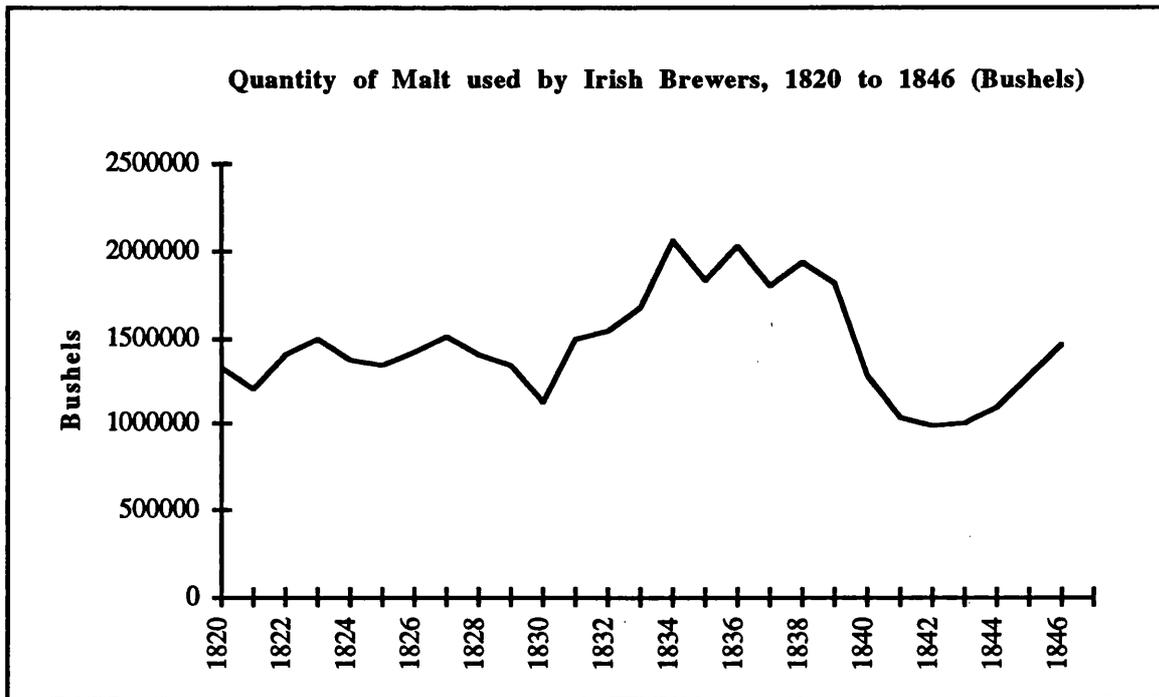


Figure 1:3. Source; *Return of licensed brewers in the UK*, BPP 1823, xvi (316) p. 3. annually to BPP 1847-8, lviii (101) p. 12. 1821-1825 converted from quarters (8 bushels =1 qtr).

Consumption of beer in Ireland was not increasing significantly during this period as spirits remained the most popular drink, particularly in rural Ireland. Growth in the 1830s was connected with an extension of the British trade, particularly from Dublin breweries to Lancashire. Guinness alone exported half of its output of 80,000 barrels to England in 1840. Although part of the explanation for their ability to compete was evasion of the malt tax,¹⁷ there were other factors running in Ireland's favour; a number of Irish breweries were producing good quality beer at competitive costs. The large area of limestone land in Ireland was particularly suitable for growing barley for brewing. Output was not increasing, but the industry was becoming more concentrated in larger concerns. The total number of breweries fell from 215 in 1831 to 118 in 1846. Barley, a significant part of the total costs in brewing, was less expensive in Ireland because of the cheaper cost of agricultural labour. Steam navigation made transport costs from Dublin to Lancashire a minimal consideration. Therefore, a number of the larger Irish breweries had little difficulty in competing in the British market.

¹⁷ Mathias (1959), p. 167.

This trade was to increase over the following decades with the growth of the British railway network.

Table 1:4.

THE GEOGRAPHY OF THE IRISH BREWING INDUSTRY IN 1846.

EXCISE DISTRICT	BREWERIES	% OF TOTAL OUTPUT*
DUBLIN	12	49.4%
DROGHEDA	2	3.0%
DUNDALK	6	3.2%
KILKENNY	7	1.8%
NAAS	4	1.7%
BIRR	7	1.1%
WEXFORD	4	0.4%
ATHLONE	3	0.4%
FOXFORD	5	1.5%
SLIGO	5	1.0%
GALWAY	7	0.8%
ARMAGH	5	3.7%
COLERAINE	4	1.0%
LISBURNE	10	5.4%
LONDONDERRY	4	1.4%
BANDON	5	2.7%
CORK	7	12.0%
CLONMEL	8	3.6%
LIMERICK	4	1.4%
WATERFORD	6	4.6%
TOTAL	115	100%

*Calculated from malt duties paid.

Source; *Return of Licensed Brewers in the UK*, BPP 1846, xlv (136) p. 12.

From the duty paid on malt it is possible to get some idea of the geography of the industry (see table 1:4). By 1846, the 12 breweries in Dublin accounted for roughly half of total output. The 12 breweries in Co. Cork came next, in order of importance; output in this region was less than a third of that in Dublin. Other centres of the industry were Louth, Armagh and Waterford. Connaught accounted for less than 4% of national output reflecting the low level of beer consumption in that province; Ulster accounted for under 12% which was low relative to Munster, which accounted for over 24%. Leinster accounted for over 60%, most of output here being concentrated in Dublin.

Although the output of the industry had not increased much during the first half of the nineteenth century, production had become more industrialised and concentrated in a smaller number of larger breweries. The British trade began to become more significant during the 1830s. Because of the industrialisation of the industry, and the cheaper cost of raw materials and labour, the larger Irish brewers, notably in Dublin and Cork, were able to compete in the British market, while simultaneously extending their Irish market at the expense of smaller brewers.

Between 1800 and 1846, the output of the Irish brewing industry increased from about 450,000 barrels to about 732,000 barrels, but there were considerable fluctuations in between these years. Output increased significantly between 1790 and the end of the Napoleonic War, reaching 960,000 in 1809.¹⁸ This was the first phase of expansion of commercial brewing in Ireland, a period when retail brewing declined. Following the post-Napoleonic depression the output of the industry remained fairly stagnant, until the 1830s; between 1834 and 1839, output reached its pre-Famine peak. But rapid decline set in thereafter, and by the mid-1840s, output had dropped back to the levels of the 1820s. Whiskey remained the more popular drink in most of Ireland; its value relative to volume was much higher so it was much more economic to transport than beer. Although a limited amount of beer was transported by canal, brewers had to wait until the rail network was built before they could really penetrate the rural Irish market. Beer in pre-famine Ireland therefore largely remained the preserve of the inhabitants of the larger towns.

¹⁸ O'Brien (1921), p. 343. Lee, J. 'Money and Beer in Ireland 1790-1875', *Economic History Review*, xix (1966), p. 185.

II

The Irish brewing industry experienced significant growth during the second half of the nineteenth century. Output rose from 617,000 barrels in 1847 to 3,149,000 in 1901. The industry during this period became more centralised in the larger urban breweries, which were able to exploit the railway network to displace the smaller rural breweries. High levels of capital investment and the subsequent advantages achieved by economies of scale gave them a decisive edge over their smaller rural rivals. Lower costs per unit of output could be achieved by using larger vats and other more specialised equipment. Larger brewers could also afford to employ more specialised staff for controlling production; by the end of the nineteenth century, for example, Guinness employed staff to carry out scientific research to maximise the cost effective use of raw materials. These larger brewers were in a good position to take advantage of the rise in beer consumption in post-Famine Ireland; annual per capita consumption of beer rose from about 5.4 gallons in 1859 to 11.3 gallons in 1886.¹⁹ Whiskey and poteen which had been the most popular drinks in pre-Famine Ireland, rapidly declined as drinking patterns shifted away from heavy spirit consumption. This was encouraged by the growing authority of the church and the desire for respectability, associated with rising living standards.

Dublin in particular, was able to capitalise on this rise in porter consumption in Ireland, and it also built up an export trade to England. Guinness built up an unrivalled niche for high quality traditional porter in the British market. By the beginning of the twentieth century, Dublin produced about three-quarters of the total output of the Irish industry and about 96% of exports.²⁰

During the second half of the nineteenth century pasteurisation, chilling and refrigeration began to be adopted. These new methods contributed further to the efficiency of industrialised brewing. The influence of chemistry in the industry was fairly minimal prior to the 1860s, but

¹⁹ National Library, Dublin. Ir. 6633 G.2, *Arthur Guinness and Son and Co. Ltd.* (Dublin, 1886). Vaizey, J. *The Brewing Industry, 1886-1951* (London, 1960), pp. viii, 3.

²⁰ Cullen, L. *An Economic History of Ireland since 1660* (London, 1972), p. 157.

over the following decades advances were made in the understanding of yeast and bacterial infections in beer. A small group of scientists employed in the Burton breweries began to apply this knowledge in the industry and cleanliness became a higher priority.²¹ While new technologies were eagerly imported into Ireland, a more scientific approach to brewing was very slow to become established; Guinness only began to move in this direction towards the end of the century.

The concentration of the industry in large breweries and the changing geography of the industry can be traced through the malt duty payments which brewers were obliged to pay (see table 1:5). They graphically illustrate Dublin's growing dominance of the industry. Cork remained the second centre of the industry. Other centres where the industry was prominent were Louth and Kilkenny. The brewing centres of importance outside Dublin were predominantly located in barley growing regions of the midlands, the south and in Co. Louth. Louth was the only barley growing region of any importance north of Dublin.

Table 1:5.

BUSHELs USED BY BREWERS IN IRELAND				
	DUTY PAID USED (BUSHELs)		NO. OF BREWERIES.	
	1835	1895	1835	1895
CO. CORK	291,643	524,578	25	6
KILKENNY*	315,329	219,766	69	10
CO. LOUTH	121,071	244,609	18	4
DUBLIN	577,021	3,926,190	24	7
OTHERS	524,523	155,569	109	10
TOTAL	1,829,587	5,070,712	245	37

*Includes Waterford, Wexford, Athlone, Maryborough excise districts.

Source; *Return of Licensed Brewers in UK*, BPP, 1836 xlv (259) p. 3. BPP, 1876 lxviii (192) p. 3. BPP, 1896 lxxvi (100) p. 6.

The most spectacular development within the industry during this period was the growth of Guinness. By 1864, over half the beer sold in Ireland outside Dublin was Guinness. Over the following decades Guinness increased its share of the Dublin trade and its share of Irish

²¹ Sigsworth, M. 'Science and the Brewing Industry 1850-1900', *Economic History Review*, xvii (1965), pp. 536-541.

exports. Output increased from about one hundred thousand barrels in 1850 to over one million in 1881. The output of the remaining breweries in Dublin combined in the latter year did not exceed a tenth of Guinness's output. Despite the fact that it was already the largest porter brewery in the world, Guinness was completely reorganised during the 1870s. This resulted in a doubling of output between 1868 and 1876. Output doubled yet again between 1879 and 1886. In the latter year the company was sold by Edward Cecil Guinness to a limited liability company. It was floated on the London Stock Exchange for six million pounds sterling.²² The issue was a major success as Guinness had become a household name. Guinness at this stage made over two-thirds of all the beer brewed in Ireland and one twentieth of that made in the UK. Growth continued so that by 1930, Guinness had become one of the seven largest companies in the world.²³

The technology used by the brewery by the 1880s, was often imported from British manufacturers of brewing equipment. Most of the boilers and steam engines were British made, although a few were made by Coates of Belfast. There were 51 steam engines in the brewery at the end of the 1880s, with a combined horse power of 2,000. Spence of Dublin executed a number of orders for Guinness for pumps and steam locomotives for the internal rail network in the brewery which had been designed by Geoghegan (the brewery engineer).²⁴ Since Guinness was the largest brewery in the world, it is hardly surprising that design innovation was not unusual within the company. In the 1860s, Geoghegan's predecessor, Walker, had invented a device for removing yeast from beer. The steam driven machines for printing, cutting and numbering Guinness bottle labels was patented by a Dubliner.²⁵ By any standards the company was highly advanced in technical and organisational terms.

²² Daly, M. *Dublin, The Deposed Capital* (Cork, 1985), pp. 23-6.

National Library, Ir 6633 G.2, *Guinness Brewery* (Dublin, 1906).

²³ Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1907), p. 471.

Hannah, L. *The Rise of the Corporate Economy* (London, 1983), p. 62.

²⁴ Barnard, A. *Noted Breweries of Great Britain and Ireland* (London, 1889), pp. 5-42.

²⁵ Measom, G. *Guide to the Midland, Great Western, and Great Southern and Western Railways* (London, 1866), pp. 151-165.

In 1893, Guinness employed an apprentice brewer who had a first class degree in chemistry from Oxford. A second chemist with the same degree was appointed in 1895. A chemist was appointed from Edinburgh University in 1896 and others followed. This marked a recognition within the company of the importance of science within the industry. But change to new methods remained slow. These employees helped to improve the cost effectiveness of raw material inputs (malt and hops accounted for about 40% of the total costs of brewing at the end of the nineteenth century). After the turn of the century Guinness established an experimental brewery and an experimental maltings to assist scientific investigation. Here they discovered the nitrogen levels in barley which best served the brewer's needs, and they subsequently encouraged the growth of strains which met these requirements. This finding was significant for the UK brewing industry at large and had an important influence on determining the types of barley subsequently used for brewing. Guinness scientists also made important contributions to the understanding of the use of hops in brewing, and from 1906 they purchased a hop farm in Kent to assist further study in this area.²⁶

There is little doubt that the company had outstanding management during the major expansion which took place from 1870 down to the second decade of the twentieth century. The beginning of this period of exceptionally good management can be traced to the partnership of Sir Ernest Cecil Guinness, Christopher Digges La Touche and Samuel Geoghegan; a financier, a brewer, and an industrial engineer. Their specialist knowledge in these fields enabled the company to take full advantage of the revolutionary changes taking place within the spheres of technology, science and finance. This led to a complete overhaul and rationalisation of the organisation and structure of the business over the following decades. Productivity was increased by introducing labour saving devices and the entire business was organised into departments. Quality was standardised and the brewery gained from the scale and efficiency of its production and marketing.²⁷

²⁶ Brown, J. *Guinness and Hops* (London, 1980), pp. 1-21. Sigsworth (1965), p. 550.

²⁷ Malone, A. 'A Great Irish Industry; Messrs A. Guinness, Son and Co. Ltd' *Studies*, xv, 1927, pp. 447-451.

One of the key features of Guinness's success in the British market was product differentiation. Few British brewers tried to compete with Guinness in the market for high quality stout. Another important factor was that Guinness specialised in stout production. The company did not invest large amounts of capital in purchasing public houses like many of the larger British brewers during the last quarter of the nineteenth century, who did this to increase sales in the face of a fall in per capita consumption.²⁸ In Ireland in contrast, per capita consumption was rising so Guinness did not experience the same problem. In fact Guinness's main problem was expanding sufficiently to meet the growing demand for its stout in Ireland and Britain. Guinness therefore retained a certain independence from the rest of the brewing trade in Britain, while its nearest rivals in Ireland were dwarfs by comparison. By specialising and manufacturing on a large scale, and staying out of the business of retailing, they became the lowest-cost manufacturers.²⁹

By the end of the nineteenth century the number of breweries in Ireland had fallen to only 39 (compared to 245 in 1835). But the output of the industry was more than five times greater than it had been in the 1840s (see tables 1:3 and 1:4). As the Irish barley crop decreased during the second half of the nineteenth century, many brewers (including Guinness) had to import at least part of their requirements. Hops, the other raw material, was almost entirely imported from English growers based predominantly in Kent.

While Guinness was the major success story in the business, a number of smaller breweries were still operating by the end of the nineteenth century, some of which had also managed to increase their trade. There were 7 other brewers in the Dublin excise district working in the shadow of Guinness. Dublin accounted for about four-fifths of the output of the industry, dominating both rural and export markets. But competition from Guinness, was making it hard to survive for most of these. The sales and profits of second largest in Dublin, the Phoenix Brewery, were declining by the turn of the century, and by 1905, the receiver was selling off

²⁸ Hawkins, K. Pass, C. *The Brewing Industry* (London, 1979), pp. 25-28.

²⁹ Lynch and Vaizey (1960), p. 225.

the premises.³⁰

Table 1:6.

THE GEOGRAPHY OF THE IRISH BREWING INDUSTRY IN 1899

	BREWERIES	MALT USED (Bushels)
Belfast	3	52,740
Cork	6	571,075
Dublin	8	4,317,993
Dundalk	5	282,489
Galway	1	5,136
Kilkenny	10	216,305
Limerick	3	94,053
Derry	3	12,652
TOTAL	39	5,552,443

Source; *Return on Malt Duties in the UK*, BPP, 1900 lxxviii (69) p. 10.

In Cork, the second centre of the industry, Murphy's and Beamish and Crawford could still compete with Guinness in the Munster market. Kilkenny was the next centre of the industry in order of importance; Smithwick's who made ale were the best known firm here. Other small brewers survived in Belfast, Derry, Galway, Limerick and Dundalk.

The geography of the industry suggests that urban demand was the most important factor in the development of the industry in the first instance, as Dublin and Cork emerged as the major centres. Dublin had access to barley supplies from Kildare and the midlands by canal and Wexford by sea. Cork drew its barley from Cork and Tipperary. The location of the secondary centres of the industry seems to have been strongly influenced by the availability of barley. During the first half of the nineteenth century transport costs had been too high to market beer in much of rural Ireland, except those areas served by inland waterways. The railways changed the economics of transportation. Nowhere is this more evident than in the spread of Guinness's markets.

Guinness became the biggest player in the Dublin market during the first quarter of the

³⁰ National Library, Dublin. Ir. 670 P. 12, The Phoenix Brewery Ltd (Dublin, 1905).

nineteenth century. Over the following decades it slowly began to carve out a niche in the British market as the growth of the railway network there made this possible. The growth of the railway network in Ireland in the post-famine era subsequently opened up the rural Irish market. Guinness in Dublin, at the hub of the Irish rail network, was in an ideal location to exploit this new market, while still increasing their market share in Dublin and Britain. Rising demand in Ireland (in contrast to Britain from the 1880s), and specialisation in high quality porter produced at a scale which facilitated low costs to the consumer, contributed to the success of Guinness. But some other brewers, notably in Dublin and Cork, were also successful during this period in exploiting the rise in Irish demand, though as the century proceeded the growth of Guinness made this more difficult for many of the smaller breweries which went out of business.

Table 1:7.

OUTPUT OF THE BREWING INDUSTRY (BARRELS*)

1847	617,000
1856	926,000
1861	1,438,000
1871	1,617,000
1882	2,044,000
1891	2,555,000
1901	3,149,000
1911	3,215,000

*To the nearest thousand barrels.

Source; Riordan, R. *Modern Irish Trade and Industry* (London, 1920), p. 156. Lee, J. 'Money and Beer in Ireland 1790-1875', *Economic History Review*, xix (1966), p. 185.

The transport revolution combined with falling spirit consumption and rising living standards, contributed significantly to the expansion of Irish output. The relative importance of brewing within the industrial sector increased during this period and by 1907 the net value of brewing and malting was worth £3,528,000.³¹ At this stage it was by far the most important industry in the south of Ireland.

³¹ *First UK Census of Production*, BPP, 1912-13, cix (cd. 6320) p. 524.

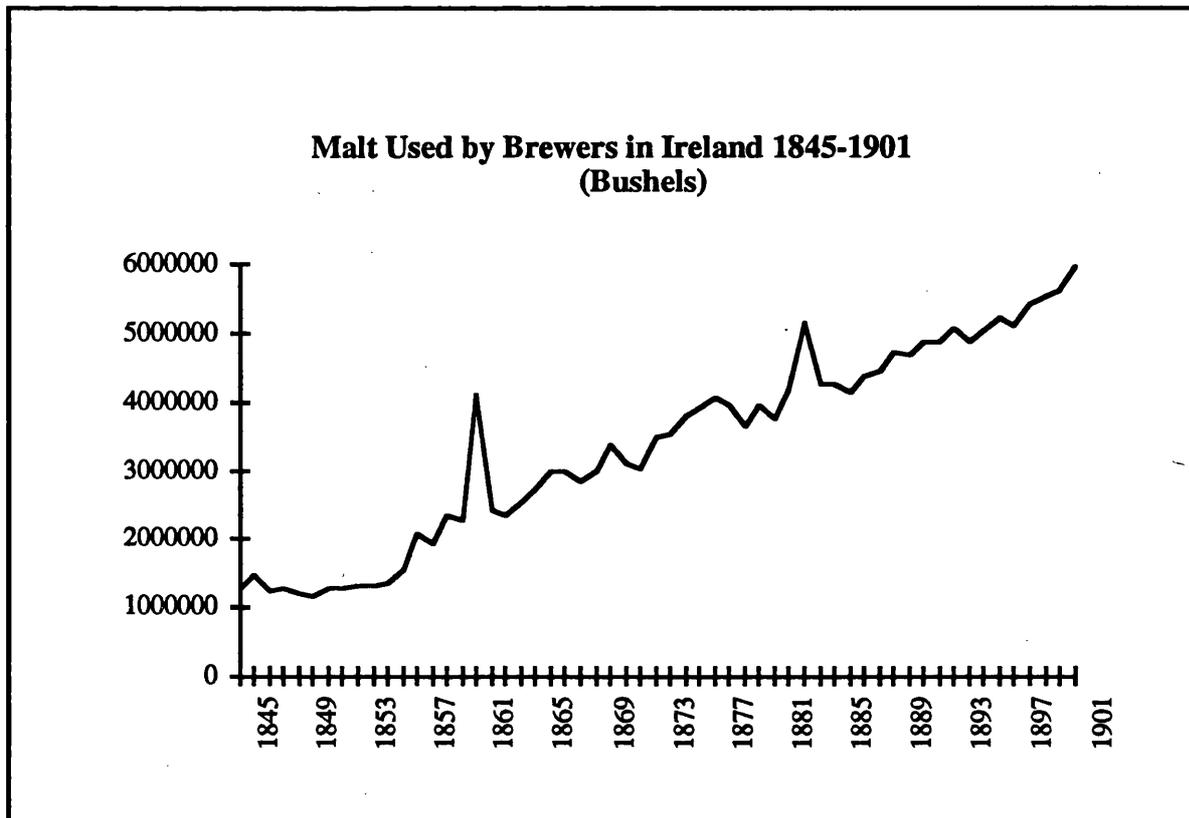


Figure 1:8. Source; *Return of Brewers in the UK*, BPP, 1846, xliv (136) p. 12. - annually to BPP, 1901, lxix (101) p. 12.

Brewing was a capital intensive industry with low levels of employment per unit of capital employed. Of Guinness's income for example between 1871-6 (taken together), more than £600,000 went to the partners, less than £400,000 was reinvested, and only £300,000 went to pay wages and salaries.³² Relative to linen, engineering or shipbuilding which were labour intensive and yielded a higher added value, brewing was a much weaker agent of industrialisation and urbanisation. The large amount of barley and malt used, provided significant backward linkages to the agricultural sector, so the growth of the industry probably had greater economic benefits to the barley growing regions than to the urban centres in which the breweries were located.

³² Lynch and Vaisey (1960), p. 176.

Chapter Two

THE DISTILLING INDUSTRY

I

Between 1790 and 1845 the Irish distilling industry became industrialised. In part one of this chapter, the transition of the industry will be traced from being a widely dispersed small-scale process to a more highly capitalised industrial operation carried out in larger distilleries located predominantly in towns. The major changes in the excise legislation during this period will also be examined, as this had a significant impact on the battle for the Irish market, which was fought out between the legal and illicit distillers.

The consumption of spirits in Ireland increased dramatically during the last quarter of the eighteenth century, particularly the consumption of whiskey. Drinking habits were changing; in 1770, whiskey only accounted for 25% of the duty paid on spirits, rum accounted for 51%, brandy 10% and gin 10%. By 1790, whiskey dominated the spirit trade, accounting for 66% of the duty paid. It had effectively displaced imported spirits and become by far the most popular drink in Ireland.¹

As the industry rapidly expanded, the parliament became alarmed by the extensive levels of fraud which distillers practised. To counteract this, new excise legislation was introduced in 1779-80, which had far reaching consequences for the industry. Excise thereafter was estimated from the size of the still and the assumed speed in working it off in 28 days.

Licensed distillers had to work a minimum of 112 days. Production became more concentrated in a much smaller number of distilleries. The number of licensed distilleries in Ireland fell from 1228 in 1780 to 246 in 1790. The excise authorities obviously felt these changes were justified since the quantity of spirits produced on which duty was paid rose from 1.2 million gallons to 2.9 million gallons.² But the illicit industry experienced significant expansion during this

¹ Malcolm, E. *Ireland Sober, Ireland Free* (Dublin, 1986), p. 23.

² Maguire, E.B. *Irish Whiskey* (Dublin, 1973), pp. 127-8, 148.

period, replacing the large number of small rural licensed distillers who were unable to operate economically under the new excise laws introduced in 1779-80.

The new legislation suited the larger distillers located in the major urban centres where local demand was sufficient to justify an increase in the scale of production, notably in Dublin and Cork. But in many rural areas, the new legislation had plunged official control of the industry into a crisis. There were only two licensed distillers operating in the whole province of Ulster by 1808. The illicit industry was thriving at this stage, and fraud among the licensed distillers was openly admitted. One surveyor of excise held the opinion that in the provinces of Ulster and Connaught duty was paid on only about 2% of the spirits consumed.³

The contraction of the number of licensed distillers was partly a consequence of the rising duty on spirits, which rose from 1 shilling 1.5 pence per gallon in 1791 to 6 shillings 1.5 pence in 1816.⁴ As duty drove up the price of legally produced spirits, the illicit industry began to thrive, particularly in Ulster and Connaught where most of the small licensed distillers went out of business. The government also encouraged the rival brewing industry at the expense of distilling, by abolishing the tax on beer in 1795. By 1806, there were only 51 licensed distillers left in Ireland. But these tended to be much larger than the small production units which had been prevalent all over Ireland in the 1780s.⁵

The growth in the scale of licensed distilling is reflected in a rise in the capital invested in distilling partnerships registered under the Anonymous Partnerships at the Registry of Deeds in Dublin. The joint stock of the first five distilling partnerships set up between 1791 and 1795 were all under £1,200. The average joint stock of the next thirteen partnerships set up between 1795 and 1802 was £3,800. In the nine partnerships set up between 1802 and 1813 the average joint stock rose to £11,244.⁶ The scale of fixed capital investment in distilling was

³ *Ibid.*, p. 182.

⁴ *Seventh Report on Excise*, BPP, 1834 xxv, App. 66, p. 228.

⁵ Nettleton, J. *The Manufacture of Spirits* (London, 1895), p. 8. Shipkey, R. 'Problems in Alcoholic Production and Controls in early Nineteenth Century Ireland' *The Historical Journal*, xvi (1973), pp. 291-5.

⁶ Registry of Deeds, Dublin. Anonymous Partnerships, 1. Dublin was the premier distilling centre in Ireland where these partnerships were set up, including the largest (Roe on Thomas St.) which had a joint stock of £27,000. But large investments were also made elsewhere. A partnership in Clonmel set up with a joint stock of £24,000. Many more were set up without partnerships; two distilleries were set up in Midleton in the mid-1820s at a cost of £20,000 and £30,000. Others were set up at Limavady, Carrickfergus and Ballyshannon between 1814 and 1826, all of which

clearly increasing, and invariably this led to an increase in the amount of working capital distillers required. Most distillers depended on their own resources to purchase corn and other raw materials, but by the 1820s, banks were advancing short term seasonal loans to distillers for this purpose.⁷

Whiskey consumption in Ireland at the beginning of the eighteenth century, was largely confined to those who were higher up the social scale. But by the end of the century, whiskey and poteen drinking had become an important part of the culture of Irish peasants and small farmers. It commonly appeared at births, christenings, weddings, wakes and funerals; it was also used as a goodwill gesture at fairs, markets and for other commercial transactions. It was not uncommon for artisans and labourers to take a few drinks during the course of a day's work. There was also a strong belief among the Irish peasantry that poteen and whiskey had strong healing powers. It was a symbol of friendship, courtesy, and hospitality. The shebeen was a focal point in most communities; spirits were also sold in shops and groceries. By 1843, according to one estimate there was one licensed liquor seller to every 40 families.⁸

Although the output of the licensed industry rose significantly between the 1780s and the 1830s, much of the growth in demand for whiskey during this period was supplied by the illicit industry. The illicit distillers were able to capitalise on the rise in duties which licensed distillers were obliged to pay. Their major advantage was that they could market spirits at lower costs.

The illicit industry was located predominantly in the north and west, notably in Donegal, Cavan, Leitrim, Mayo, Clare, Sligo, Monaghan and Tyrone. It was an important cottage industry in poorer regions where other sources of cash income were difficult to gain. By the 1830s, when the domestic textile industry was in decline in these districts (because of the

had about £10,000 invested in them, while one built at Dungannon cost £16,000 to build. Bielenberg, A. *Cork's Industrial Revolution, 1780-1880* (Cork, 1991), p. 64. Gribbon, H. *The History of Waterpower in Ulster* (Newton Abbot, 1969) p. 125.

⁷ Allied Irish Bank, Foster Place, Dublin; Provincial Bank Records, General Committee Minutes, no. 1. 1825-6, Bank of Ireland, Baggot St Dublin; Court of Directors Transactions, no. 3, 3 Jan. 1826. Wise's distillery in Cork for example received a cash credit of £12,000 in 1826 from the Provincial Bank. In the same year, Roe of Dublin received a similar loan using his premises as collateral.

⁸ Barrett, J. 'Why Paddy Drank, The Social Importance of Whiskey in Pre-Famine Ireland' *Journal of Popular Culture*, xi (1977), pp. 156-60.

progressive mechanisation of flax spinning) illicit distillation became the major source of income for many households. Poteen manufacture was much less common in south-east Ulster. Neither was it commonly found in Leinster or Munster which were the strongholds of the legal industry.⁹

The much larger number of detection of illicit stills made by the excise in Ireland relative to England and Scotland, and the heated conflict caused by official attempts to suppress the illicit industry, were two indications of the economic importance of the illicit trade in Ireland.

Landlords were reluctant to suppress the industry since the sale of illicit spirits was often the only way rent payments could be raised in areas where smallholders would find it difficult to make a sufficient income from agriculture alone. The turf and provisions trade and the coasting trade or fishermen provided convenient means for distributing poteen to the major markets. According to a number of Dublin distillers, illicit spirits were sold on the streets of that city as openly as a loaf of bread.¹⁰

By the 1820s, parliament recognised that bad excise legislation had led to the growth of the illicit industry and extensive fraud amongst the surviving licensed distillers. Therefore, new legislation was introduced in 1823 which provided the legal industry with more favourable conditions. After 1823, distillers could use the best technologies available rather than those which the excise legislation required. They could work off their stills as slowly as they wished, (which improved quality) and they could make as much or as little as they wanted. Larger stills could be employed. Duty only became payable on sales rather than on the amount made, so spirits could be stored in bond without paying duty which reduced the amount of capital tied up in stock. Duty was halved in 1823, which significantly reduced the incentive to distil illicitly. All of the cumbersome excise legislation which interfered with the industry was overhauled so that distillers thereafter could achieve success by the efficient management of production.¹¹ After 1823, there was a significant decline of the illicit industry and a corresponding period of pronounced investment in the legal industry. The average number of gallons on which duty

⁹ Connell, K. *Irish Peasant Society* (Oxford, 1968), p. 49.

¹⁰ *Ibid.*, pp. 13, 17, 26-9.

¹¹ Maguire (1973), pp. 240, 244.

was paid rose from 3,852,879 per annum between 1816 and 1823 to 10,437,888 between 1832 and 1839.¹² The number of distilleries in Ireland rose dramatically from 32 in 1821 to 82 in 1827, rising to a peak for the nineteenth century of 93 in 1835.¹³

The Jameson family was among the most substantial distillers in Dublin, owning two distilleries in the city. In order to make a profit in the years prior to the changes in excise legislation the whole process had to be carried out with great speed. James Jameson the owner of the Marrowbone Lane distillery later recalled how in these years they worked off 13 or 14 fermenting backs continuously for 6 or 7 months; he mentioned that no brewer in Ireland was making as much wort as this. The speed required resulted in a significant waste of fuel, grain, yeast and labour; by hurrying fermentation the alcohol yield was much lower so the whole process was immensely inefficient. To offset some of these losses fraud was commonly practised. At least once (in 1808) Jamesons had all their stock and utensils seized for not paying the correct duties.¹⁴

After 1823, the new excise legislation brought major improvements to the operation of Jameson's distilleries. By 1832, the Marrowbone lane concern was the largest distillery operating in Ireland. The Jamesons came to Ireland at the end of the eighteenth century. They were one of a number of Scottish emigrants into Ireland who had a significant influence on the industrialisation of the Irish distilling industry, both in terms of the capital they invested in the industry, and the technological improvements they introduced from the Scotch industry.¹⁵

Dublin remained the main centre of the industry since it was the largest market for spirits in Ireland; distillers were therefore able to increase the scale and speed of production, unlike their smaller rural rivals who served limited country markets. By 1823, the five largest distillers in

¹² Connell (1968), p. 43. *Return of Spirits Distilled in UK*, BPP 1852-3, xcix (547) p. 2

¹³ Nettleton (1895), p. 31. *Return of Spirits Distilled in UK*, BPP 1852-3, xcix (547) p. 2.

¹⁴ PRONI. D. 207/32/77, Document Concerning Excise Payments Relating to Jameson's. Maguire, (1973), p. 186, 209.

¹⁵ Morewood, S. *A Philosophical and Statistical History of the use of Inebriating Liquors* (Dublin, 1838), p. 633, 678, 48. Maguire (1973), p. 373. National Archives, Dublin. Irish Distillers Collection, 1007 B. 3. The Jamesons spread their distilling interests beyond Dublin, a brother named William set up a distillery in Enniscorthy, while James became involved in a distilling partnership in Drogheda in 1845.

Ireland were based in Dublin. In 1832, the eight distillers operating in the city accounted for 26.5% of the output of the Irish industry.¹⁶

By 1833, the output of the Irish distilling industry was larger than that of either Scotland or England.¹⁷ The illicit industry was also far larger in Ireland. Spirits were one of the few commodities for which there was a larger market in Ireland than in either England or Scotland. The figures of the output of the industry need to be interpreted with caution since the illicit industry and fraud were so widespread. The revenue commissioners estimated that less than a third of the spirits distilled in Ireland in 1822 had duty paid on them.¹⁸ But the growth in output and in the number of licensed distilleries thereafter, indicates that the rise in recorded output reflected a period of significant growth for the licensed industry, at the expense of the illicit operators.

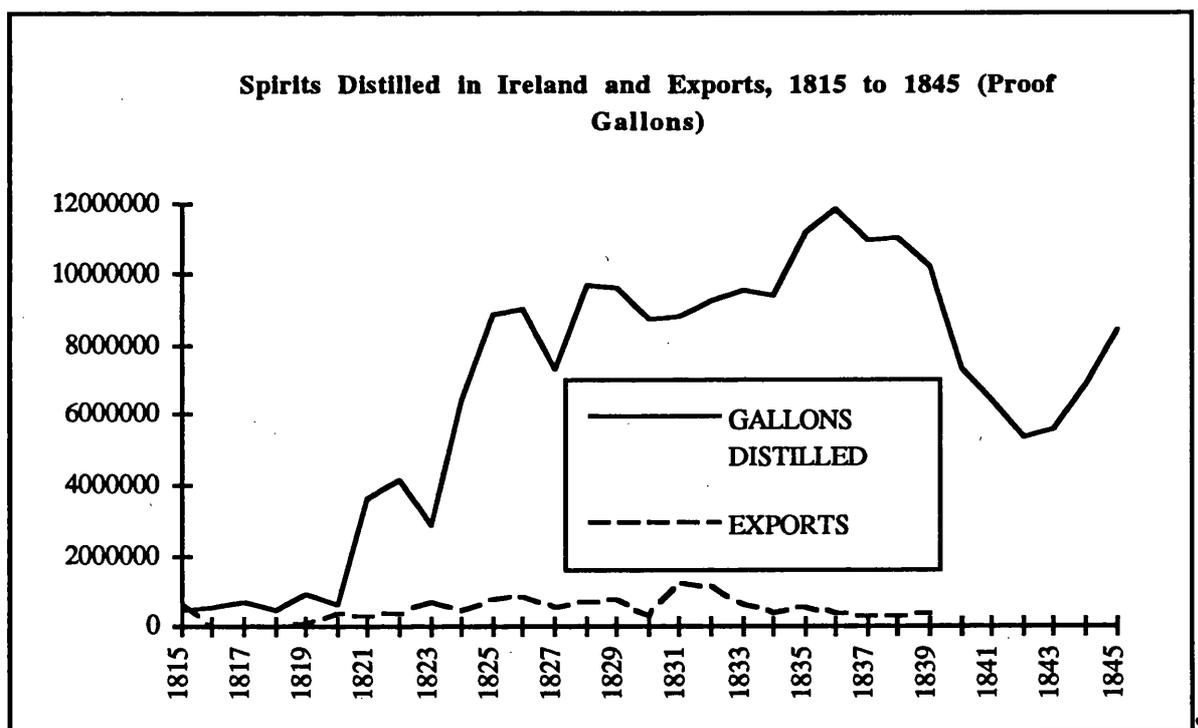


Figure 2:1. Source; *Return of Spirits Distilled in UK*, BPP 1836, xlv (325) p. 2. BPP 1840, xlv (623) p. 5. BPP 1851, liii (368) p. 9. BPP 1863, lxvii () p. {exports 1815-1839 to UK only}.

¹⁶ *Seventh Report on Excise in Ireland*, BPP 1834, xxv, app. 67, pp. 233-4.

¹⁷ *Ibid.*, pp. 233-4.

¹⁸ O'Brien, G. *The Economic History of Ireland from the Union to the Famine* (London, 1921), p. 359.

Price was the critical variable in the competition between the illicit and the licensed distillers. Exorbitant duty favoured the illicit operators by driving up the price of legal whiskey. Duty rose from two shillings, ten and a quarter pence per gallon in 1802, to six shillings one and a half pence in 1815. The illicit industry flourished during this period, since by 1815, duty accounted for well over half of the market price. Despite the high price which distillers were forced to pay on duty the price which legal whiskey was marketed at fell from about thirteen shillings a gallon in 1800 to between nine and ten shillings a gallon in 1815. In the latter year the illicit operators marketed spirits at about six shillings a gallon.¹⁸ As the price came down the illicit distillers brought down their prices, with the result that the consumption of spirits in Ireland increased. By 1831, the cost of legal spirits was about 7 shillings a gallon (duty accounted for three shillings and four pence at this time), while illicit poteen could be purchased for about three shillings a gallon. Falling prices of corn after 1815 helped both legal and illicit distillers to reduce costs. By 1816, if oats were used, it accounted for almost a quarter of the sale value of illicit whiskey; barley was more expensive, in 1834 it accounted for almost a third of the sale value of illicit whiskey. The falling price of spirits was a critical factor in the growth of Irish consumption between 1800 and the mid-1830s, as this made it possible for those with lower incomes to consume whiskey and poteen. The Poor Law Report noted disapprovingly in 1837 that an Irishman could get "dead drunk" for as little two pence.¹⁹

The arrival of the patent still in the 1830s also had a significant impact on the cost of whiskey since it could produce spirits more cheaply than the traditional pot still. However, it was not until after the mid-nineteenth century that it began to have a significant impact on the industry, when it began to be adopted on a more widespread scale in Scotland and England where it revolutionised the industry. In Ireland it was adopted more slowly, despite the fact that the first successful commercial patent stills had been built and operated in Ireland. Aeneas Coffey patented his new still in 1830, which broke away entirely from the conventional design of the pot still. The alcohol could be extracted at lower costs than when using the traditional pot still since less fuel was required. It was extremely efficient, producing a concentrated spirit containing between 86 and 95% alcohol in a rapid and continuous process, thus also saving on

¹⁸ Connell (1968), p. 1, 19, 21. Bielenberg, A. *Cork's Industrial Revolution* (Cork, 1991), p. 73.

¹⁹ O'Brien (1921), p. 359. Shipkey (1973), p. 291. Connell (1968), pp. 19-20.

labour costs. By 1833 there were at least seven in use in Ireland. These were the pioneers of patent still production.²⁰ But most Irish distillers continued to operate the traditional pot still which dominated the Irish industry until well into the second half of the nineteenth century.

The exceptionally high output of the Irish distilling industry during the 1830s was already declining by the end of the decade (see figure 2:1). This decline continued in the early 1840s. The industry began to recover to some extent in the mid-1840s, but not to the levels of the preceding decade. A number of factors combined to bring about this contraction in demand, including economic depression, poor harvests, the rising cost of duty, and the growth of the Temperance movement. The number of distilleries fell from a peak of 93 in 1835 to 51 by 1847. The industry became more concentrated after the mid-1830s in a smaller number of larger distilleries. By 1847, exports of whiskey to Britain were becoming more important accounting for well over a quarter of output. With the decline in demand on the home market over the previous decade, distillers were beginning to take more interest in the growing British market. This market was to provide the basis for the expansion of the industry during the second half of the nineteenth century.

The growth of the Irish distilling industry up to the end of the 1830s, was almost entirely dependent on the high level of demand in Ireland. This may explain why the technical breakthroughs in patent still production were made in Ireland. The Irish industry was more industrialised than in England and Scotland and the average size of Irish distilleries was also much larger.

Between the 1790s and the 1840s, the Irish distilling industry became geographically more concentrated in urban locations. With eight distilleries by 1834, Dublin accounted for over a quarter of the duty paid by Irish distillers reflecting the city's premier status within the industry. With ten distilleries, Co. Cork was the other major centre, accounting for over three-sixteenths of the duty paid in the country. Cork was an important region for growing barley,

²⁰ Slater, A. 'A London firm of Still Makers', *Business History*, viii (1966), pp. 48-59. The patent still depended on heat exchange and contra flow through two connected vertical columns. Heat was supplied by steam through one end and the wash was passed through in the opposite direction.

Dublin acquired barley from a wider hinterland, most notably from Wexford. The remainder of the industry was geographically more dispersed in the larger towns across the country, with more notable concentrations in the barley growing districts of Louth and the Midlands.²¹

Distilling yielded low added value as malt and grain accounted for a large part of the gross value of whiskey. At Locke's of Kilbeggan (Co. Westmeath), grain and malt accounted for 74% of the distillery's total costs in 1868, and accounted for almost half of the value of the whiskey when it was sold; labour only accounted for 9%.²² Much of the benefits of the industry therefore accrued to the Irish agricultural sector, which provided the bulk of the raw materials.

Although distillers made good profits, the industry was not very labour intensive, so the economic benefits to the Irish industrial sector, were much lower than in textile manufacture for example, which was very labour intensive (even after mechanisation). Textiles created a much higher level of added value than distilling, for the equivalent levels of capital investment. In macro-economic terms, distilling was a much weaker agent of industrialisation than textiles. The growth of a number of large and highly capitalised distilleries in Dublin and Cork during the first half of the nineteenth century, therefore never had the same beneficial impact in economic terms at a regional level, as the growth of mechanised textile manufacture around Belfast.

The licensed industry undoubtedly experienced growth between the 1790s and 1840s, with a pronounced period of growth during the 1820s and 1830s; peak output for this period was reached in 1836 when almost 12 million gallons was produced. Output declined dramatically in the early 1840s, recovering to a level of over 8 million gallons by the middle of the decade.

²¹ *Seventh Report of Excise*, BPP 1834, xxv, App. 67, p. 233-4.

²² National Library, Dublin. Locke Collection, Ms 20062, Miscellaneous Ledger, 1858-1871. Also see Bielenberg, A. *Locke's Distillery ; A History* (Dublin, 1993), pp. 48-9. According to an estimate of costs in the illicit industry in 1854, the production of a quantity of spirits sold for 70 shillings required 45 shillings worth of barley-malt. see Connell (1968), p. 20.

II

What distinguished the Irish distilling industry in the second half of the nineteenth century to that in the first half of the nineteenth century was the emergence of patent still production, which displaced the traditional pot still as the dominant method for making whiskey. The notable difference in the taste between pot and patent still whiskey is a consequence of the application of different distilling techniques. The traditional pot still is a flat-bottomed copper pot with a high head to prevent the fluid from boiling over. From the head runs the worm which carries the alcohol in the form of vapour through a spiral tube which is contained within a vessel of cold water which condenses the vapour into liquid. This liquid (called low wines) is re-distilled which makes it stronger. Patent still production in contrast is a continuous process and highly concentrated alcohol is produced in one run, so much less fuel is consumed. This revolutionised the economics of the industry. The low wines are not condensed and collected as in pot still production; instead the vapour passes on to a large rectifying column where it is purified into strong spirits. The spirits obtained from patent still production contain very little of the volatile oils produced from pot still production which give whiskey its flavour and character. Patent still whiskey is therefore blended with pot still whiskey to give it more body and taste.²³

Following the recession in the Irish distilling industry during the early 1840s, the output of the industry stabilised at around 8 million gallons per annum until the end of the 1850s. Production became more concentrated in larger distilleries which increasingly displaced smaller concerns. There was no increase in the export trade during this period which averaged about a fifth of total output (see table 2:2).

²³ Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1907), p. 502.

Table 2:2.

OUTPUT AND EXPORTS OF THE IRISH DISTILLING INDUSTRY

1845-1862 (Gallons)

	DISTILLERIES	OUTPUT	EXPORTS
1845	57	8,397,459	
1846	54	8,658,879	
1847	51	5,737,687	1,508,267
1848	55	8,126,507	1,175,824
1849	53	8,355,083	1,123,747
1850	51	8,293,034	999,805
1851	52	8,035,504	1,030,648
1852	46	8,117,708	1,318,088
1853	40	8,772,961	1,617,523
1854	40	8,259,930	1,958,031
1855	39	8,279,574	2,202,792
1856	38	8,542,809	2,346,937
1857	37	10,073,860	1,911,877
1858	36	8,235,367	2,241,073
1859	35	7,235,993	1,738,413
1860	31	6,474,670	1,267,478
1861	30	4,801,115	-
1862	27	-	-

Source: *Return of Spirits Distilled in Ireland*, BPP 1852-3, xcix (547) p. 2. BPP 1861, lviii (479) pp. 2-3. *Return of Distilleries in Ireland*, BPP 1863, lxvii (249) p. 3. *Return of Spirits Taken Out of Bond for Export*, BPP 1851, liii (368) p. 1. *Return of Spirits Exported from Ireland*, BPP 1861, lviii (479) p. 4. Coyne, W. Ireland, *Industrial and Agricultural* (Dublin, 1907), p. 499.

The consumption of spirits began to decline in Ireland from the late 1870s falling from 6.4 million gallons in 1877, to 3.6 million gallons in 1907. The tax on spirits increased dramatically from 2s 8d a gallon in 1853 to 8s in 1858, when the UK duty rates were harmonised. This sharp rise in 1858, led to an immediate 20% fall off in consumption in the following year. Thereafter, duty rose gradually to 11s a gallon in 1902. The decline in population also reduced consumption. In addition, beer consumption was increasing at the expense of spirits.²⁴

The social and cultural profile of post-Famine Ireland was quite different to the pre-Famine era. Spirit drinking which played such an important part in peasant culture, was significantly undermined by rapid population decline during and after the Famine. The church began to have a more powerful influence; increasingly the traditional drunken festivities on holy days and

²⁴ Mitchell, B. *British Historical Statistics* (London, 1988), pp. 408-9. Malcolm, E. *Ireland Sober, Ireland Free* (Dublin, 1986), p. 323. Coyne (1907), pp. 498-9.

saints' days were replaced by more sober activities. The church also exercised its growing authority in reducing opportunities for heavy drinking at weddings, wakes, patterns, dances, fairs and festivals so that by the end of the century the prolonged drinking sessions which went on for several days were much less common. Irish society was increasingly characterised by a more systematic division between work experience, recreational activity and religious devotion which slowly reduced spirit consumption.²⁵ Rising living standards brought an increased desire for respectability; heavy spirit consumption was increasingly frowned upon by the rising middle class.

The decline in consumption in Ireland during the second half of the nineteenth century was however more than offset by the growth of exports. The export trade in spirits had been relatively insignificant during the first half of the century, but it became more important thereafter. The growth of exports, particularly to England, enabled the output of the industry to continue expanding for the remainder of the nineteenth century (see table 2:3).

Table 2:3.

SPIRITS DISTILLED IN AND EXPORTED FROM IRELAND 1851 to 1901

	OUTPUT	EXPORTS
1851	8,035,504 gallons	1,030,648 gallons
1860	6,474,670 gallons	1,267,478 gallons
1871	8,873,545 gallons	2,093,789 gallons
1881	9,720,834 gallons	-
1891	12,988,924 gallons	7,595,902 gallons
1901	14,221,520 gallons	8,451,839 gallons

Source: *Return of Spirits Distilled in Ireland*, BPP 1852-3, xcix (547) p. 2. Coyne, W. *Ireland Industrial and Agricultural* (Dublin, 1907), p. 499.

The rise in output in the last quarter of the nineteenth century, which depended entirely on exports, was not accompanied by an increase in the number of distilleries. By 1862, the number of distilleries had fallen to 27; the number changed little over the next half century, but the new and surviving firms became larger and more highly capitalised, facilitating a rise in output to meet the growth in British demand.

²⁵ Malcolm, p. 327. Barrett, J. 'Why Paddy Drank, The Social Importance of Whiskey in Pre-Famine Ireland', *Journal of Popular Culture*, xi, (1977), p. 19.

From the 1860s, the limited liability company became a convenient way to secure capital for expansion; the Cork Distillers Company, which had been set up in 1867 with a nominal capital of £250,000 was a leader in this respect. The seven joint stock distilling companies set up between 1867 and 1874 had an average nominal capital of £125,714. By far the largest was Dunville's of Belfast, established in 1879 with a nominal capital of £500,000. Dunville's heralded the arrival of the large Belfast patent still producers and blenders, who dominated the Irish industry over the next half century.²⁶ The cheaper and lighter blended whiskey produced by them, became popular on the British market during the last quarter of the nineteenth century.²⁷

The contracting Irish market at the end of the nineteenth century remained a stronghold for pot still producers many of whom also sold a large share of their product to the blenders. There was also an export niche for pot still producers. Thus a few smaller firms with good reputations and good management stayed in business and even expanded their trade during the second half of the nineteenth century; these included Bushmills in Co. Antrim and Locke's of Kilbeggan, Co. Westmeath, which were both re-organised as joint stock companies.²⁸

Many of the concerns registering as joint stock companies were older established distilleries which required both increased capital investment and the protection afforded by limited liability. The capital raised could then be used to pay off debts, extend plant and increase the working capital. H.S. Persse Limited of Galway, for example, registered in 1896 with a nominal capital of £150,000; the money they raised through the sale of shares and loans from two separate banks enabled them to make significant improvements to their plant and also to

²⁶ The banks also assisted companies in their capitalisation programmes; there were three banks involved in the amalgamation of the 5 distilleries which made up the Cork Distillers Company; by 1873 the Bank of Ireland, The Provincial Bank and the Munster Bank had each advanced £30,000 to the company which continued thereafter to use the credit facilities of all three. Register of Joint stock Companies, BPP annually, for reference for each year see Cockton, P. *Subject Catalogue of the House of Commons Parliamentary Papers 1801-1900* (Cambridge, 1988). Ollerenshaw, P. 'Aspects of Bank Lending in Post Famine Ireland', in Mitchison, R. and Roebuck, P. (eds), *Economy and Society in Scotland and Ireland* (Edinburgh 1988), p. 229.

²⁷ Weir, R. 'The Patent Still Distillers and the Role of Competition', in Cullen, L. and Smout, T. (eds) *Comparative Aspects of Scottish and Irish Economic and Social History, 1600- 1900*, (Edinburgh, 1977), pp. 136-9.

²⁸ *Register of Joint Stock Companies*, BPP annually, for reference for each year see Cockton (1988). Locke's became a limited company in 1893 with a nominal capital of £40,000. The average nominal capital of the 9 distilleries registered as joint stock companies between November 1880 and April 1890 was much larger than this averaging £108,000.

acquire new premises at Earl's Island in Galway city in 1899. By 1901, the additional working capital had enabled the company to expand its trade, net profits averaged £12,000 per annum between 1897 and 1900 which exceeded the profits made in the years preceding the formation of the limited company.²⁹

The banks played an increasingly important role in providing working capital for distilleries during the second half of the nineteenth century. Their capital requirements had become much larger. The banks advanced credits on a seasonal basis so that distillers could purchase stocks of corn in the autumn, which was the principal cost within the industry. At Locke's for example, malt and grain accounted for about 74% of total production costs. The bank overdraft which distillers built up in the autumn was then brought back into the black by sales of raw and mature spirits during the following season.³⁰

Dublin was the principal distilling centre in Ireland until it was displaced by Belfast in the last quarter of the nineteenth century. The Jamesons, of Scottish extraction, were the most prominent and prestigious of the Irish pot still producers, running two large distilleries in the city. Both of the Jameson distilleries survived the general contraction which took place within the industry during the 1840s down to the 1860s. Exports and northern blenders opened up new sources of demand for their whiskey from the 1870s onwards. £100,000 was invested in Marrowbone Lane to meet the growth in demand during the 1870s.³¹ The Bow street concern also experienced significant expansion; In 1891, John Jameson and Son became a limited company with a nominal capital of £450,000. This reorganisation appears to have been a success as the Irish sales of Jameson increased from 289,956 gallons in 1890 to 587,460 gallons in 1899. The concern was greatly enlarged at the end of the century.³²

²⁹ National Archives; M. 4859, Prospectus of Persse, Ltd.

³⁰ Bank of Ireland, Baggot St., Dublin. Court of Directors Transactions, no. 3, 7, 18. November, 1853, no. 30, 33, September and 14 September 1897. Both Jameson and Power only received overdraft facilities of between £5,000 and £7,000 in 1854. By 1897, Power had been given overdraft facilities of up to £65,000 while Jameson received accommodation to the extent of £80,000. Bielenberg, A. *Locke's Distillery; A History* (Dublin, 1993), pp.48-9.

³¹ Jameson, J. *Truths About Whiskey* (Dublin, 1878), pp. 41-5. Barnard, A. *The Whiskey Distilleries of the UK* (London, 1887), pp. 372-3.

³² National Archives, Dublin. Irish Distillers Collection, 1007 B. 3. Maguire (1973), pp. 373-4.

William Jameson merged the Marrowbone lane concern in 1889 into a new firm, the Dublin Distillers Company Limited (the other partners were Roe's on Thomas street and the Dublin Whiskey Distillery on the Jones Road). This heavily over capitalised merger was paying no dividend by 1902. By 1904, stocks had built up to the equivalent of five years sales at a time when consumption was falling. The rise in spirit duties in 1909 exacerbated this oversupply within the industry at large. The huge size of the firm's overheads made it particularly difficult for it to cope with declining demand during the first quarter of the present century; by 1926 all three companies within the merger had gone out of business.³³

Although the output of the Irish industry increased significantly during the last third of the nineteenth century, it was patent still production which accounted for most of the increase. In 1860, 6.4 million gallons were produced within the Irish industry and only 35% of this was made in patent stills. By 1900, output had risen to 14.5 million gallons of which over 71% was made in patent stills.³⁴ Most of the Dublin distillers doggedly stuck to pot still production. They poured scorn on the use of neutral grain spirit for blending with matured pot still whiskey. But their opposition to blending ignored consumer preference in Britain for lighter and cheaper blends.³⁵ But confidence and investment in pot still production continued, in 1892-3 there were eight distilling firms operating in and around Dublin. But by the turn of the century many of these were running into trouble. By 1926, only two remained; Jameson's on Bow Street and Power's on Thomas Street.

Distilling in Ulster followed a similar pattern to the rest of Ireland prior to the extensive adoption of the patent still during the second half of the nineteenth century. Belfast became the most important location for patent still production and the blending trade in the last quarter of the nineteenth century, while Dublin remained the traditional stronghold of the pot still industry. The British market provided the demand for blended whiskey which enabled the Ulster distilling industry to increase its output during this period. Though Dublin exports of pot

³³ Roe's on Thomas street was the largest distillery in the country with an annual output of about 2 million gallons by 1886; it was also one of the oldest having been established in 1757. The Jones road concern had been set up as a joint stock company in 1872 with a nominal capital of £100,000.

Daly, M. *Dublin, the Deposed Capital* (Cork, 1985), p. 30. Maguire (1973), p. 338.

³⁴ Weir (1977), pp. 132, 138-9.

³⁵ Daly (1985), pp. 27-30.

still whiskey increased during the second half of the nineteenth century, the main growth in Irish exports came from patent still distillers based in Belfast and Derry.

Table 2:4.

EXPORTS OF WHISKEY FROM IRELAND 1860-1905 (GALLONS)				
	BELFAST	DUBLIN	CORK	TOTAL
1860	135,270	-	-	1,267,478
1871	754,427	727,642	611,720	2,093,789
1876	2,006,383	1,281,708	613,564	3,901,655
1884	3,837,024	1,158,526	630,460	5,626,010
1892	4,885,056	1,701,258	598,152	7,184,466
1900	6,648,912	1,650,473	494,424	8,793,809
1905	5,262,057	2,003,316	212,625	7,477,998

Sources; *Return of Spirits Exported*, BPP 1861, lviii (479) p. 4. Totals for 1871 to 1900 includes Belfast, Dublin and Cork only. These figures are converted into gallons from Belfast Harbour Commissioners, Cork Harbour Commissioners and *Thom's Directory*. The 1905 figures come from *Thom's Directory*.

The oldest of the Ulster patent still dynasties which emerged during this period was Watts of Derry. Watts built a distillery in Derry in 1825, adding a patent still in 1833. At this stage the annual output of the distillery was around 132,000 gallons per annum. The installation of the patent still enabled them to reduce costs and undercut other licensed distillers in the region, in addition to competing with the thriving illicit industry of neighbouring County Donegal. By the mid-nineteenth century Watts were the leading distillers in north-west Ulster. In 1867, they acquired a smaller rival distillery (the Waterside) which was converted entirely to pot still production while the other distillery (Abbey St.) was given over entirely to patent still production. By 1886, it had a capacity of 2 million gallons making it one of the largest distilleries in Ireland. David Watt and Co. acquired limited liability status two years later with a nominal capital of £150,000. In the decades that followed the market became extremely competitive because of the general oversupply of whiskey. To counteract this Watts formed a merger with two of the other major Ulster patent still producers who were both based in Belfast, the Avoniel Distillery, and the Irish Distillery Ltd., Connswater. This merger, the United Distillers Company Ltd., dominated the Irish market for patent still and became one of the key players in the UK, second only to Distillers Company Ltd. of Scotland.³⁶

³⁶ Bielenberg, A. 'The Watt family and the Derry Distilling Industry, 1762-1921', *Ulsterfolklife*. forthcoming.

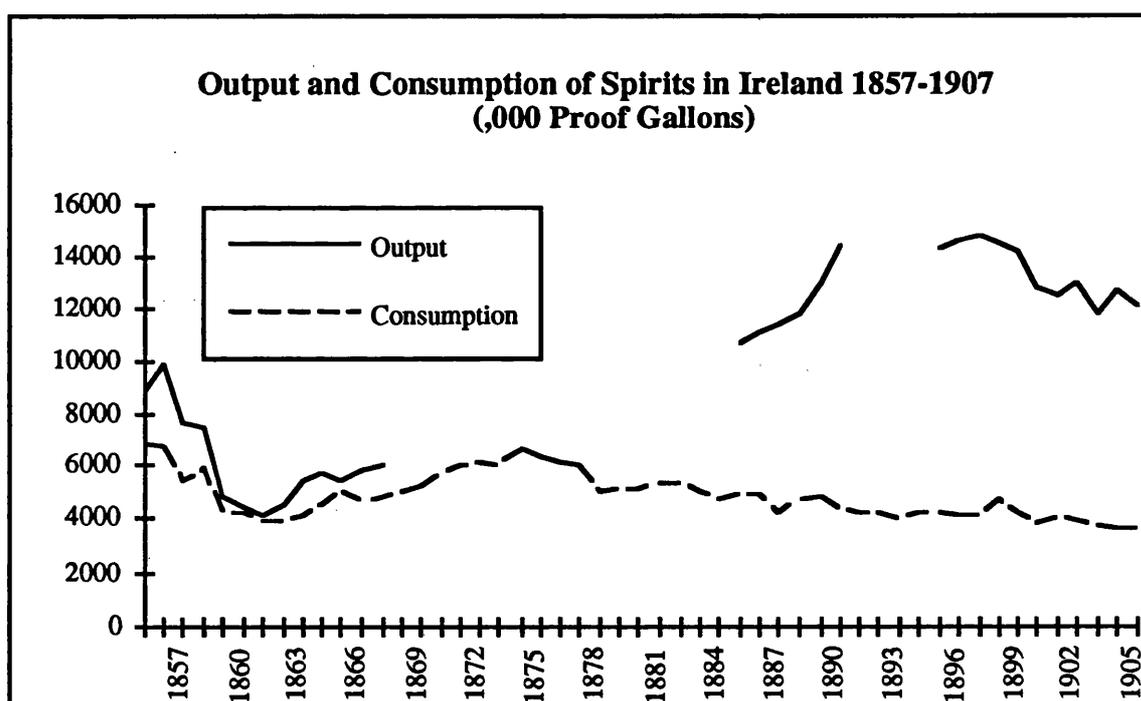
Belfast at this stage was the principal centre of patent still production and blending in Ireland. A number of capital intensive export oriented distilleries had been set up in the vicinity of the city. These included Dunville's Royal Irish Distillery built in 1869; Higgin's Avoniel Distillery established in 1882, the Irish Distillery Ltd. of Connswater (1886) and McConnell's Distillery built towards the end of the century. Smaller pot still distilleries were still operating in Comber, Limavady, Coleraine and Bushmills at the end of the nineteenth century.³⁷ There were no major centres in Ulster with a tradition of pot still production like Dublin or Cork. Lacking the reverence which the big southern distilling dynasties had for traditional pot still whiskey, distillers and blenders in Belfast were quick to exploit investment opportunities which opened up in the growing market for blended whiskey in Britain. Increased investment in patent still production put the Ulster distillers in a good position to compete with Scotch on the British market. Exports provided the engine of growth for the Ulster industry; the export figures from Belfast rose from under 140,000 gallons in 1860, to over 6,500,000 gallons in 1900 (see table 2:4).

The heavy investment in UK patent still production led to a glut of spirits on the market by the 1860s. Consequently a number of UK firms, including four Irish distilleries, attempted to cooperate to reduce output by using a quota system. These firms (which included Walker of Limerick, Cork Distillers Company, Watt and Co. of Londonderry and Brown of Dundalk) all joined the Scotch Distillers Association (1865-1876) and later the United Distillers Association (1878-1888). Higgin's Avoniel Distillery was also forced to join this group in 1883 shortly after it had been established. Some of the major Belfast blenders responded to these attempts to control market supply by setting up their own distilleries; Three blending firms in Belfast set up the Irish Distillery Ltd. at Connswater in 1885. This was one of the reasons the United Distillers Association finally broke up in 1888. In 1902, a more successful merger was established; the United Distillers Ltd (UDL), which included Watt's of Derry, the Irish Distillery Ltd., and Avoniel, both located in Belfast. Three years later the company accepted an

³⁷ Maguire (1973), pp. 348-9. Ollerenshaw, P. 'Industry 1820-1914' in Kennedy, L. Ollerenshaw, P. (eds), *Economic History of Ulster* (Manchester, 1985), p. 86.

exchange of shares with DCL of Scotland and the two companies began to co-operate in controlling the supply of UK patent still spirit.³⁸

The Irish distilling industry performed reasonably well during the second half of the nineteenth century, despite the fact that Irish consumption was in decline. During this period the industry experienced consolidation and growth in response to growing British demand for blended whiskey. But when British demand began to contract, and Irish demand continued to follow a downward trajectory, a decline in output set in after the turn of the century which reversed the trend of the preceding decades. However, output at over 12 million gallons in 1907 was still higher than in 1845 when just under 8.4 million gallons was produced. Overall therefore, the industry had experienced growth since before the Famine, despite a significant fall in output in the late 1850s and early 1860s. This fall in output followed the rise in duty in 1858, when Irish duty was raised to the same level as the rest of the UK.



Note; years ending on the 31st of March.

Figure 2:5. Source; *Account of Spirits Distilled in UK*, BPP 1870, xx (c. 82) p. 3. Nettleton, J. *The Manufacture of Spirits* (London, 1893), p. 406. Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1907), pp. 494-511. *Whiskey Commission, UK*, BPP 1908, lviii (Cd. 4181).

³⁸ Weir (1977), pp. 131-142. Weir, R. 'In and Out of Ireland, The Distillers Company Ltd. and the Irish Whiskey Trade 1900-39'. *Irish Economic and Social History*, viii, (1980), pp. 45-65. DCL finally acquired full control and closed down all of their Irish based distilleries in the 1920s, effectively making Ireland irrelevant as a centre for patent still production.

Chapter Three

FOUNDRY WORK AND ENGINEERING

I

By the end of the eighteenth century very little iron was smelted in Ireland. The supply of charcoal had been terminated by the destruction of the woodlands. An ironworks was set up at Arigna in Roscommon in 1788 which used coke from the Connaught coalfield to smelt iron. But operations here were not a success and the works was finally abandoned in 1838.¹ Most of the iron used in Ireland was imported from Britain and Sweden. Coal also had to be imported from Britain so the iron foundries established in Ireland between 1790s and the 1840s tended to be located in the major ports, as overland costs for transporting iron and coal were prohibitive. This chapter will examine the growing demand for ironwork in different sectors of the economy between 1780 and 1845. It will also explain the emergence of a more highly developed engineering industry in the north-east of Ireland.

During the eighteenth century, many of the tools and household goods consumed in Ireland were imported from the iron working districts in England. In order to curtail these imports and encourage the growth of Irish foundries the Irish parliament imposed duties on British ironware in the 1790s.² Irish foundries were unable to compete with light castings made in the British iron working districts, so they tended to concentrate on heavier castings which required less precision.

Urban development in Ireland created a demand for items like iron railings, gates, finials, window grills, fanlights, lamp arches and holders,³ pumps, plumbing and guttering. In Dublin, specialist ironworkers like bell founders and copper-smiths could ply there trades. It

¹ Coe, W. *The Engineering Industry in the North of Ireland* (Plymouth, 1969), p. 157

² Gribbon, H. *The History of Waterpower in Ulster* (Newton Abbot, 1969), p. 76. O'Brien, L. *Observations on the Manufactures of Ireland* (Dublin, 1785), pp. 1-38.

³ N. A. 'Ironwork', *The Georgian Society Record*, III (1969), pp.125-9.

was also the centre of the coachbuilding industry which required ironwork. By the end of the eighteenth century there were over 40 coach factories in the city employing up to 2,000 men.⁴

Dublin also became the main centre for supplying large and small castings for public works during the first half of the nineteenth century. These included bridges, lighthouses, wharfs, cranes, bollards, lamp posts and manhole coverings. By 1824, there were 13 iron foundries operating in the city. A number of smaller towns also provided a demand for less specialised ironwork. There were 5 foundries in Belfast at this time and in Cork there were 7 by 1837.⁵

1a) Agriculture

The agricultural sector was an important source of demand for castings and implements.

During the last quarter of the eighteenth century a number of small foundries were established which cast a range of agricultural equipment like plough parts, harrows, axles, crow bars. The forge of local blacksmiths provided much of the ironwork for the agricultural sector .

Blacksmiths shod horses and made and repaired a whole range of tools and implements and provided a service to farmers in the construction and repair of iron equipment. Specialized spade makers emerged after the mid-eighteenth century.⁶

Spade mills were predominantly located in Ulster, although a few were established close to Dublin and Cork. These mills applied a greater degree of technical sophistication on a larger scale to processes commonly practised in the traditional forge. But unlike the forge, they utilized water power to drive bellows, shearing machinery, grind stones and trip hammers. The application of these machines to the process of spade making enabled the scale of operations to be increased dramatically. The growth in demand for implements from the mid-eighteenth century justified investment in such mills. Some were quite substantial; Carvill's in Newry for

⁴ Webb, J. *Industrial Dublin since 1698* (Dublin, 1913), p. 88.

⁵ *Pigots Directory*, 1824, p. 75, 353. Lewis S. *Topographical Dictionary* (London, 1837), I, P. 416.

⁶ Watson, M. 'North Antrim Swing Ploughs: Their Construction and Use'. *Ulsterfolklife* , xxviii (1982) pp. 13-32. Bell J. and Watson, M. *Irish Farming 1750-1900* (Edinburgh, 1986), p. 124.

example, made 3,500 dozen spades and 57,000 shovels per annum by 1830. But most were small concerns serving limited local markets.⁷

A large number of spade types were used in different parts of Ireland so the the larger mills which emerged from the 1830s onwards, had to diversify to meet the varying demand in different regions. This enabled these mills to survive against the competition of more standardised English imports. As the transport infrastructure improved from the 1830s onwards, larger and better organised concerns tended to broaden their markets at the expense of smaller mills. Many of the larger concerns did a range of activities apart from spade making.⁸

Heavier castings for the agricultural sector were made in the small foundries which were emerging in Ireland by the end of the eighteenth century. The most important single items they made were plough parts; these had considerable regional variation in design and construction. Very gradually, ploughs and harrows of English or Scottish manufacture or design were used. By the mid-nineteenth century the Scottish swing plough had become the most common. The spread of these new improved plough types, which replaced the timber ploughs of the eighteenth century required a new range of construction and repair skills. Iron ploughs incorporating these new designs were often built by blacksmiths who bought the main components from iron foundries. This practice continued in many regions into the twentieth century.⁹

The continued growth of arable farming between the 1780s and 1840s, increased the demand for ploughs, harrows and a range of other equipment for processing the grain harvest. Most of the technology for threshing and winnowing grain was based on English or Scottish prototypes. Irish foundries began to make this type of equipment extensively during the first half of the nineteenth century. By the 1830s, a number of Irish foundries were making ploughs in addition to their constituent parts. Dublin dominated this trade; Courtney and Stephens of

⁷ Bell and Watson (1986), pp. 43-4. Gailey, A. *Spade Making in Ireland* (Ulster Folk and Transport Museum, 1982), pp. 1-15.

⁸ Gailey (1982), p. 15.

⁹ Watson (1982), pp. 13-14.

Blackhall Place, Kennan's of Fishamble Street and Le Strange of North Street were the more notable names in the trade. In Ulster this was also a period of growth; Gray's of Belfast and Kennedy of Coleraine were both established in the early 1840s.¹⁰

Foundries tended to specialize according to the demand generated in the region they were located in. Mowers and reapers were used predominantly in the south so this industry became concentrated in the southern foundries.¹¹ Threshing machines were initially imported from Scotland at the end of the eighteenth century. Their use spread slowly during the first half of the nineteenth century. They were expensive machines and were therefore only suitable for larger farms where the owner had sufficient capital resources. This is perhaps why they were adopted more readily in the major grain growing regions in the south during the first part of the nineteenth century, notably around Cork, Dublin and Wexford. After Pierce established their works in Wexford in 1837 they soon became the largest manufacturers in Ireland. By this time, the price of the machines was decreasing as slender iron castings began to replace wood as the main component. This fall in price, and increased versatility contributed to extending their use in Ireland.¹²

Wexford's early success in agricultural machinery, was a consequence of its location in one of the main tillage farming regions in the country. The industry in the town was associated particularly with one firm, Pierce. James Pierce who established the company was a millwright who started out manufacturing fire fans in 1830. In 1837 he diversified into the manufacture of threshing machines. The firm later became extensively engaged in the production of ploughs.¹³

¹⁰ Coe (1969), p. 111. O'Neill, T. 'Tools and Things; Machinery on Irish Farms 1700-1981', in Gailey, A. O'hOgain, D. (eds) *Gold under the Furze* (Dublin, 1982), pp. 101-114.

¹¹ Coe (1969), p. 113.

¹² Bell and Watson (1986), pp.192-224. Gailey, A. 'Introduction and Spread of the Horse-Powered Threshing Machine in Ulster', *Ulsterfolklife*, xxx, (1984), pp. 37-54.

¹³ O'Neill (1982), p. 113.

1b) Industry

From the end of the eighteenth century, the industrial sector became an important source of demand for the engineering industry. Machinery and parts for mills for grinding corn, finishing linen, finishing wool and extracting oil were largely made of timber during the eighteenth century. The itinerant millwrights who erected and serviced these mills were therefore skilled woodworkers, although they could also work with iron and stone. As iron became more important from the 1790s onwards, engineering firms with foundries and machine shops began to displace millwrights in the construction of many of the larger mills. These firms employed erection and maintenance squads in which millwrights played an important role.¹⁴

In the south of Ireland arable farming and the processing industries connected with it were undoubtedly the most important factor behind the growth of engineering and foundry work during this period. Between the mid-eighteenth century and the 1840s, the milling industry experienced growth and the demand for millwork in Ireland became substantial. Between 1759 and 1790, 248 new corn mills were erected in Ireland. Many more were built during the Napoleonic Wars and construction continued thereafter. By 1835, there were almost 2,000 corn mills operating in the country.¹⁵ Their erection and maintenance provided extensive work for millwrights, and foundries.

In the late eighteenth and early nineteenth century, a number of English and Scottish engineers were hired to carry out millwork in Ireland. The best known were Rennie, Hewes and Fairbairn. Through their work a number of Irish millers were able to fully exploit the revolution in milling technology which was underway in Britain. The new techniques and methods were subsequently adopted by Irish millwrights and engineers. A number of the engineering firms which were established in Ireland were set up by English and Scots artisans and engineers; many of the skilled workers employed were also from Britain. Gradually the standard of the millwork done in Ireland improved and it became more cost effective and

¹⁴ Coe (1969), pp. 19-20.

¹⁵ Daly, M. *Dublin, The Deposed Capital* (Cork, 1985), p. 67.

convenient for Irish millowners to hire Irish based firms for the installation and servicing of mill machinery.¹⁶

The engineering firms and foundries which carried out millwork tended to extend their trade into the surrounding counties. Thus, for example Cooke's foundry in Londonderry, which was established in 1821, made and erected machinery for corn, flour and flax mills mainly in Derry and Donegal, but also in locations as far off as Sligo and Roscommon.¹⁷

Engineering works often started on a very small scale. John Steel for example ran a small millwright business on Lancaster Quay in Cork in the 1820s. Slowly he built up a good reputation in the hinterland of the city installing waterwheels, flour dressing machinery and other milling equipment of the latest designs. By the 1840s, he had established the Vulcan Foundry to make castings for mills, subsequently diversifying into casting ship bollards, manhole covers and iron railings. The Hive Iron Works in Cork was also initially very small; it was established in 1800 by Thomas Addison Barnes for making screening machinery for flour mills, distilleries and maltings. Barnes entered into a partnership with a wrought iron and brass founder named Atkinson in 1811 who had been making textile machinery and steam engines. Two more partners, Perrott and Mc Swiney joined in 1813 and a large new foundry and engineering works was built on Hanover Street. The main activity of the company was millwork, but in 1816, they built the first Irish marine engine. The manufacture of stationary steam engines and boilers became an important part of the firm's activities over the next decades. They also made a wide range of agricultural equipment, pumps and household goods. When Perrott took over the entire business in the 1830s, they were the largest iron founders, engineers and iron merchants in Munster.¹⁸

Specialist firms servicing the needs of the brewing and distilling industry were also emerging at the beginning of the nineteenth century. Miller of Dublin was probably the largest. Initially

¹⁶ Bielenberg, A. *Cork's Industrial Revolution* (Cork, 1991), pp. 94-5.
Bowie, G. *Watermills, Windmills and Stationary Steam Engines in Ireland*
(unpublished PhD, QUB, 1975) p. 237.

¹⁷ Mullin, T. *Ulster's Historic City; Derry, Londonderry* (Belfast, 1986), p. 134.

¹⁸ Bielenberg, (1991), pp. 96-8.

John Miller (a Scotsman) came over from Glasgow around 1806 to help Jameson's equip the Bow St. distillery. He set up a small works on Bow St. and by 1810, they were doing work for other distillers and brewers based in Dublin. Their reputation spread and by 1825, they were building stills and doing pipe and copperwork all over Ireland.¹⁹

Engineering and foundry works developed along different lines according to the varying types of demand in each region. In Ulster, the linen industry had a strong influence on the nature of its development. The first foundry was set up in Belfast in 1760 by Stewart Hadskis who made boilers for the linen industry in addition to pots and pans for household use. A second was set up in 1783 by a Bristol man named Benjamin Edwards in Ballymacarrett. He made glass making equipment and subsequently pots, pans and yarn boilers for the linen industry in addition to equipment for paper mills. The first large foundry in Belfast was built in 1799 at Short Strand by Mc Clenaghan, Stainton and Co. This foundry was taken over by Victor Coates in 1802. The 'Lagan Foundry' as it became known made castings for bleachworks and mills.²⁰ All of these early foundries in east Ulster made equipment for bleaching linen. As other sectors of the linen industry also became mechanised and centralised the demand for castings and machinery increased. This ultimately differentiated the development of engineering in this region from the rest of the country. The more rapid urban development around Belfast, the commercial and manufacturing centre of the linen industry, also boosted demand for ironwork for construction.

Cotton spinning was undertaken successfully in the vicinity of Belfast until its decline in the 1830s. The surviving letterbook of one firm (Boomer) indicates that the machines for these mills were largely made and serviced by Manchester based machine makers.²¹ The first generation of mechanised flax spinners mostly used machinery made by Leeds based firms. But as demand increased in the 1830s and 1840s, local firms began to meet this demand. The number of engineering and foundry works in the city increased from four to twelve between 1825 and 1851. Many English and Scottish engineers and mechanics moved to Belfast,

¹⁹ Business records of Miller and Co., Church St., Dublin.

²⁰ Coe (1969), p. 23.

²¹ PRONI, D. 2450/2, Boomer Letterbook, 1826-9.

bringing new skills which assisted the rapid growth of the city's machine industry. The numbers employed in engineering works and foundries in 1837 was under a thousand. By 1851 the five largest foundries alone (out of a total of 12) employed 1,500 people.²²

The extent of the linen industry in east Ulster gave machine makers who were located there advantages over other European rivals and Belfast firms began to export flax spinning machinery. Belfast foundries provided castings for agriculture, millwork, household goods and the construction industry, as in the south; but they also benefited from backward linkages from the region's textile industry which gave rise to the development of a larger and more complex engineering sector.

The principal engineering company which emerged in Ulster during the first half of the nineteenth century was Victor Coate's Lagan Foundry which started out making a wide range of castings and millwork. Cotton spinning in east Ulster was creating a demand for steam engines. The first locally made engine was built in the Belfast Foundry in 1811 and in the following year Victor Coates made one. Because of the demand for steam engines created by the mechanisation of linen spinning from the 1830s, Belfast became the principal centre for the manufacture of steam engines in Ireland, and Coate's had undoubtedly become the best engine makers in the country. Spring Rice speaking of developments in Belfast stated in 1834 that; 'a great improvement has taken place in the foundry and millwright business; and I can say with safety that no part of England can produce better steam engines than have lately been manufactured by Coates and Young, of this place'.²³

In 1820, the company engineered the first steam boat launched in Belfast with two 70 horse power engines. These were probably the largest yet built in Ireland. Over the next years they continued to provide engines for Belfast shipbuilders. In 1838, they built and launched the first Irish made iron steamboat, and up to 1860 they built a whole range of iron vessels. The firm also did millwork and castings for the construction industry. A wide range of castings were

²² Boyle, E. *The Economic Development of the Irish Linen Industry 1825-1913* (Unpublished PhD, QUB, 1977), pp. 190-1. Lewis (1937) 1, pp. 194-5. *The Advocate or Irish Industrial Journal*, 23 April 1851.

²³ *Belfast Newsletter*, 15 February 1811, 22 September 1820. Takei, A. *The Early Mechanisation of the Ulster Linen Industry 1800-1840* (Unpublished M. Litt, TCD, 1989), p. 167.

undertaken for linen bleachers, underlining the importance of this industry for the firm. They also did castings for railway companies from the 1840s onwards.²⁴

1c) Railways

The construction of the railway network in Ireland created a major demand for the work of engineers and iron founders, which taxed the skills of the engineering industry to its limits. The arrival of the railway era, led to a significant growth in the scale of operations at existing foundries and the establishment of a number of new foundries. They created a demand for a vast range of castings and heavy engineering work. Railway stations alone, contained much more ironwork than had been used previously in public buildings. Although most of the rails were imported, items like footbridges, signals, iron columns, roof structures and girders, spans and lattice work for bridges were cast in Ireland. In addition many locomotives, carriages and wagons were built in Ireland and the railway companies had to run fairly sizable engineering works to build and maintain their rolling stock.

Dublin rather than Belfast emerged as the main centre of railway engineering in Ireland, as it became the hub of the whole network. The capital already had a strong tradition of engineering and foundry work; it was also the main centre of the carriage and coachbuilding industry so the railway companies could exploit some of the existing skills in the city.

The Dublin and Kingstown Railway was the first to open in Ireland (in 1834). In order to establish a workshop the company acquired the site of the Dock Distillery on Grand Canal Street. By 1837 the works on Grand Canal Street were complete and the D and KR began constructing its own coaching stock. The D and KR works had a small foundry, but most of the larger castings like cylinders were cast by outside contracts, and frames were also purchased cut to shape with the main holes already bored.²⁵

²⁴ Coe (1969), p. 41, 112. McCutcheon, A. *The Stationary Steam Engine in Ulster* (Dublin N.D.), p. 5. PRONI. D. 1905/3/21, Furgeson Letterbook, 1847. I would like to thank R. Clements for information on contracts given by railway companies.

²⁵ Murray, K. *Ireland's First Railway* (Dublin, 1981), pp. 190, 196, 199, 200, 220, 222. The machinery was installed by two Dublin engineering firms; Courtney and Stephens and J and R Mallet. The former company was already casting wheels for the D and KR at this stage at their works in Blackhall Place, and they subsequently built a number of carriages for them. Dawson, a Dublin coachbuilder, also built the bodies of a

Mallets fulfilled a large amount of contracts for the railways. Like many engineers in Ireland, the Mallets came from England. Around 1780, they established a small business on Capel Street doing high class plumbing work. After the turn of the century the family began to do small scale foundry work, acquiring a new premises at Ryder's Row. In 1831, the son of the owner, Robert, became involved. He had taken a degree in Trinity College Dublin, which included mathematics and science, and rapidly acquired a knowledge of engineering from his father's works and from visits to engineering concerns in England and the Continent.²⁶

The demand for engineering was increasing in Ireland in the 1820s. Under his management the company became engaged in high class millwork in the south of Ireland, including the construction and installation of water-wheels and steam engines. Mallet designed and made railway locomotives and steam engines for canal boats. Although the company built a number of powerful engines, demand in Dublin (in contrast to Belfast) was insufficient to reach a critical mass sufficient to sustain this end of the business economically. So the company began to specialize in civil engineering contracts. But the major contracts which led to the expansion of the company from the late 1830s, were those undertaken for the Irish railway companies.²⁷

Grendon's of Drogheda, were also general iron founders prior to their entry into heavy railway engineering. By 1820, Grendon Mackay and Co. were making marine engines and boilers. They were also doing millwork and a range of iron and brass castings. By 1837, the company had built a large new foundry for steam machinery.²⁸ So by the time the railway era got under way Grendon's had already built up a significant local trade in general foundry work and heavy engineering. They were already experienced shipbuilders. But the firm is best known for the construction of railway locomotives (building 42 between the 1840s and the 1880s) and parts

number of their early carriages.

²⁶ Cox, R. *Robert Mallet 1810-1881*. (Dublin, 1982), pp. 1-3, 71.

²⁷ Bowie (1975), p. 27. Martin, R. *Ireland, Before and after the Union* (London, 1848), pp. 90-92, 86, 76. One of the first of the larger castings in the 1830s, were a number of very wide iron bridges spanning the Shannon. The company also undertook castings for lighthouses and built cranes, dock gates and cast bollards for harbours. They built fire engines and heating, ventilating and hot water systems for a number of the more notable public buildings in Dublin. Contract work for Guinness's Brewery was also undertaken (including the construction of a new beam engine in 1838).

²⁸ *Commercial Directory of Ireland, Scotland and Northern England* (Manchester, 1820), Pigot's Directory (London, 1824), p. 144. Slater's Directory (London, 1846), p. 32.

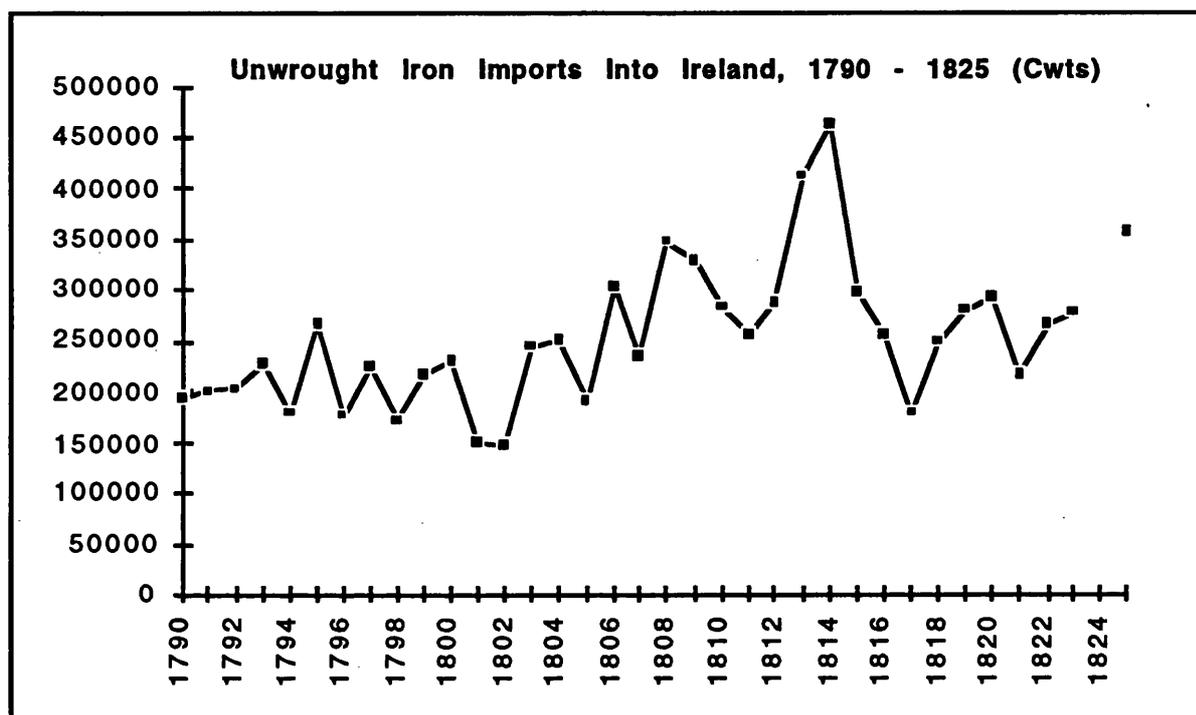
(notably cylinders and boilers). The significant growth of the firm during and after the 1840s was largely through contracts undertaken for the construction of the railways.²⁹

The construction of the railways had greater impact on the engineering industry in Dublin than elsewhere. Although they also provided contracts for engineering firms based in Belfast and Cork, neither of these cities ever challenged Dublin as the main centre of railway engineering in Ireland.

²⁹ Clements, R. 'Grendon Locomotives', *Journal of the Irish Railway Record Society*, ix (1969), pp. 63-79. They cast water tanks, ironwork for bridges, chairs, fastenings, carriage wheels, axles, girders, roofs, columns, turn-tables, weighing machines, lock gates, pumping machinery, cutting machinery, horizontal pumping engines, brass pumps and cast iron draining plates. They also made cylinders and boilers and carried out repair work for railway companies.

1d) CONCLUSION

Overall it seems evident that the amount of engineering and foundry work carried out in Ireland between 1790 and 1845 was slowly increasing, although growth was extremely sluggish. It is impossible to get any idea of the output of engineering and foundry establishments, but since nearly all the iron in Ireland was imported this can provide a rough guide to the growth of the industry (see figure 3:1).



Note-1825 and 1835 converted from tons assuming 1 ton=20 cwt

Figure 3:1. Source; *Imports and Exports Ireland*, BPP 1823, xvi (472) pp. 6-7 and (318) pp. 4-7. *Railway Commissioners* BPP 1837-8, xxxv, app. b. no. 10, p. 92.

During the last decades of the eighteenth century growth was slow, but iron consumption increased significantly towards the end of the Napoleonic war reflecting the growth of the industry during this period. Consumption slumped dramatically during the post-Napoleonic depression, recovering slowly again during the 1820s and maintaining this level into the 1830s. The railway age was already under way by the late 1830s, so it is probable that iron imports rose during the 1840s. The demand for ironwork for public works was also increasing, so it seems probable that the demand for iron increased during the 1830s and 1840s.

Engineering and foundry work had very gradually increased in Ireland between the 1790s and the 1840s, in response to rising demand in the agricultural and industrial sectors, in domestic household goods, in construction, carriage building and railway engineering. In the north-east, the growth of mechanised linen manufacture in the region created a demand which led to the growth of a more complex machine building industry in Belfast, in addition to creating a demand for steam engines and a wide range of castings. Linen provided the Belfast engineering industry with a more constant and extensive source of demand, which was sufficient to reach the minimum critical mass necessary to establish and sustain a specialist niche. A symbiotic relationship developed so that both engineers and linen manufacturers benefited from working in close proximity to one another. This external economy was similar to that which existed between Lancashire cotton manufacturers and the machine manufacturers of the same region. As Ulster was becoming the leading linen manufacturing district in Europe by the mid-nineteenth century, the flax spinning machine builders also began to build machinery for linen manufacturers in other parts of Europe.

The amount of iron used by farmers was also slowly increasing in the decades before the Famine. Large arable farmers employed draft horses which required the regular attention of blacksmiths; they also employed a range of equipment containing iron parts like ploughs, harrows, reaping machines, grubbers and carts. They also used a range of spades, scythes and other implements which were commonly used by smaller farmers. Much of this equipment contained iron parts which were made or maintained by iron founders and smiths.³⁰

³⁰ Mc Manus, M. O'Kane, S. *Hot Shoes and Heavy Metal* (Ulster Folk and Transport Museum, 1992), pp. 8-10.

II

2a) Agriculture

It has been noted that arable farming was the most important source of demand in the agricultural sector for the work of iron founders and blacksmiths during the first half of the nineteenth century. During the second half of the nineteenth century there was a shift away from arable farming to livestock. Hay making became more important which led to a growth in demand for mowers. In general, agriculture became less labour intensive.

The application of iron equipment and machinery in Irish agriculture accelerated in the post-Famine period, as the cost of labour was rising. Farmers' incomes improved in the long term so they had more capital to invest in machinery. Despite the decline in tillage, the amount of machinery used increased significantly, even on small holdings.³¹ Shoeing horses for agricultural purposes provided the bulk of the demand for the farriers trade. Almost 85% of the horses in Ireland in 1891 were used for agricultural purposes.³² Blacksmiths continued to work on the frontline, constructing and repairing a range of agricultural equipment. Their contribution remained significant as standardisation had not become strongly established by the mid-nineteenth century. In some areas blacksmiths continued building ploughs until well into the present century.³³

Engineering works and foundries tended to specialize according to the demand generated in the region they were located in. Since horse-driven threshing machines were used mostly in the North their manufacture was carried out mostly in northern foundries (two thirds of the threshers in Ireland in the first decade of the twentieth were located in Ulster). Threshing was a very labour intensive activity so with the rise in the cost of labour during the second half of the nineteenth century, their installation became economically more attractive, even for small

³¹ O'Neill, T. 'Tools and Things, Machinery on Irish Farms 1700-1981', in Gailey, A., O'hOgain, D. (eds) *Gold under the Furze* (Dublin, 1982), pp. 101-114.

³² McManus, O'Kane (1992), p. 31.

³³ Watson, (1982), pp. 13-23. Bell and Watson (1986), p. 124.

farmers. The gearing was often designed so that the drive could also be used for running churning or winnowing machinery. Kennedy's of Coleraine became the principal makers of these machines in Ulster during the second half of the nineteenth century. Mowers and reapers were used predominantly in the south so this industry became concentrated in the southern foundries,³⁴ Sheridan of Dublin and Pierce of Wexford being the best known makers.

Up to the 1880s, mowers and reapers were made by a number of smaller engineering works. But by the end of the nineteenth century, Wexford was the only town where mowers and reapers were still being made.³⁵ From the 1860s, Irish agricultural machine makers experienced increased competition from the new machine factories in America and Britain. Arable acreage was declining dramatically which also depressed demand. Employment in the five major Dublin firms which made agricultural machinery had declined to only 50 by 1880. In the mid-1850s, these companies had employed 250 people. Firms therefore increasingly concentrated on sales and repairs rather than manufacturing.³⁶ This pattern is apparent in Cork; by the late 1870s, Perrott's were having difficulties with American and British competition. This malaise seems to have affected almost all of the agricultural machine and implement makers in Ireland. Only a few larger companies like Pierce in Wexford were able to compete with these imports. Even the surviving spade mills in Ireland were finding English competition tough by the mid-1880s. They complained that English manufacturers enjoyed cheaper through rates on the railways which inhibited Irish makers' ability to extend their home trade. But the decline of spade cultivation in most parts of Ireland was probably the main cause of their problems.³⁷

Thompson and Co. of Carlow was one example of a firm which established a successful business importing, selling and repairing machinery. By the 1870s, they acted as agents and

³⁴ Coe (1969), p. 113.

³⁵ Ibid, Power, P. *History of Waterford* (Dublin, 1990), pp. 186-7. R and F. Kean of Cappoquin, Co Waterford for example employed 120 people making mowers, reapers, wheel rakes, churning gears, ploughs, winnowers. These works were connected to the rail network so raw materials could be brought in and finished machinery taken out conveniently. But during the 1880s, Keane's was being out priced by an American competitor who made reapers and binders. They sold out to Pierce of Wexford.

³⁶ Daly, M. *Dublin: The Deposed Capital* (Cork, 1985), p. 34. *Commission on Irish Industry*, BPP 1884-5, ix, app. no. 26, pp. 814-828.

³⁷ Bielenberg (1991), pp. 96-8. *Commission on Irish Industry*, BPP 1884-5, ix, App. no. 26, pp. 814-828.

intermediaries for larger manufacturing firms based in England, installing and servicing their machinery. They sold mowers, reapers and threshing machines and sold parts for Philip Pierce and Co. of Wexford by the 1880s. A major part of their business was installing, altering and repairing millwork for the larger corn mills in the region. They also built up an extensive trade in iron roofing.³⁸

Servicing and repairing machinery was a lucrative trade; by 1912, there were 250,000 ploughs in Ireland, and over 300,000 harrows, 120,000 cultivators and grubbers, 115,000 land rollers, 62,000 seed sowing machines, 97,000 mowers and reapers, 9,000 binders, 65,000 horse rakes, 30,000 threshers and 2,000 combined threshers and finishers, 49,000 winnowers amongst other machines. These and the engines and water-wheels which provided motive power on Irish farms required a significant amount of servicing which Irish firms undertook. But much of the new machines were imported, and only a few manufacturers emerged in Ireland.³⁹

Wexford became the principal centre for the manufacture of agricultural machinery in Ireland during the second half of the nineteenth century, even developing a small export trade.⁴⁰ By the mid-nineteenth century Pierce and Co. had already become the largest manufacturers of threshing machines in Ireland. They also became extensively engaged in the production of ploughs with interchangeable parts; Wexford became the main centre for manufacturing the larger plough types by the end of the nineteenth century, notably wheel ploughs. Around the 1860s, Pierce began making reaping machines which could be used for mowing hay and reaping corn. They subsequently became the largest manufacturers of reaping machines in Ireland.⁴¹ There was a second agricultural machinery works in Wexford by the 1860s, the Selskar Ironworks, which was owned by the Doyle family. This also contributed to the expansion of the industry in Wexford over the next decades.

By 1889, employment at Pierce's had risen to 140 and the company had increased its export

³⁸ National Archives, Dublin; Records of Thomas Thompson and Son, Hanover Works, Carlow. Car 15/29/2, 15/29/4, 15,13/1, 15/36/1, 15/45/1.

³⁹ O'Neill (1982), p. 110.

⁴⁰ Ibid, p. 113.

⁴¹ Bell and Watson (1986), pp. 80-1, 194, 212.

trade.⁴² The business grew dramatically over the following decades, employment rising to 400 by 1911. Employment in the towns engineering industry was further increased when a third works opened in the town in 1893, the Star Works (the Wexford Engineering Company), which specialized in making wheel rakes, swath turners, hay cars, tumbler rakes, mowers, ploughs etc. The Star Ironworks was larger than the Selskar Ironworks and by 1911, it had also developed an export trade.⁴³

Unlike many smaller machine manufacturers in Ireland the Wexford companies could compete comfortably with imports from Britain and America, in addition to competing in foreign markets. Wexford's early success was associated with the proximity of the town to the most important part of the country for tillage farming. Demand was therefore sufficient to sustain production on a scale which was sufficiently large to compete with imports. No doubt, there were external economies for the three works because of their close proximity; an available pool of skilled labour in the town was perhaps the most notable. There may also have been economies in the importation of coke, coal, iron and parts and Wexford was in a good location to import these from Britain at reasonable costs. However, to put this in perspective, it should be noted that Ireland was a net importer of agricultural machinery.

II b) THE RAILWAYS

The construction and maintenance of the railway network was an important source of demand for engineers and iron founders during the second half of the nineteenth century. Dublin, at the hub of the network, became the main centre of railway engineering in Ireland, although smaller

⁴² They had agents all over Ireland at this stage and abroad they had an office in Buenos Aires. Around this time the family, who personally ran the business, decided to employ professional management with the view to improving efficiency at the works. Efforts were being made to improve efficiency within the industry as competition was becoming sharper with many smaller firms closing down. The new management increased discipline and introduced new work practises. This led to conflict with the workers who disliked the introduction of piece work because of the highly seasonal nature of the industry. The skilled fitters and turners also opposed attempts by the management to introduce 'de-skilling'. There were major strikes at the works in 1890 and 1911. Enright, M. *Men of Iron, Wexford Foundry Disputes, 1890 and 1911* (Wexford, 1987), p. 9.

⁴³ *Ibid.*, pp. 18, 33.

centres emerged at Drogheda, Belfast and Dundalk. The first railway workshop was built at Grand Canal Street by the Dublin Kingstown Railway.⁴⁴ A number of carriages, wagons and even a few locomotives were built at the works by the successors of the DKR until the works were closed in 1925.⁴⁵ The DKR was the smallest works in the city. The largest was the GSWR works at Inchicore.

The construction of the Inchicore Works began in 1852. A location close to Dublin was finally chosen because of the availability of skilled labour; convenient access to imported coal, iron and components were also important considerations. Initially the company found it very difficult to recruit skilled labour, so many boiler makers, blacksmiths, and fitters were recruited from Britain.⁴⁶

At first, the works only engaged in the construction and repair of wagons. But slowly the scope and extent of the work done at Inchicore increased. A new wagon shed was built in 1879 and outside purchases in this department were significantly reduced thereafter. 100 locomotives had already been built at Inchicore by this time. The works at this stage could make locomotives for about £400 less than those purchased outside the company. Growth was spectacular during the 1870s, employment rising from 625 people in 1870 to 1,200 in 1879.⁴⁷ Prior to the 1880s, it is evident that the bulk of the components like frames, tubes, wheels, axles, boilers, plates were being imported from England.⁴⁸ The growing self sufficiency of the company thereafter, contributed to the decline of contracts for outside companies like Grendon's in Drogheda.

Initially the company imported engines from private builders in Britain. But after the first engine was built in 1854, the company became more self sufficient; 90% of the 400 engines used by the GSWR between 1852 and 1924 were built at Inchicore. About 75% of the

⁴⁴ Murray, K. *Ireland's First Railway Dublin* (Dublin, 1981), pp. 190, 196, 199, 200, 220, 222.

⁴⁵ Shepherd, E. *The Dublin and South Eastern Railway* (London, 1974), pp. 135, 161-3.

⁴⁶ Murray, p. 172. Geraghty, H. Rigney, P. 'The Engineers' Strike in Inchicore Railway Works, 1902', *Saothar*, ix, (1983), p. 20.

⁴⁷ Daly (1985), p. 36.

⁴⁸ GSWR Locomotive Book, 1873, summary of components of each engine, 1858-1873, in possession of R. Clements, Killadoon, Celbridge, Co Kildare. Grendon's in Drogheda supplied most of the cylinders and a few Dublin companies supplied parts; Hind Dawson and Hardy for example made boiler plates and iron tyres and Mc Garry supplied copper plates.

MGWR's more modest locomotive requirements were built at the Broadstone Works. Usually the first engine of a new design used by the GSWR was purchased from the best makers in England. Thereafter design was characterised by a modest amount of innovation, which was sufficient to make some improvements and economies. Construction at Inchicore was heavily influenced by English practise, most notably from Crewe. Nearly all the chief engineers at Inchicore had worked in English workshops. In the 1860s and 1870s, design and construction practises improved significantly and more standardisation was introduced.⁴⁹ A description of the works in 1878 provides some impression of developments during this period; 'in 1854 the first locomotive engine was built. During the ten following years there were forty engines built in these works. Since 1864 a very considerable amount of machinery of the best kind has been obtained, and considerable additions have been made to both the locomotive shops and those for the building of carriages and waggons. Since 1864, ninety five locomotives had been built in the workshops, and at present from eight to twelve new locomotives can be built in a year, in addition to the ordinary repairs of the working engines. In addition to the ordinary works for the engines, carriages, and waggons, there are now mills where all the timbers and sleepers used on the railway line are cut, and there are creosoting works for preparing sleepers. There are small gas-works which supply gas to the workshops and the terminal at Kingsbridge. All the iron forging are made from scrap iron and heated in a small Siemen's gas furnace, which is supplied with gas made from peat'.⁵⁰

In the last decades of the nineteenth century the size and power of locomotives had to be increased to make them capable of drawing heavier loads, because of the general growth in traffic. The management at the works during this period also began to take a growing interest in improving efficiency at the works. Major efforts were made to rationalize work and management practises. This sometimes led to conflict between management and workers such as the major strike at the works in 1902.⁵¹

⁴⁹ Murray (1981), pp. 146, 154.

⁵⁰ TCD; Gal TT 8 51. *Guide to the City and County of Dublin* (British Association, 1878), p. 89.

⁵¹ Geraghty and Rigney (1983), p. 20.

The size of the company made it economic to introduce the best technology available. By 1913, Inchicore in technical terms, was among the finest railway workshops in the British Isles. The works employed about 1,400 people at this stage. It was the only workshop in Ireland with its own foundry. The company at this stage had built nearly all its own rolling stock, which consisted of 283 locomotives, 885 passenger vehicles and 7,852 goods vehicles.⁵²

BRITAIN	1243.
IRELAND	647.
EUROPE	5.
USA	2.

Source; *Irish Steam Locomotives 1834-1984* (Irish Railway Study Group, 1984).

BCDR	Belfast, Queens Quay	1
BNCR	Belfast, York Road	15
UR, GNR	Belfast,	20
INWR, GNR	Dundalk, Barrack St	3
GNR	Dundalk	34
T. Grendon	Drogheda	42
CBSR	Cork	1
WLR, WLWR	Limerick	6
DKR, DWWR,	Dublin, Grand Canal Street	46
MGWR,	Dublin, Broadstone	104
Wm Spence	Dublin	18
GSRW	Dublin, Inchicore	357
TOTAL		647

Source; *Irish Steam Locomotives 1834-1984* , (Irish Railway Study Group 1984).

⁵² Cairns, J. 'Inchicore Works', *Railway Magazine*, xxxiii, (1913), pp. 265-278. Engine cylinders and turn table centres were the heaviest castings made. The works also did castings and other work for the signals and engineering department.

Inchicore was a-typical of Irish railway workshops. About two-thirds of the locomotives used by the Irish railways between 1841 and 1921 were imported from Britain. This indicates that most of railway companies in Ireland, apart from the MGWR and the GSWR, imported most of their locomotives from Britain. Carriages and wagons were probably predominantly made in Ireland. Dublin dominated the railway engineering industry accounting for over four-fifths of the locomotives built in Ireland between 1841 and 1921 and a large proportion of the carriages and wagons built (see tables 3:2 and 3:3).

Surprisingly, Belfast never emerged as an important centre of railway engineering. The railways did however provide a demand for a wide range of castings for foundries in Belfast. Although some locomotives were built at the Ulster railway workshops in Belfast between the early 1860s and 1882, this early momentum was not sustained. When most of the Ulster railway companies were amalgamated into the GNR in 1876, the new company inherited five workshops. It was decided that all heavy engineering work should be centralised in Dundalk in preference to Belfast.⁵³

The construction of the Dundalk works began in 1880. By 1917 the works employed 700 men and covered an area of 14 acres. They maintained and partially built some of the 204 locomotives, 688 passenger carriages, 5,811 goods wagons and 295 service wagons which the company owned. Iron and steel castings had to be obtained from outside.⁵⁴ The decision of the GNR to locate in Dundalk seems strange in view of Belfast's tradition of engineering. This choice seems to have been made largely because of Dundalk's location at the junction of two of the company's important routes.

Drogheda had Ireland's only independent firm of mainline locomotive builders, Grendon's. The growth of Grendon's in the 1840s and 1850s was largely related to contracts undertaken for railway companies. The engines made by Grendon performed reasonably well in the early 1850s when compared with engines imported from English companies. The cylinders made by

⁵³ Coe (1969), pp. 103-4. PRONI. T. 2385a, Letterbook 1876-84, Mc Keown Ltd, Ironworks. T. Firth and Co., for example, on the Falls Road made switches, crossings, couplings and other rail equipment during the 1860s. Mc Keown Ltd, another Belfast ironworks, supplied alot of this type of work to all the local railway companies in the 1870s and 1880s. In addition, they cast anything from footbridges, girders, carriage side lamp irons, to linen boxes and pork crates.

⁵⁴ Cairns, J. 'Dundalk Works,' *Railway Magazine*, xl, (1917), pp. 159-179.

the company had a very good reputation. Between this time and the early 1890s the company made at least 44 locomotives. The works employed over 300 people in 1860. The company's fortunes had declined somewhat by the 1870s, because of the fall off in demand for railway castings as most lines had been built; many of the railway companies began to build their own rolling stock. With declining orders the company became less competitive. The company struggled on for a few more years, finally closing in the early 1890s.⁵⁵

Courtney Stephens of Dublin fulfilled a large number of engineering and ironwork contracts for the railways during the major period of construction. It also did a wide range of other castings and machinery, employing up to three hundred workers in the 1870s, but it depended heavily on railway contracts; when these declined it went bankrupt in 1884.⁵⁶

Mallet's of Dublin carried out much of the ironwork for the major railway termini in Dublin. They also won some large contracts in Britain against stiff competition; these included the engine shed at Miles Platting near Manchester (subsequently known as the Irish shed), and the large passenger shed at Wakefield which had a span of 95 feet and was 750 feet in length.⁵⁷ By 1854, Mallet's employed between 200 and 300 people. The company depended heavily on the contracts provided by the growth of the railway network. There was a contraction in this type of work by 1860 since the main lines had been built. When Mallet's failed to secure the contract for pipes and other castings for the Dublin Corporation waterworks in 1861, the Victoria Foundry was closed.⁵⁸ The problem for Mallet's and many other southern foundries was that the southern Irish industrial sector only provided a limited demand for foundry and engineering work. So once the railway contracts dried up many of them went out of business. For British foundries and engineering works, demand was more extensive and more constant.

⁵⁵ Clements, R. 'Grendon Locomotives' *Journal of the Irish Railway Record Society*, ix (1969), pp. 63-79. The GSWR had most of their cylinders made by Grendon's. In 1886, Grendon's lost the MGWR cylinder contracts to Ross and Walpole, by which time the GSWR were making their own. Around this time they ceased to acquire contracts from Guinness, for whom they had built a range of machinery.

⁵⁶ Daly (1985), p. 35. This is evident from the company stamp, which is still the most common seen on bridges, water tanks and other railway furniture around Ireland.

⁵⁷ Cox, R. *Robert Mallet 1810-1881* (Dublin, 1982), pp. 85-90.

⁵⁸ *Ibid.*, pp. 85-90. In addition to the Victoria Foundry on Ryder's Row, the company now also had extensive premises on both sides of King's Inns Street. They also leased a premises on the Royal Canal which were used for making bolts and spikes for the railways.

They could therefore operate on a more competitive basis than foundries and engineering works operating in Ireland which depended solely on limited domestic demand.

Once the railways had been built, railway engineering became concentrated in the railway companies workshops. Dublin was therefore able to maintain its dominant position in railway engineering, even though there had been a fall off in the development of engineering works servicing the agricultural and industrial sector. Construction projects and services like gas, water and electricity provided some demand though these tended to be on a small scale. By 1895, the majority of 2,654 workers employed in 35 plants in the engineering sector in Dublin worked in a few large railway workshops. Inchicore employed 1,200 people in 1879, and Broadstone employed over 600 by 1881.⁵⁹

IIc) INDUSTRY

It is no coincidence that engineering was more highly developed in the north-east of Ireland by the end of the nineteenth century, as this area had experienced a greater degree of industrialisation than the rest of the country. The Ulster linen industry contributed to the growth of machine building and engine making in Belfast. As a range of other industries developed in the north-east during the second half of the nineteenth century they too could exploit the services of the Belfast foundry and engineering works.

The milling industry provided a substantial source of demand for provincial engineering works and foundries. The evidence from a major industrial archaeological survey carried out in Northern Ireland indicates that there was a regional division of work among the various firms. The foundries of Kennedy and Moore of Coleraine dominated the millwork carried out in North Derry and North Antrim, judging by stamp marks on surviving water-wheels. The water-wheels of Stevenson and Taylor of Strabane are to be found predominantly in west-Tyrone and Donegal. Mid- and south Antrim were largely dominated by the Kane foundries in Ballymena and Larne and the York Street and Great George's Street foundries of John Rowan

⁵⁹ Daly (1985), pp. 34-5.

and Son. In the Upper Bann and Lagan many of the water-wheels were built by Mc Keown's Grovenof Foundry, Ritchie Hart's Mountpottinger Foundry, Musgrave's St. Anne's Ironworks and Cromac Foundry (all in Belfast), and in Portadown Foundry, or Smith's Lenaderg Foundry near Banbridge. In South Down and in South Armagh Rennie and Lucas of Newry, Baillie of Bessbrook and Manisty of Dundalk were the main companies doing millwork. The industrial archaeologist may find the odd wheel in Ulster made in Dublin, and some from Glasgow or Liverpool. But most of the wheels (and therefore most of the millwork presumably) were done by foundries based in the province.⁶⁰

The limited amount of industrial archeology surveyed in the the south reveals a similar regional pattern. In County Cork, J. Steel and Co. of the Vulcan Foundry seem to have been the dominant firm and their stamp mark is still to be seen on surviving water-wheels in Counties Cork, Kerry and Limerick. But there were other important firms in Cork, like Perrott's Hive Ironworks who also did work outside the county.⁶¹ Robert's of Mountmellick, Thompson's of Carlow, Jacob of Clonmel and Smith of Celbridge were all examples of smaller provincial firms doing millwork.

Dublin's influence was strong all over the south since it was the main iron founding centre. The stamp marks of a few Dublin companies can be found on surviving millwork right across the country. Mallet's made and installed a number of wheels in and around Dublin and in a few locations in the midlands up to the 1860s. The millwork of Byrne's of Dublin and Thos. Sheridan and Co. of the Eagle Foundry can be found as far a field as Co. Galway. Manisty's and Russell, both of Dundalk, dominated Co. Louth and did work in some of the neighbouring counties. But these are only the better known firms. Bowie estimated that there were at least 50 firms of engineers and millwrights doing millwork throughout the country during the nineteenth century.⁶²

⁶⁰ Mc Cutcheon, W. *The Industrial Archaeology of Northern Ireland* (New Jersey, 1984), p. 235.

⁶¹ Bielenberg (Cork, 1991), pp. 95-98.

⁶² Bowie, G. *Watermills, Windmills and Stationary Engines in Ireland* (Unpublished Phd thesis, QUB, 1975) p. 23.

A number of the smaller provincial foundries ran into difficulties in the 1860s and 1870s as the demand for millwork from the corn milling industry and arable farming began to contract considerably. They also suffered from increased foreign competition. Perrott's of Cork for example experienced setbacks during the 1870s. In the 1860s the works employed 190 people; the millwright's shop which had been the largest part of the concern, was closed by the turn of the century. Although the firm continued to do simple castings like railings, gates, buildings columns, pumps, manhole covers, bollards etc., the more remunerative contracts for more complex castings were falling off by the 1870s. Competition from England and America and Wexford began to undermine the sales of agricultural equipment which the company made. The declining industrial base in the region reduced contracts from the industrial sector and many of the larger industrial companies emerging in the region began to get their plant and equipment made by specialist machine makers based in Britain. These problems affected the provincial engineering industry all over Ireland. Improved transport infrastructure and increased integration with the British economy had made it more difficult for general engineering and foundry works (which produced a wide range of household goods, agricultural and industrial equipment) to compete against specialist producers in Britain.⁶³ Ross and Walpole, one of the largest surviving Dublin iron founders by the mid-1880s, attributed the decline of Irish foundries to increased competition from large specialist works in Britain which had a more advantageous location. Cheap through rates on the railways gave the English and Scotch further advantages in Ireland where foundries had also suffered from the decline of other industries like mining, paper and milling.⁶⁴

It was only in the north-east that demand from the industrial sector was sufficient to sustain a healthy engineering sector. Most of the flax spinning machinery was initially made in Manchester and Leeds, but by 1851, production of many of the spinning and preparatory machines had switched to Belfast.⁶⁵ Victor Coates of the Lagan Foundry, was perhaps the

⁶³ Bielenberg (1991), pp. 97-8, 113-5.

⁶⁴ Daniel Miller and Co. Ltd, Church st. Dublin, Ledgers, 1874-1881, 1882-1907. I would like to thank Mr Ennis of Miller and Co. who made these records available and provided me with information on the firm's history. *Commission on Irish Industry*, BPP 1884-5, ix. app. no. 26, pp. 814-828.

⁶⁵ *The Advocate or Irish Industrial Journal*, 23 April 1851. At this stage the five largest foundries employed 1,500 people and three of these made steam engines.

most prominent general engineering and foundry works in Ireland, fulfilling a wide range of contracts.⁶⁶

By the 1870s, two Belfast companies, Victor Coates and Rowan, carried out most of the steam engine construction and maintenance work in Ireland. Coates engined a large number of linen mills and other industrial premises all over Ireland (including the construction and installation of boilers). The firm also did structural work like bridges and other castings for the construction industry including street furniture. They also made and installed water-wheels, mill gearing, rope and strap drums for main driving, and a wide range of castings and machinery for linen bleachers; these included beetling machines, rub boards, wash mills and pumps. Victor Coates supplied plant for breweries, distilleries and other industries in the region. All of these industries required an ongoing maintenance and repair service for their plant and prime movers which Coates provided.⁶⁷ They made turbines from the 1850s onwards, and from the 1880s, they made roller mills and centrifugal flour dressing machinery. It can be seen that the work of the foundry was very general.⁶⁸ Apart from the manufacture of steam engines and boilers they had failed to build up any specialist niche. This situation ultimately led to the company's demise in 1906, as the demand for steam engines had been in decline during the last quarter of the nineteenth century because of the growing use of electric motors, gas and internal combustion engines, which were not made in Ireland.

Firms which specialised in the manufacture of machinery for the linen industry were more successful in the second half of the nineteenth century than those doing general engineering and foundry work. The whole industry was becoming much more competitive and specialization facilitated lower costs and higher standards. Flax spinning and preparing machinery was the

⁶⁶ Ibid, Rebbeck, D. *The History of Iron Shipbuilding on the Queen's Island* (unpublished Phd, QUB, 1950), p. 50. Marmion, A. *The Ancient and Modern History of the Maritime Ports of Ireland* (London, 1855), p. 359. Coates built iron vessels up to the 1860s. In 1851, 250 were employed in the Lagan Foundry. Although they made marine engines for their own boats and for other shipbuilders, they principally made stationary steam engines.

⁶⁷ Coe (1969), pp. 42, 112. Mc Cutcheon, A. *Stationary Steam Engines in Ulster*. (Dublin, n.d.), pp. 5-7. Mc Cutcheon, A. *The Industrial Archaeology of Northern Ireland* (New Jersey, 1984), p. 254, 261, 269, 365. PRONI. D. 1905/3/21, During the rapid growth of the railway network from the 1840s onwards, they also did castings for railway companies; apart from doing general railway castings they made a lot of boilers for locomotives. I would like to thank R. Clements for information on railway boiler making.

⁶⁸ Gribbon, H. *The History of Water-Power in Ulster* (New York, 1969), p. 33. Coe (1969), p. 115. PRONI. D. 1770/3/1, Richardson's Letterbook, 1894-5. In the 1890s, Coates was still doing a wide variety of castings at short notice from the drawings and specifications of local industrialists. John Rowan and Co. was another important engineering firm which made steam engines. By the 1870s, they were the second most important manufacturers of engines in Ireland. But at this stage the market for steam engines began to decline, and the firm (which was badly managed) went bankrupt in 1883.

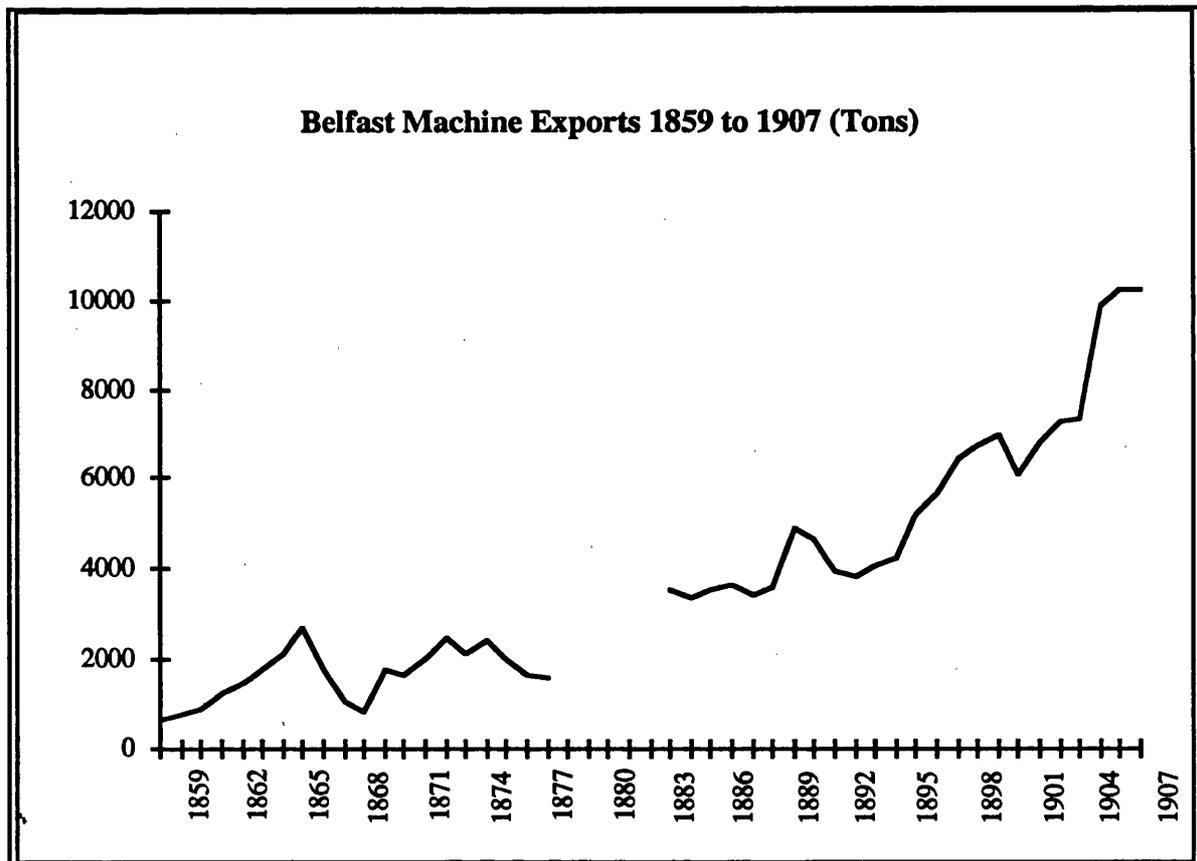


Figure 3:4. Source; National Library, Ir. 387 b. 2. Belfast Harbour Commissioners, Imports and Exports.

first type of equipment which Belfast engineering firms improved and developed themselves in co-operation with local manufacturers. During the second half of the nineteenth century these companies built up an extensive export trade (see figure 3:4).

By far the largest and most successful of these firms was Combe and Barbour of the Falls Foundry. James Combe, a Scotsman, set up this foundry in 1845 to provide castings for the railways. By 1852, the company had expanded into the manufacture of spinning machinery for the linen industry and employed 380 people. Significantly, James Barbour (from the famous linen manufacturing family who became Combe's brother in law) joined the firm in 1851 to do an apprenticeship. When he finished this he became a partner and the firm started trading as Combe and Barbour. Barbour's background undoubtedly assisted the move into the manufacture of machinery for the linen industry; the firm made a number of technological improvements to spinning and preparing machinery including roving frames with expansion

pulleys, double thread faller screws for preparing and spiral type drawing frames. They built up a world wide reputation becoming one of the more important machine makers in the UK.⁶⁹

The Falls Foundry worked in close association with many of the manufacturers in the region. By 1853, hackling machines (for preparing flax for spinning) were being made at the foundry. Around 1856, Combe began to develop a rope drive system for transmitting power from shafts to machinery and ultimately from prime movers to the main shafts. This system proved very efficient compared to the traditional gearing and upright shafts, so it was subsequently widely adopted in a number of textile mills until it was superseded by the arrival of the electric motor. It was one of the most important innovations which Ireland contributed to engineering during the British industrial revolution.⁷⁰ It is evident from the company's sales that its reputation had spread far beyond Ulster by the mid-1860s.

Table 3:5.
LOCATION OF SALES OF COMBE AND BARBOUR IN 1864

ULSTER (OUTSIDE BELFAST)	24.7%
BELFAST	14.7%
REST OF IRELAND	3.9%
SCOTLAND	15.8%
ENGLAND	2.1%
FRANCE, GERMANY, BELGIUM	37.3%
RUSSIA	1.1%
AMERICA	0.4%

These have been calculated by the number of sales, not by value.

Source; PRONI. D. 769/15 Combe Barbour Orderbook, 1860-1870.

By the 1890s, 1,500 were employed at the works. These covered five acres all interconnected with tramlines and cranes so that heavy weights could be carried from place to place and floor to floor.⁷¹ In 1890, the company was incorporated with a nominal capital of £150,000.

Competition in textile machine building was stiff, so in order to reduce competition, the

⁶⁹ Mc Cutcheon, A. *Stationary Steam Engines* (Dublin, n.d.), p. 7. Mc Cutcheon, A. *The Industrial Archaeology of Northern Ireland* (New Jersey, 1984), p. 301. Coe (1969), pp. 41, 63. Ollerenshaw, P. 'Industry 1820-1914', in Kennedy, L. Ollerenshaw P. (eds) *An Economic History of Ulster* (Manchester, 1985) p. 73. Barbour, W. 'Falls Foundry Belfast,' *Textile Quarterly*, vi, (1956), pp. 208-214. By 1882, the firm employed 1,200 people. In the 1880s, Combe, Barbour and Combe started making steam engines for mills, factories and pumping stations all over Ireland, some were sold abroad. After Victor Coates closed down in 1906, they were the only steam engine makers left in Ulster.

⁷⁰ Barbour (1956), pp. 208-214.

⁷¹ Crawford, W. *Industries of the North*, (Belfast, 1987), p. 95. Motive power for all the workshops and departments was provided by a whole series of engines and boilers, and power was transmitted using Combe's rope driving system. It was one of the first premises in Ireland to have electric light installed. The

company joined a combine in 1900 with two Leeds based companies. They began trading as Fairburn, Lawson, Combe and Barbour Ltd.⁷²

Another important textile machine-maker to emerge during the second half of the nineteenth century was James Mackie, a Scotsman. Others of importance were James Reynolds and Co. of the Linfield Foundry, Grosvenor St. They all benefited from the expansion of flax spinning in Ulster down to 1914, in addition to building up substantial export orders.⁷³

Of the other large engineering works which emerged in Belfast which built up an export trade the most notable was Davidson's Sirocco Works (established in 1881), which manufactured tea estate machinery and later heating and ventilation equipment. From the 1850s, Musgrave Brothers also built up an export trade in stoves, patent stable and cow house fittings.⁷⁴

II d) CONCLUSION.

In the mid-nineteenth century, the smaller Irish provincial foundries tended to make a wide range of castings, machinery and implements without specialising. They serviced local corn and flax mills and other industries; in this regard their proximity gave them advantages over firms located on Dublin, Belfast or Britain. They could carry out repairs at short notice for industrialists and farmers, in addition to fulfilling simple castings for local construction. Many of them like Thompson's in Carlow, simply acted as agents for larger specialist machine makers like Pierce in Wexford or firms based in Britain, selling machines and providing a repair and maintenance service. Apart from railway engineering, textile machine building, and

engineering and mechanical departments contained upwards of 900 machine tools and other apparatus, some of which was made specially by the firm for its own use

⁷² Caskey, A. *Entrepreneurs and Industrial Development in Ulster 1850-1914* (Unpublished M. Phil., UU, 1983), pp. 48, 99, 103-4, 147. In 1892, the company had an output of £146,132 and made a trading profit of only £17,116. By 1895 output had fallen to £110,242 and profits fell to a mere £107. The management of the firm paid great attention to the day to day details of running the large works. At board meetings, apart from discussing the finances of the firm, the directors discussed the machinery then being erected, future orders, tenders, orders partially delivered, agents, a comparison between wages paid and machines finished, mixtures in the foundry furnace, the number of spindles and flyers produced from the smith's shop.

⁷³ Coe (1969), pp. 64-5. Mackie took over the Albert Foundry in 1858 where Scrimgeour had previously established a textile machine making business in the early 1840s. Mackie built up a substantial trade in flax preparing and spinning machinery both locally and for export, so the business moved in the 1890s to a larger premises on the Springfield Road.

⁷⁴ *Ibid*, pp. 118-121.

agricultural machinery, the home market was insufficient to sustain large specialist engineering works. As in shipbuilding and marine engineering, the larger type firms which were successful, were those which exported a large part of their output, like Coombe and Barbour and Mackie's of Belfast. But a number of small engineering firms emerged in the larger cities by the end of the nineteenth century, to meet the growing demand for services like plumbing, gas and electricity.

By the end of the nineteenth century, engineering and foundry work had become more specialised. Shipbuilding and textile engineering had become concentrated in Belfast which had become the principal centre for heavy engineering. Railway engineering was largely centred on Dublin. Wexford, Dublin and Belfast became the main manufacturing centres of agricultural machinery. Many of the general engineering and foundry works in the south went into decline during the last quarter of the nineteenth century in the face of competition from specialist producers elsewhere in Ireland and in Britain and America.

Scotland was a more suitable location for general foundry work than Ireland as it had both iron and coal. Lighter castings were increasingly imported from Scotland by the end of the nineteenth century. In engineering, the major advantage that English manufacturers had was that production was on a much larger scale and this factor became more important as the nineteenth century progressed. Irish firms serving only local markets, importing all the raw materials, could never hope to achieve a sufficient critical mass to minimise costs. The concentration of flax spinning in the north-east was one of the few cases where demand was sufficient for Belfast machine makers to build up a specialist niche on the international and domestic market.

The iron and engineering sector experienced limited growth during the second half of the nineteenth century. Employment in this sector as recorded by the census of 1841 and 1911 declined from 43,134 to 36,379 (if machines, tools and implements, harness, iron and steel, copper, tin and zinc, other metals, are included). This fall was more than offset by a significant rise in productivity. Textile machine building and railway engineering were the big growth sectors within the industry. The demand for engineering and foundry work from the

agricultural sector also increased, but much of this machinery was imported. But the services of blacksmiths and engineering works were still needed to service machinery, and carts and shoe horses. The arrival of the railway age increased the demand for horse transport as goods had to be brought to and from the railway stations; more goods were moved overland with the growth of trade. So the farriers trade probably increased overall between the 1840s and the turn of the century. The number of horses employed in Irish agriculture increased from 363,492 in 1891 to 401,951 in 1939, so there is no evidence of any decline in this sphere.⁷⁵ Railway engineering definitely increased its output over the period in question. In the industrial sector (including work for the construction industry and civil engineering contracts) growth seems probable. It would seem probable that any decline in demand from agriculture (and even this has not been clearly established) was more than offset by a growth in engineering works which were meeting the growth in demand from the industrial and service sectors (notably railway engineering in Dublin and textile engineering in Belfast).

⁷⁵ McManus, O'Kane, p. 8.

Chapter Four

SHIPBUILDING

I

Shipbuilding was widely dispersed around the Irish coastline at the beginning of nineteenth century. By the end of the century, it had become concentrated predominantly in Belfast. Small timber vessels were built in many of the minor ports, while larger trading vessels were built in Dublin, Cork and Belfast. But the scale and output of the industry remained small during the first half of the nineteenth century. The capital costs of setting up a yard were not prohibitive at the beginning of the century since ships were built on a slip in the open air and craftsmen provided many of the tools. Morton, an extensive Dublin builder for example, set up a yard for less than £5,000 in 1812. Dublin was the largest centre of the industry at this time. There were five shipbuilders in the port employing about 400 shipwrights. But the industry rapidly declined over the next decades; by 1838 there were still 4 shipbuilders, but only about 100 shipwrights were still employed, work being confined to the construction of smaller vessels and repair work.¹

County Cork emerged as the most important centre of the industry in the decades after the Napoleonic War. The trade of the port and the British naval presence created a demand for shipbuilding and repair work. The extensive fishing industry in Co. Cork also provided a demand for boat building in the smaller ports of Baltimore, Kinsale, Bantry and Glandore.²

Shipbuilding facilities in Cork remained fairly primitive until the 1830s. A period of pronounced investment in the industry in the harbour began in the late 1820s; Knight and Wheeler's yards in Glanmire had patent slips and cranes installed at this time so vessels previously sent to England for repairs could now be serviced in the harbour. Brown built a large dry dock at Passage in the mid-1830s. Already in 1815, a Passage based company,

¹ Pollard, S. Robertson, P. *The British Shipbuilding Industry* (London, 1979), p. 67.
Webb, J. *Industrial Dublin since 1698* (Dublin, 1913), pp. 81-4.

² Bielenberg, A. *Cork's Industrial Revolution* (Cork, 1991), pp. 103-113.

Hennessy's, had built the first Irish paddle steamer. A second paddle steamer was built shortly after which was engined at the Hive Iron Works. This was the first Irish made marine engine. By the end of the 1830s, Cork's reputation as a shipbuilding centre was improving. Most of the timber ships built in the port and harbour were built by two companies, Brown at Passage, and Robinson and Co. of the Waterside Dockyards in the port. Brown's business at Passage continued expanding in the 1830s and 1840s. But it is clear that the yards in the port were more innovative; from the mid-1840s they began building in iron which was transforming the scale and complexity of the industry in the British Isles. Lecky built the first iron hulled vessel in the port in 1844 at the yards of the Cork Steam Ship Company. This company continued expanding over the following decade. Robinson's (established in 1830) was the largest and most successful company in Cork by the mid-nineteenth century. Initially they built large timber sailing ships, subsequently building screw steamers and paddle steamers.³

Table 4:1.

VESSELS BUILT IN IRISH PORTS 1814-1826 (TONS)

	1814	1817	1820	1823	1826
CORK	217	625	215	344	1095
BELFAST	232	475	323	112	364
DUBLIN	510	105	240	173	157
NEWRY	70	24	132	44	311
LIMERICK	130	-	35	-	304
BALTIMORE	90	29	47	135	119
WATERFORD	-	17	-	89	187
YOUGHAL	20	325	62	27	-
KINSALE	156	757	237	111	-
GALWAY	13	-	45	93	83
OTHERS	348	257	312	122	33
TOTAL	1973	3126	1684	1659	2653

Source; Moreau, C. *Past and Present State of Ireland*. (Dublin, 1827), p. 19.

³ Ibid., pp. 103-113.

After the Napoleonic war, Belfast emerged as the second centre of the shipbuilding industry in Ireland. William Ritchie had set up the first shipyard of any consequence on the banks of the Lagan in 1791. Ritchie came from Scotland bringing ten men from Ayrshire where he had previously run a yard. Another member of the family set up a second yard in the harbour at the end of the eighteenth century. By 1812 ships of up to 400 tons burden were being built in Belfast.⁴ The first steamboat made in the harbour was launched in 1820. It was engined by Coates and Young who subsequently built a number of marine engines for shipbuilders in the harbour, including those for a 750 ton paddle steamer launched in 1838 by Connell and Sons (the successor of one of the Ritchie yards). This was the largest ship yet built in Ireland. In that year Coates and Young also launched the first iron steamboat in Ireland, and over the next decades the company built a number of iron hulled boats. Larger timber shipbuilders continued operating in the port during this period. These included Ritchie and Mc Laine, Charles Connell and Sons and Thompson and Kirwan.⁵ But it was in iron shipbuilding that Belfast came to dominate the industry during the second half of the nineteenth century.

Shipbuilding in both Cork and Belfast was slowly expanding during the period between 1790 and 1845. The available statistics on the tonnage built in Ireland suggest that there was a small increase in the amount of tonnage built in Ireland during this period despite considerable fluctuations.

Table 4:2.
TONNAGE BUILT IN IRELAND

1794	1,441
1804	1,611
1814	1,973
1824	1,376
1834	2,521
1844	3,564

Source; O' Brien, G. *Economic History of Ireland Between the Union and the Famine* (London, 1921), p. 367.

⁴ Moss, M. Hume, J. *Shipbuilders to the World; 125 years of Harland and Wolff* (Belfast, 1986), pp. 1-2.

⁵ Rebbeck, D. *The History of Iron Shipbuilding on the Queen's Island* (Unpublished PhD, QUB, 1950) pp. 36-53.

II

During the second half of the nineteenth century the extent and organisation of the Irish shipbuilding industry experienced a dramatic transformation. The industry became predominantly concentrated in the growing industrial town of Belfast, and by the end of the century it was the second industry of the north-east after linen.

The foundation of the first major iron shipbuilding venture, which had more than just a regional significance, began on the Queen's island in Belfast during the 1850s. This island had come into being because of the major improvements which the Harbour Commissioners had made to the port between the late 1830s and the mid-1850s. The public authorities played an important role in assisting the growth of iron shipbuilding in Belfast by providing a suitable location for launching ships, in contrast to Dublin or Liverpool where shipbuilders were squeezed out by dock development.

The growth of a successful iron shipyard took place after a number of noble failures, which were initiated by Liverpool entrepreneurs. A well equipped ironworks and foundry was established on the Queen's island by a Liverpool engineer at a cost of £25,000; in 1851 the first boiler plate to be rolled in Ireland was made here. But it was difficult to make a commercial success of the works since it was cheaper to import British iron.⁶ Robert Hickson, another Liverpool engineer, took over the works in 1853 and it was subsequently decided that a shipyard established on the island might provide the demand for iron, which was lacking. The Harbour Commissioners eagerly supported this scheme by providing more land. Between 1854 and 1859, Hickson built 8 vessels there predominantly for Liverpool owners. Late in 1854, Hickson appointed a new manager, Edward Harland since his own knowledge of shipbuilding was limited.⁷ Harland's influence on the future of the Belfast industry was decisive.

⁶ Rebbeck (1950), pp. 50-55.

⁷ Moss, Hume (1986), pp. 11-12.

HARLAND AND WOLFF

Edward Harland was only 23 years of age when he acquired the job as manager in Hickson's yard in Belfast. But he already had an impressive range of working experience within engineering and shipbuilding. His father was a talented amateur engineer and a close friend of George Stephenson, the railway engineer. This family connection enabled him to secure an apprenticeship at the engineering works of Robert Stephenson and Co. of Newcastle Upon Tyne, this provided him with a thorough grounding in the most advanced practises in iron working and drawing. He had already developed an interest in marine engineering and shipbuilding by the end of his apprenticeship and his first job as a journeyman was with a shipbuilding company on the Clyde. He acquired this job through the family connection with a Liverpool shipping magnate, Gustav Schwabe. Shortly afterwards he was appointed to the position of head draughtsman. Harland spent two years on the Clyde, during which he became thoroughly acquainted with the techniques applied by the more important yards on the river. In 1853, he moved briefly to a shipyard in Newcastle Upon Tyne to take up the post of manager, and in the following year he took up Hickson's job in Belfast. He therefore had eight years experience in engineering and iron shipbuilding in Britain before his arrival at Hickson's yard.⁸

Hickson's business was experiencing on-going financial difficulties; in 1858, his financial resources were insufficient to ride out a recession in the industry. He offered Harland his entire interest in the yard and plant for £5,000. Harland accepted with the financial backing of Schwabe who also seems to have been instrumental in securing contracts for the company to build ships for John Bibby and Sons of Liverpool. These vessels were well turned out, so Bibby made further orders. The growing involvement with Liverpool shipping interests laid the basis for Harland's reputation. The rapidly expanding Liverpool shipping business provided both the demand and capital which enabled Harland's new company to expand. Skilled labour drawn from the Clyde and Newcastle was also a critical factor in the development of the yard. Among those taken on was Schwabe's nephew, Gustav Wolff, who became a personal assistant to Harland in 1857. This engagement was probably made to return some of

⁸ Ibid., pp. 12-19.

Schwabe's favours to Harland; it also seems probable that it had a significant influence on the financial commitments which Schwabe subsequently made to the company, quite apart from the contracts he secured for it. In 1861, Harland entered into a partnership with Wolff and by the following year the capital of the company had risen to almost £23,000. Over the next years the capital of the company rose to over £96,000, reflecting the rapid growth of the yard.⁹

Harland and Wolff was well established by the mid-1860s; it was therefore in a good position to take advantage of the rising demand for shipping in the UK resulting from the growth of world trade. The UK accounted for about one third of the world's tonnage during the second half of the nineteenth century. The Bibby Line of Liverpool provided the orders which stabilised the business, while the White Star Line of Liverpool provided the really important orders for the firm between 1870 and the First World War.¹⁰ The yard accounted for the bulk of the growth in tonnage launched in Ireland between 1860 and the end of the nineteenth century, by which time a second large company was emerging in Belfast, Workman and Clarke.

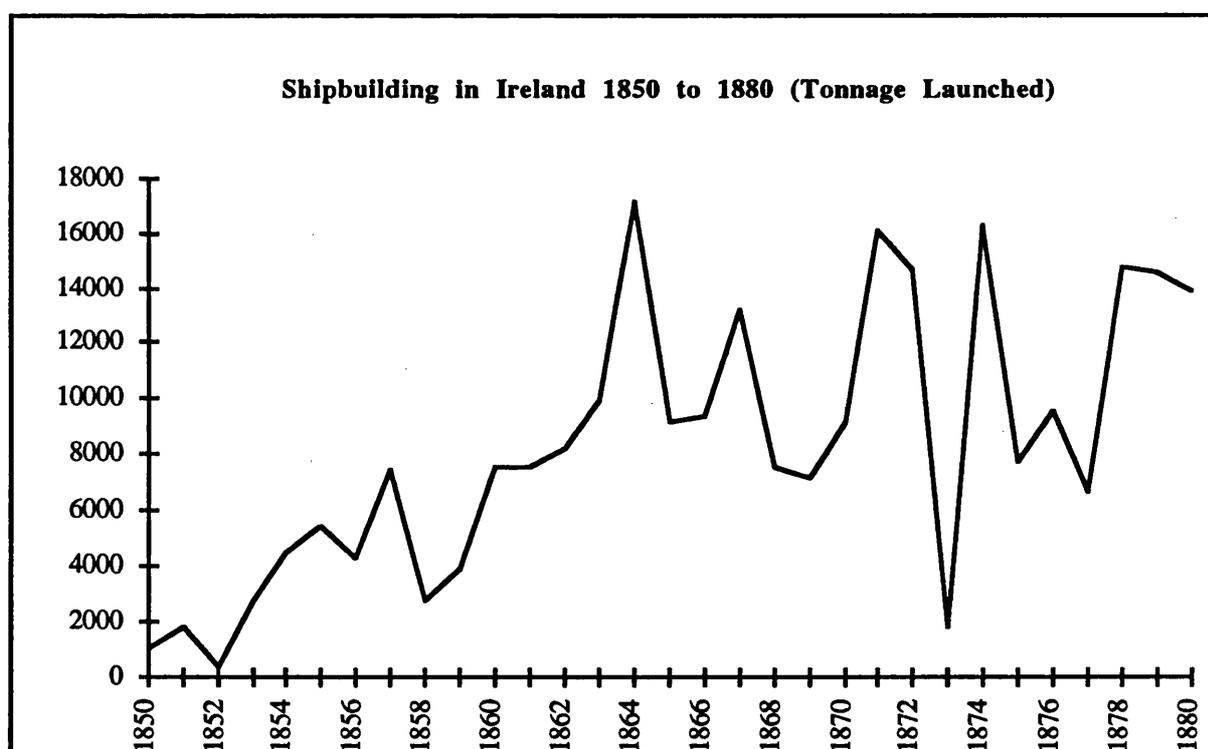


Figure 4:3. Source; Oldham, C.H. 'The History of Belfast Shipbuilding,' *Statistical Society of Ireland*, xii (1911), p. 430.

⁹ Ibid, pp. 16-22. Rebbeck (1950), p. 100.

¹⁰ Ollerenshaw, P. 'Industry 1820-1914', Ollerenshaw, P. Kennedy, L. (eds), *The Economic History of Ulster 1820-1939* (Manchester, 1985), pp. 90-1.

Harland was one of the pioneers in the construction of large iron ships, breaking away from the limitations imposed by the use of timber. He developed the theory that iron vessels could be increased in length without any corresponding increase in the beam; this increased the capacity of a vessel without any significant increase in the cost of engines and fuel. The greater strength required by these vessels could be achieved by making up the entire deck of iron and the spaces between the frames were filled with portland cement.¹¹

From the mid-1870s, the management of the firm gradually passed into the hands of W.J. Pirrie and the Wilson brothers. The financial input of the two older partners remained important, notably when the large new engine works were built in 1879-80 at a cost of £60,000. Harland was still the principal shareholder when Harland and Wolff was registered as a limited liability company in 1885. The capital of the company was £297,500, excluding loans amounting to £22,432. Pirrie soon emerged as the new leader of the company. He had a strong ability to win orders, assisted no doubt, by strong family connections with Liverpool which had been so vital to the growth of Harland and Wolff. The team running the company during these years combined specialists in different spheres of engineering and management. Harland was at the forefront of the science and technology of shipbuilding; Wilson was a more practical naval architect; Wolff was a financier with the right connections in Liverpool; Pirrie, built up a whole network of connection within the industry through a range of directorships he held which enabled him to win many orders for the firm.¹²

From about 1890, the company devised a radical new method of selling ships for the cost of construction plus a fixed commission. These terms were offered to a select group of Harland and Wolff's larger customers (known as the commission club) who agreed to place all their UK repair work with them. This brought the yard a huge volume of trade.¹³ Because a large output was maintained, Harland and Wolff was able to gain economies of scale and keep costs

¹¹ Oldham (1911), pp. 421-2.

¹² Moss and Hume (1986), pp. 36-54. Coe, W. *The Engineering Industry of Northern Ireland* (Plymouth, 1969), p. 197.

¹³ Moss and Hume (1986), pp. 36-67.

down. The company achieved sufficient levels of productivity to compete in the UK market by continually reinvesting in refitting the yard with the best available technology.

Harland and Wolff employed 7,045 people in its shipyard and 2,429 people in the engine works at the end of 1907. It was the largest shipyard in the world. Labour relations were obviously an important consideration as strikes could cripple the business. Harland and Wolff was unconventional in this respect; the company refused to participate in a national lockout in 1897 and also refused to join the Shipbuilders Employers' Federation. In 1897 management conceded a shorter working day and the workers accepted a three shift system. Work could now be done around the clock which enabled the company to meet the large orders gained by the commission club and maintain a higher output than its competitors.¹⁴

Harland and Wolff remained at the forefront of the application of new designs during this period. The company built up a reputation for technical excellence and economy. The large passenger liners it began to build for the growing trans-Atlantic passenger trade were designed to be more comfortable than earlier liners. This was achieved by improving passengers' quarters and by installing engines with less vibration and greater power so the time of voyages could be reduced. The firm began making engines for their vessels in 1880, when a new engine works and boiler shop was opened. The company also made some important improvements in this sphere by reducing fuel and repair costs. They successfully introduced the surface condenser so that steam could be condensed and returned to the boiler without using salt water internally which avoided 'salting up'. The improvements they made to reciprocating engines on the 'balance' principle reduced vibration. They also introduced a fuel saving arrangement around 1907 whereby high pressure steam first drove reciprocating engines working the wing propellers and then passed into a low pressure turbine which drove the main propeller.¹⁵ To gain access to the latest turbine technology Pirrie managed to make an arrangement whereby Harland and Wolff exchanged shares with John Brown and Co. of Glasgow who were in the forefront of developments in this sphere.¹⁶ These kinds of deals were critical in maintaining the company's competitive edge in design and performance.

¹⁴ Ibid., pp. 91, 133.

¹⁵ Oldham (1911), pp. 422-3.

¹⁶ Moss and Hume (1986), p. 135.

The company also benefited from the assistance and cooperation of the Harbour Board which built a number of graving docks and other facilities which it used. This close relationship continued throughout the nineteenth century. When the Harbour Commissioners refused to lease more land to the firm in 1899, Harland and Wolff acquired facilities in Southampton, Liverpool and Glasgow.¹⁷ In view of the repair contracts gained by the commission club arrangement, the growth of new facilities in Britain was strategically useful. In order to win orders during the preceding decades Harland and Wolff had also been obliged to purchase shares in a range of shipping interests. At one stage (in 1904) the company had over one million pounds invested in the International Mercantile Marine Shipping Syndicate. Pirrie became involved in the formation of this large combine in order to defend orders within its commission club.¹⁸

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The external economies of Belfast's growing shipbuilding and engineering industry seems to have been an important factor in the emergence of a second major firm of shipbuilders in the city during this era. Significantly, Workman Clark and Co. was established in 1880 by two former employees of Harland and Wolff. They could take advantage of the large pool of skilled and unskilled labour available in the city with experience in shipbuilding. In contrast to Harland and Wolff, the company initially developed connections with Glasgow shipping interests rather than Liverpool, although its customers subsequently became more diverse and broadly spread geographically. The development of this yard in the last decades of the century is apparent from employment figures which rose from 150 in 1880 to 7000 by 1902. Initially this company had all their vessels engined on the Clyde, but in 1893 they took over the engineering works of MacIlwaine and MacColl from where they built their own engines.¹⁹ After the turn of the century the tonnage launched by Workman and Clark was sometimes greater than the larger rival yard.

The scale of the yards in Belfast meant that large amounts of skilled, semi-skilled and unskilled labour was needed. The cost of labour was therefore also of great importance in

¹⁷ Pollard, S. Robertson, P. *The British Shipbuilding Industry 1870-1914* (London, 1979), p. 67.

¹⁸ Moss and Hume (1986), p. 122.

¹⁹ Ollerenshaw (1985), pp. 94-5.

establishing the firm's competitiveness within the UK industry, particularly during the second half of the nineteenth century. While skilled labour costs were not cheaper in Belfast, semi-skilled and unskilled labour was cheaper. Geary and Johnson argue that Belfast's comparative advantage lay in its abundant supply of cheap unskilled labour. The table below lends some support to their hypothesis. Of the four great shipbuilding centres which emerged by the end of the nineteenth century (Clydeside, Newcastle, Sunderland and Belfast), Belfast was the cheapest in terms of the average cost of labour.²⁰

Table 4:4.

**Wage Indices of Eight Maritime Districts, Shipbuilding and Engineering
(all districts, 1883=100)**

District	1866-72	1883-89	1900-06
Mersey	96	102	119
Tyne	88	103	116
Wear	93	105	114
Hull	90	98	110
Clyde	90	95	111
Belfast	78	91	109
Barrow	80	90	104
Dundee	71	87	99

Source; Pollard, S. Robertson, P. *The British Shipbuilding Industry 1870-1914* (London, 1979).

Relative to the rest of the UK, rents and unskilled labour were cheap in Belfast. With adequate organisation and the use of the appropriate technologies, much of the work associated with iron and steel ship construction could be undertaken by semi-skilled labour. It was therefore not difficult to train up men in Belfast, which had already built up a significant engineering capacity by the 1870s. Although coal, iron and steel had to be imported largely from England and Scotland, the cost of ocean freight for bulk goods was not prohibitive. Belfast could therefore enjoy close links with the coal mines and iron and steel makers located in Northern England and Scotland. Against a background of rising world trade, engineering ability and capital formation, Pollard and Robertson identify proximity to major shipping centres, cheap supplies of iron, steel, coal and machinery and the labour supply as the major factors which made the

²⁰ Geary, F. and Johnson, W. 'Shipbuilding in Belfast, 1861-1986,' *Irish Economic and Social History*, xvi (1989), p. 51, 63.

rivers in the north of England and Scotland attractive to shipbuilders.²¹ The Belfast shipbuilding industry was very much linked into this concentration of heavy engineering in northern Britain which was based on cheap supplies of iron, steel and coal so it enjoyed all the advantages of the other shipbuilders in this region. When this is taken together with the comparative advantage which Johnson and Geary argue Belfast enjoyed in terms of cheap labour, it can be seen that the conditions for the growth of iron shipbuilding in Belfast were not un-promising. But it took entrepreneurs with flare and technical ability to capitalise on these opportunities.

Outside Belfast, there was no sustained development in shipbuilding during the second half of the nineteenth century. The Cork and Waterford shipbuilders went into decline from the 1860s. Their orders had come predominantly from local shipping interests which were insufficient to maintain the development of the industry.²² In Dublin, the development of shipbuilding was sporadic, depending predominantly on local orders and repairs of little consequence. It therefore lacked the critical mass achieved in the Belfast industry. The firms involved in ship repairs in Dublin frequently had to import skilled labour from Belfast or Britain as work was too intermittent to keep artisans permanently employed.²³

The output of the industry increased significantly during the second half of the nineteenth century, particularly in the last decades of the century when the expansion of Harland and Wolff was accompanied by the growth of Workman and Clarke (see figure 4:5). It was undoubtedly the fastest growing industry in Ireland during the second half of the nineteenth century.

²¹ Pollard and Robertson (1979), p. 57.

²² Bielenberg, A. *Cork's Industrial Revolution 1780-1880* (Cork, 1991), pp. 111-3. Power, P. *History of Waterford City and County* (Dublin, 1990), pp. 182-3.

²³ Smellie, J. *Shipbuilding and Repairing in Dublin* (Glasgow, 1920), p. iii.

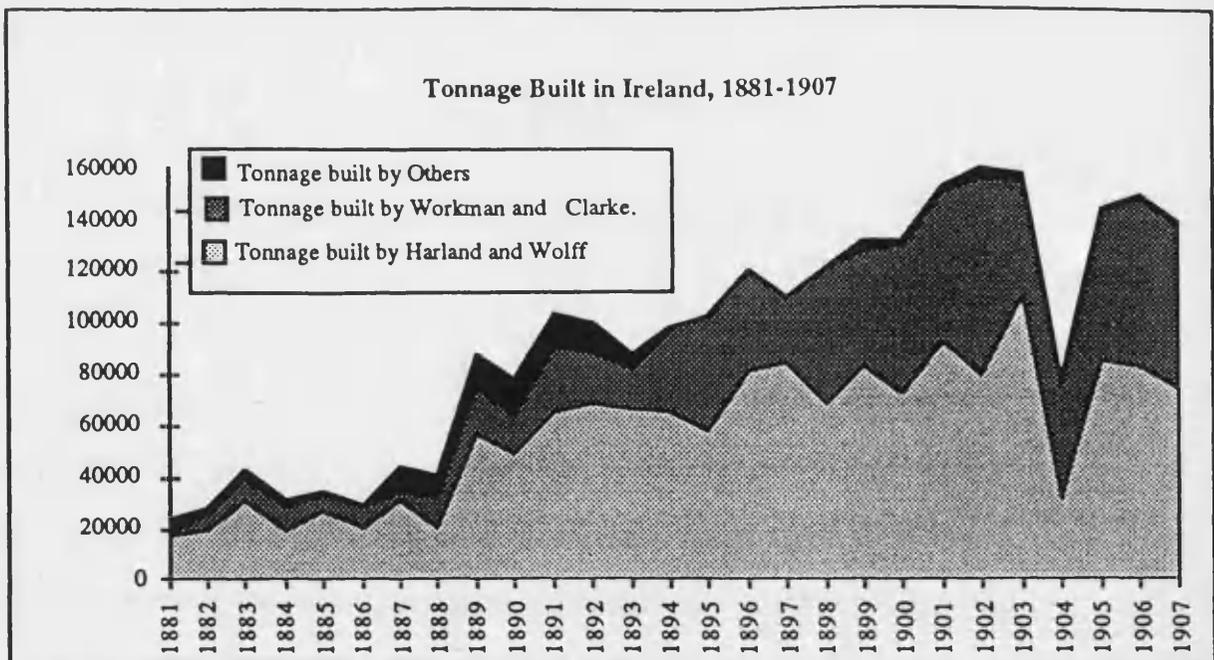


Figure 4:5. Source; Oldham, C. 'The History of Belfast Shipbuilding', *Statistical Society of Ireland*, (1911), p. 431. Moss, M. Hume, J. *Shipbuilders to the World, 125 years of Harland and Wolff* (Belfast, 1986), p. 510, 513. Workman and Clarke, *Shipbuilding at Belfast, 1880-1933* (Belfast, 1928), p. 21

Chapter Five

THE WOOLLEN INDUSTRY

I

The growth of the Irish population during the eighteenth century led to an increase in the demand for woollens, which were the most commonly worn fabric. Ireland had an extensive woollen industry during the eighteenth century, although British imports of finer woollens increased throughout the century, particularly during the last decades. A large part of the Irish industry was rural and cottage based, producing a regionally varied coarse range of cloth. A more specialist craft-based industry producing finer woollens had developed in a number of towns.

Dublin was the principal manufacturing centre for finer woollens during the eighteenth century, and remained so until the second half of the nineteenth century when it was displaced by Cork. Dublin was also an important finishing and marketing centre for woollens made in rural Ireland. When trade was good, up to 10,000 people were engaged in the woollen and silk industries in the city. Outside Dublin, the traditional urban strongholds of the industry were Cork and Bandon, which specialised in camblents; Kilkenny, which specialised in blankets and Carrick-on-Suir, which was noted for ratteens.¹ Other centres included Maryborough and Mountmellick in the midlands, and Blarney, Newmarket, Doneraile and Castlemartyr which were all in Co. Cork. Thus, the more commercially oriented manufacturing sector of the industry was strongly centred in Leinster and Munster during the eighteenth century.

As the British industry became more mechanised from the 1770s onwards, British imports increased and the urban based craft industry in Ireland experienced reversals.

¹ Dickson, D. *New Foundations; Ireland 1660-1800* (Dublin, 1987), pp. 123-5. Dickson, D. 'The Place of Dublin in the Eighteenth Century Irish Economy', in Dickson, D. and Devine, T.(eds) *Ireland and Scotland 1600-1850* (Edinburgh, 1983), p. 182.

In addition, the cost of Irish wool was increasing. By introducing new carding and spinning machinery, manufacturers in the Yorkshire region in particular, increased their market share by making coarse quality broad and narrow cloths using low grade wool. Yorkshire's share of the output of the English industry rose from 20% to about 60% during the eighteenth century.² In the West of England a number of larger capitalists concentrated on making finer quality cloths. In their respective fields these two regions were among the most advanced in Europe.

The competitiveness of the British industry led to a contraction in the urban strongholds of the industry in Ireland during the last third of the eighteenth century.

Table 5:1.

**IRISH IMPORTS OF WOOLLENS
(YARDS) 1779-1835**

1779	447,033
1783	792,286
1788	1,211,465
1796	1,661,077
1800	3,498,969
1821	1,317,634
1825	3,384,918
1835	7,884,000

SOURCE; Lord Sheffield, *Observations on the Manufactures of Ireland* (Dublin, 1785), p. 161. Murray, A. *History of the Commercial Relations. Between GB and Ireland* (London, 1903), p. 269. *Report of Railway Commissioners*, BPP 1937-8, xxxv, app. B, no. 10, p. 92.

In 1783, the Cork woollen manufacturers complained that their trade was declining for a number of years because of 'the amazing influx of foreign goods'. The manufacturers in Dublin and Carrick also sought protection from British competition.³ Employment in

² Jeremy, D. *Transatlantic Industrial Revolution* (Oxford, 1981) p. 19. Hudson, P. *The Industrial Revolution* (New York, 1992) p. 116.

³ *Petitions from Woollen Manufacturers*, 15, 18, November 1783, Irish Commons Journal, 1783-5, xi.

all the major centres of the industry had declined by the end of the eighteenth century.⁴ In Cork city, there had been about 2,000 looms working on camblets alone in 1755, but with the decline of this trade the total number of woollen looms had fallen to 457 by 1800. There was a similar decline in Bandon.⁵ In Kilkenny by the turn of the century, there were only about 50 looms in constant work making blankets, with 780 employed in the different branches.⁶

The much coarser cloth produced by the domestic cottage industry proved to be more resilient. Much of it was made up for home use, but a large surplus was sold at fairs and local markets; some domestic producers made most of their output for the market. Although the yarn trade (based on exports to the British woollen manufacturing districts) declined after the 1760s, the domestic manufacture of coarse cloth worn by most of the peasantry continued to expand. According to Cullen, the total output of new drapery by the 1770s was in the region of nine to ten million yards.⁷

The domestic manufacture of coarse cloth like frieze and flannel was still increasing at the turn of the century. Newenham, writing in 1805, noted that even though the manufacture of the finer types of cloth had not increased, the manufacture of coarser types certainly had. He pointed out that:

'the greater part of the wool produced in Ireland is consumed by the lower orders of the country people, who generally speaking, get it manufactured at home for their own use'. Wallace noted in 1798 that women wore woollen clothing from head to foot, while the men wore woollen waist-coats, coats, and over these they wore big woollen great coats.⁸

⁴ Mason, S. *A Statistical Account of Ireland* (Dublin, 1814-19), ii, p. 119. Clarkson, L. 'The Carrick on Suir Woollen Industry' *Irish Economic and Social History*, xvi (1989), p. 33. In Carrick, up to 3,000 people were employed prior to the decline of the industry, but by 1800 the number had fallen to roughly 2,000.

⁵ *Report of the Committee on the state of Manufactures*, Irish Commons Journal, xi, 1784, App. pp. cli-clii, . Sullivan, W. *The Economic History of Cork* (Cork, 1937), p. 243.

⁶ Tighe, W. *Statistical Observations Relative to County Kilkenny* (Dublin, 1802), pp. 543-8.

⁷ Cullen, L. *An Economic History of Ireland since 1660* (London, 1972), p. 65. Since there are no footnotes in this book it is unclear how Cullen arrived at this figure.

⁸ O'Brien, G. *The Economic History of Ireland from the Union to the Famine* (London, 1921), p.298.

There were significant regional variations in the cottage-based industry. It never became established to any great extent in east-Ulster. In west-Ulster at the turn of the century farmers made up coarse woollens for their own use but labourers purchased Connaught frieze in the shops; an indication of the existence of an inter-regional trade in domestically manufactured woollens between Connaught and Ulster.⁹

Connaught was the principal wool growing region in Ireland. There was an extensive domestic industry both for home use and for commercial purposes. Frieze, flannels and cadow blankets were made in the Galway area which were sold locally. In most of Connaught women wore home-made frieze and flannels and woollen stockings. Only on Sunday or other special occasions did they wear more refined woollens or colourful linen or cotton fabrics.¹⁰ The domestic manufacture survived in Connaught until well into the nineteenth century. There was still no woollen factory in the province by 1850. Much of the cheap coarse cloths made there were sold outside the province. According to Lewis writing in 1837:

'Coarse Woollen cloths and friezes are made for domestic use, and a very extensive trade is carried on in the purchase of flannels, druggets, stockings and other fabrics of Connaught manufacture. Merchants from many parts of Ireland, but particularly from Ulster, come to Sligo to meet the Connaught factors'.

There were similar markets at Westport, Castlebar, Loughrea and Galway.¹¹ Although a certain amount of Connaught woollen goods were being sold outside the province, British woollens were already beginning to undermine this trade by the 1830s.

In Munster, Counties Cork and Waterford were the most important centres of the industry. In the former, serge, flannels and friezes were made up by the country people

⁹ Mc Evoy, J. *Statistical Survey of Tyrone* (Dublin, 1802), p. 152. Sampson, R. *Statistical Survey of Londonderry* (Dublin, 1802) p. 404. Mc Pharlan, J. *Statistical Survey of Donegal* (Dublin, 1802), p. 404.

¹⁰ Dutton, H. *Statistical Survey of Co Galway* (Dublin, 1824), p. 426, 424, 353. Mc Pharlan, J. *Statistical Survey of Sligo* (Dublin, 1802), p. 72. Mc Pharlan, J. *Statistical Survey of Leitrim* (Dublin, 1802), p. 63. Mc Pharlan, J. *Statistical Survey of Mayo* (Dublin, 1802), p. 109. Atkinson, S. *Irish Wool and Woollens* (Dublin, 1882), p. 87.

¹¹ Lewis, S. *Topographical Dictionary of Ireland* (London, 1837), ii, p. 566, 356.

for home use and for commercial purposes. About half of Ireland's combing wool was combed in the Cork region by cottage-based combers. Although the woollen industry had declined in Bandon by the turn of the century, the country people still took their home-made friezes to the town to be finished.¹² Clare had some small manufacturing establishments centred largely in Ennis, making blankets, coatings, serges, and beavers which were sold locally and in Limerick. At Ennistymon and Corofin there was an extensive manufacture of stockings which were sold in Dublin and the north. Home-made frieze was the most common clothing worn in the county. The 15 tuck mills (for fulling cloth) in the county in 1808 reflect the extent of the domestic industry there.¹³

The domestic industry was also to be found in Leinster. In Meath and Westmeath cloth was made up for home consumption.¹⁴ In Wicklow and Wexford frieze and ratteens were made for home use, the surplus being sold at fairs and markets. In south-Wicklow and Wexford it was estimated that about 3,000 people worked in the flannel trade on a domestic basis producing about £54,600 worth of cloth in 1822.¹⁵ In King's County frieze and stuff were made for home use, while worsted yarn, cloth and serge were made up for the market.¹⁶

From this brief survey it seems evident that the domestic woollen industry was still important until well after the turn of the century. It is probable that even as late as the 1820s, more domestically produced cloth was sold on the market than either English imports or cloth made by Irish manufacturers. According to one witness who gave evidence to the Revenue Commissioners in 1822, at least 100,000 people were employed in the domestic woollen industry, compared to just over 6,000 employed by

¹² *Ibid.*, vol. 1, p. 179, 409. Townsend, H. *Statistical Survey of Cork* (Dublin, 1810), p. 254, 417, 427, 367.

¹³ Dutton, H. *Statistical Survey of Clare* (Dublin, 1808), pp. 261, 264-5, 205, 179.

¹⁴ Thompson, R. *Statistical Survey of Co Meath* (Dublin, 1802), p. 391. Mason, ii, p. 294, 304.

¹⁵ *Fourth Report on Revenue in Ireland*, BPP 1822, xiii, app. no. 21-23, pp. 167-187.

¹⁶ Coote, C. *Statistical Survey of King's County* (Dublin, 1801), p. 164, 177.

manufacturers.¹⁷ The bulk of the demand for woollens in Ireland was for cheap coarse cloths which the domestic industry was in a good position to supply.

The manufacturing sector of the Irish woollen industry, predominantly based in urban centres in Munster and Leinster, also had some success supplying coarse cloths to the market during the first quarter of the nineteenth century. Dublin maintained its position as the main centre of the manufacturing industry after the eighteenth century. From 1793, a number of Dublin manufacturers gradually began to introduce machinery on a limited scale. Carding machinery was first introduced in that year. By 1801, water-powered machinery was becoming more general in the city's woollen industry. Archer noted that;

'the woollen manufacture is in a progressive state of improvement. The machinery that has been introduced latterly, has done more for the advancement of this business than anything'. Machinery had been installed in mills at Islandbridge, Chapelizod, Redmills, Mardyke, Milltown and Rathmines. The number of hands employed had also risen over the previous decade. By 1800, there were 91 master manufacturers and 4,038 people working on woollens and 1,491 in serge and stuffs. The number employed in the

Table 5:2.

FIXED CAPITAL INVESTMENT AND THE NUMBERS EMPLOYED IN THE PRINCIPLE CENTRES OF THE IRISH WOOLLEN INDUSTRY IN 1822.

	Manufacturers	Employment	Fixed Capital
DUBLIN REGION	45	2,885	195,000
CARRICK REGION		1,200	20,000
CORK REGION		946	25,000
KILKENNY REGION	12	925	53,000

Source; *Fourth Report on Revenue in Ireland*, BPP 1822, xiii, app. no. 23, pp. 186-7.

¹⁷ *Fourth Report on Revenue Arising in Ireland*, BPP 1822, xiii, app. no. 21-23, pp. 167-187.

Dublin industry declined over the next decades to 2,885. This was partly a consequence of the growing use of machinery. The Dublin industry reached its peak prior to the removal of the Union duties in 1824, which had provided valuable protection from imports, in the cheaper ranges of cloth which were made in the city.¹⁸ Although the fortunes of the industry in Dublin had fluctuated considerably since the Union, there had been improvements with the introduction of machinery. The coarse cloth made found a ready sale on the Irish market, and it was protected from British competition. The largest two factories in the area were both set up by English firms which were induced to come to Ireland because of the protection afforded against English competition by the Union duties. Atkinson and Houghton, from Huddersfield, Yorkshire set up the largest mill in Ireland in 1805 on the river Liffey at Celbridge. In 1822, its output accounted for about one-tenth of the machine manufactured cloth made in Ireland. The other English firm which set up in Dublin was Willans, which built a manufactory at Kilmainham in 1811.¹⁹

Houghton and Willans initially brought over English artisans to supervise and work in their mills. They also brought English machinery or had it made up by their English mechanics. The importance of the knowledge these English artisans had can be seen from the numerous efforts other Dublin manufacturers made to entice them away from Willan's employment. There was an obvious shortage of such skills in Ireland which were essential for a factory based industry. Although these artisans were better paid than their English counterparts, the cost of hiring unskilled labour in Dublin was cheaper. The roving and spinning processes required the attention of skilled personnel, but most of the preparatory processes were attended to by women and children. The

¹⁸ Ibid., pp. 167-187. Archer, L. *A Statistical Survey of Co. Dublin* (Dublin, 1801), p. 162. Warburton, J. Whitelaw, J. and Walsh, R. *History of Dublin* (London, 1818), p. 983. O'Brien, p. 274.

¹⁹ Wakefield, E. *An Account of Ireland*. (London, 1812), 1, p. 717. *Fourth Report on Revenue in Ireland*, BPP 1822, xiii, app. no. 21-23, pp. 167-187. Lewis, ii, pp. 319-20, 170. All the machinery was driven by a 200 horse-power waterwheel. The firm employed up to 600 people and by 1822 the fixed capital invested came to £60,000, the output being in the region of £60,000 per annum. By 1822, Willans had invested about £30,000 in his mill and had an output of £45,000. Willans employed 277 people in 1822, rising to almost 500 by 1837.

cost of weaving was also cheaper in Ireland than in England; yarn was put out to weavers working in their own homes.²⁰

The introduction of machinery in Cork (the main centre of the worsted industry), was less successful. It was still cheaper in 1807 to get worsted yarn spun by hand so there was still no worsted spinning machinery in Cork at that date. There were 400 to 500 hand combers working in and around the city in 1800, and about 2,500 workers in the woollen industry as a whole. But the fixed capital invested in the Cork industry was limited to only £25,000 in 1822 (see table 5:2). But as in Dublin, a number of small manufacturers had invested in machinery for preparing and spinning at this stage.²¹

Lane was the first to make a success of machine spinning and carding towards the end of the Napoleonic war, in his mills at Riverstown. Sophisticated finishing machinery imported from England was also installed there. Both Lane and Mahony (the largest worsted manufacturer in the area) benefited from the large contracts for clothing for the army stationed in Ireland during the Napoleonic War. Towards the end of the war Mahony installed a steam engine for spinning worsted mechanically.²²

The coarse woollens and blanket manufacture in Kilkenny recovered to some extent during this period. Waterpowered spinning and carding machinery was introduced by a few manufacturers after 1806. The most notable was Nowlan and Shaw which was set up in 1810 and employed up to 400 hands.²³ In Carrick-on-Suir there was no attempt to introduce machinery; employment in the industry fell from about 2,000 in 1799 to about 1200 in 1822.²⁴

²⁰ *Fourth Report on Revenue in Ireland*, BPP 1822, xiii, app. no. 21-23, pp. 162-187.

²¹ Bielenberg, A. *Cork's Industrial Revolution, Development or Decline?* (Cork, 1991) pp. 31-35.

²² Bielenberg (1991), pp. 34-5.

²³ Lord Sheffield, *Of the Trade in Wool and Woollens* (Dublin, 1813), p. 301. Hansard, (Commons), 3rd session, vol. xxii, 1246, Repeal of the Union Debate, 23 April 1834.

²⁴ Clarkson, L. 'The Carrick-on-Suir Woollen Industry,' *Irish Economic and Social History*, xvi (1989), pp. 23-41. *Fourth Report on Revenue Arising in Ireland*, BPP 1822, xiii, app. 23, p. 187.

Irish manufacturers who made cheap coarse cloth increased their trade during the first decades of the nineteenth century, assisted by protection and the introduction of machinery. British woollens imported into Ireland were not greater in 1825 than in 1800 (see table 5:1), and with a rising population demand in Ireland was increasing (assuming that average income was rising very slightly as O'Grada and Mokyr do). The English, however managed to dominate the more expensive ranges of cloth where protection made less impact. According to Houghton, this amounted to about one third of the quantity of cloth consumed in Ireland and about one half of the value in 1822 (on account of its superior quality). In that year, Houghton estimated that about half of the people in Ireland were still dressed in domestically manufactured cloth, the production of which, in his view, still employed at least 100,000 people.²⁵

After the removal of the Union duties in 1824, the limited growth of the manufacturing sector of the Irish woollen industry was thrown sharply into reverse. Thereafter, English woollen goods entered the Irish market duty free. English imports rose dramatically from 3,384,918 yards in 1825 to 7,884,000 yards in 1835. Many Irish manufacturers were unable to compete as English woollens were cheaper and better finished. In the greater Dublin area (including counties Wicklow and Kildare) the number of firms fell from 45 in 1822 to 17 in 1835. The number employed fell from 2,885 to 717. Output in this area was more than halved between 1822 and 1837.²⁶ In Kilkenny, Cork and Carrick-on-Suir the industry also suffered serious reversals. Queen's County was the only area where the industry showed any signs of resilience; there were five woollen and worsted manufacturers by 1835. But even here the largest mill, located in Maryborough, was involved in bankruptcy proceedings by the end of the 1830s.²⁷

²⁵ *Fourth Report on Revenue Arising in Ireland*, BPP 1822, xiii, app. no. 23, pp. 180-187. Mokyr, J. O'Grada, C. 'Poor and Getting Poorer? Living Standards in Ireland before the Famine' *Economic History Review*, xxxi (1988), pp. 229-231. Census, 1841.

²⁶ *Ibid.*, National Library, Ms 13629(6), Report on the Woollen Trade. *Persons Employed in Mills and Factories in UK*, BPP 1836, xlv (138), p. 3. *Report of the Railway Commissioners*, BPP 1837-8, xxxv, app. B., no. 10, p. 92.

²⁷ Lewis (1837), 1, p. 4. *Persons employed in Mills and Factories in the UK*, BPP 1836, xlv (745),

Apart from the removal of the Union duties, there were other factors which led to the decline of the Irish industry. The decades after the Napoleonic War were a period of pronounced investment in the English woollen industry, which increased productivity.²⁸ Evidence of fixed capital inputs into the Irish industry (see table 5:2) suggests that investment was modest in the years immediately after the war, and there was certainly very little investment in the industry after 1824. Since productivity is heavily influenced by the amount of fixed capital investment in machinery it seems probable that Irish productivity on average was much lower than in England. The introduction of steam navigation meant that small traders could import small quantities of woollens from the English manufacturing districts in two or three days, without having large amounts of capital tied up in the trade.²⁹ The outcome of increased integration into the British market is evident from the major decline in the number of mills in Ireland and in the number employed.

Table 5:3.
WOOLLEN MILLS IN IRELAND AND EMPLOYMENT
IN THESE MILLS

	MILLS		NUMBERS EMPLOYED	
	1835	1850	1835	1850
DUBLIN	13	4	717	133
WICKLOW	2		53	
KILDARE	2		107	32
KINGS	2	1	95	25
QUEENS	5	3	274	177
CORK	7	1	170	187
KILKENNY	5	1	225	57
WATFORD		1		50
TOTAL	36	11	1641	629

SOURCE; *Return of Mills and Factories in the UK*, BPP 1836, xlv (138) p. 3. *Return of Mills and Factories in the UK*, BPP 1850, xxxii (745) pp. 10-11.

By the end of the 1830s, a significant part of the woollen goods consumed in Ireland were British made. Total consumption of woollen goods according to Willans in 1837

p. 10-11. *Persons employed in Factories in the UK*, BPP 1850, xxxii (745) pp. 10-11.

²⁸ D. Jenkins, D. and Ponting, K. *The British Wool Textile Industry 1770-1914* (London, 1982), p. 33.

²⁹ *Report on the State of the Poor in Ireland*, BPP 1830, vii (667), pp. 15-16.

was not more than £1,400,000. Of this he estimated that only about £220,000 was manufactured in Irish mills. Taking the railway Commissioners' estimate for imports in 1835, about £701,000 worth of British woollens were imported (about three times the amount made in Irish mills). The balance (over £400,500) was probably made up of Irish domestically manufactured cloth.³⁰

Despite the slow decline of the Irish domestic industry, it was probably more important than the Irish factory industry in terms of value. In the 1841 census over 81,000 people were returned who were associated with some aspect of the woollen industry; over 73,000 of these were hand spinners (predominantly female) who worked in their own homes.³¹

English imports were beginning to undermine the domestic industry in many parts of the country by the 1830s. But the impact of British imports was probably more strongly felt in Leinster and east-Munster, than in Connaught, west-Ulster and west-Munster where domestic production survived. The Wicklow flannel trade, for example, was almost extinct by the 1830s. The critical factor in British penetration of the Irish market for woollens was the transport network. Long distances over bad roads cushioned the domestic industry in western parts of the country from English imports. But even counties in east-Connaught were exposed to British competition; by the early 1830s, the domestically manufactured coarse stuffs made in Roscommon, for example, were yielding to less costly articles sold in the shops which were made in large manufactories in England.³²

By the end of the 1830s, the domestic industry in Leinster and Munster, was largely confined to the production of goods for home consumption. But the domestic industry was holding its own in the poorer western parts of the country where it was more

³⁰ Report of the Railway Commissioners, BPP 1837-8, xxxv, app. no. 30, p. 92.

³¹ Census, 1841.

³² Lewis (1837), ii, p. 523. Weld, I. *Statistical Survey of Roscommon* (Dublin, 1832), pp. 402-3, 684.

difficult to raise cash to purchase factory goods. In the parish of Inniskeel in Donegal, for example, more than half the cloth used was the manufacture of the parish, and in Glen Columb-kill manufactured flannel was still used to pay the rent. In Cape Clear Island and in the Aran Islands, all the clothing worn was made on the islands. In marginal districts like these, people were reluctant to part with hard won cash to purchase goods which could be made up in the household. But in Connemara the industry was still an important source of cash; £10,000 per annum was made from the domestic manufacture of woollen stockings in the mid-1830s. In the decade before the Famine the domestic industry even made something of a temporary recovery in some districts.³³ The Handloom Weavers Report of 1840 pointed out that the poor quality of much of the fleece produced in Ireland was:

'only suited for the manufacture of the coarser clothes and friezes for domestic manufacture amongst the peasantry, and hence that branch of the woollen trade has received considerable extension'.³⁴

The remoteness of many districts enabled handloom weavers to still survive in local markets where shop cloth had not yet been introduced. In these places, the weavers still made up coarse frieze and blankets, trading them for both money and goods in kind.³⁵

The domestic industry survived much longer in Ireland than in other parts of the British Isles. Its survival was strongest in the poorer peripheral regions where there was a high level of under-employment and a low level of per capita income. The factory industry (which was undercapitalised and technically inferior to British manufacturers) was unable to develop export markets, and after the union duties were removed, it gradually declined as few of the manufacturers were able to compete with British woollens in terms of price, quality and fashion. The British manufacturers had a larger and more prosperous home market and had successfully developed export markets. In the main

³³ Royal Irish Academy, Ordnance survey Memoirs, Donegal Box 22, 21. Royle, S. 'The Economy and Society of the Aran Islands,' *Irish Geography*, xvi, (1983), pp. 36-54. Lewis, ii, pp. 179, 264, 276, 406, 566, 608, 633, 689.

³⁴ *Report of the Handloom Weavers*. BPP 1840, xxiii (43) pp. 591-676.

³⁵ *Ibid.*, pp. 591-676.

manufacturing districts like Yorkshire, manufacturers enjoyed external economies which gave them advantages over rivals in Ireland. A good illustration was given by an English manufacturer who set up a woollen mill in Ireland at the end of the eighteenth century, but was forced to give it up after several years;

'I went to Ireland because I got my water-power for one-fourth of the price I had to pay in Yorkshire, and because wages were much lower. My workers were not much deficient in skill, industry or integrity; but in Yorkshire, if any accident happened to a loom, I had only to send next door to borrow another. In Ireland, when any part of the machinery became deranged, I had to send to Yorkshire to get it repaired. I thus found that to establish any manufacture, special mechanical skill is required, not only in one branch of industry, but in many; and as this could not be then obtained in Ireland, I was unable to compete with my English rivals.'

Sectoral concentration conferred many benefits on Yorkshire manufacturers, over their rivals in more peripheral locations in other parts of the British Isles. This was accompanied by a revolution in the organisation of production, commercial links and credit relationships. The number of mills in Yorkshire rose from 242 in 1800 to over 600 in the mid-1830s. In the whole of Ireland in the latter year there were 36 mills and by 1850 the number had declined to only 11.³⁶

The small size of the average Irish woollen mill suggests that many of them were undercapitalised. In 1830, one Dublin manufacturer estimated that the fixed capital required to establish a viable woollen mill for spinning and carding was about £1,450. The fixed capital invested in 26 of the 45 mills in the greater Dublin area in 1822 was lower than this figure. After the Union duties were removed in the mid-1820s, many of them were unable to increase their productivity and reduce costs to meet British competition. By 1850, there were only 4 mills left in the greater Dublin area.³⁷ The

³⁶ *Ibid.*, pp. 591-676. Hudson (1992), pp. 115-120. *Returns of Persons Employed in Mills and Factories, UK*, BPP 1836, xlv (138) p. 3. BPP 1850, xxxii (745) pp. 10-11.

³⁷ National Library, Ms. 13630 (4), Estimate for Building a Woollen Mill. *Fourth Report on Revenue Arising in Ireland*, BPP 1822, xiii, app. no. 23, pp. 180-187. *Returns of Persons Employed in Mills and*

final factor which enabled British manufacturers to capitalise on all the advantages they had built up in the production process, was the introduction of steam navigation. This enabled retailers in the major Irish ports to import cheap English cloth with little difficulty and cost, thereby integrating areas where the transport infrastructure was well developed into the British market for woollens. The domestic cottage industry survived in areas which were isolated by poor transport networks.

Woollens and cottons were the really significant consumer items in which many Irish manufacturers were unable to compete with British manufacturers in the Free Trade environment which was fully in place by the mid-1820s. The few woollen manufacturers who survived or emerged after the removal of the Union duties tended to be those which were larger and more highly capitalised.

The main cause of the decay of the Irish woollen industry from the mid-1820s was the ever increasing concentration of the UK woollen industry in the West Riding of Yorkshire. This resulted in the decline of older seats of the industry such as East Anglia and the West Country. According to Johnson and Kennedy this regional decay occurred even in Yorkshire, where the worsted trade of Ripon, Selby and York declined as a result of the emergence of Bradford as the major centre of this trade. The decline of the Irish industry must be seen in the context of regional decline all over the UK, outside the premier centres of the trade in Yorkshire.³⁸

Factories, UK, BPP 1850, xxxii (745) pp. 10-11.

³⁸ Johnson, D. Kennedy, L. 'Nationalist Historiography and the Decline of the Irish Economy' Hutton, S. Stewart, P. (eds) *Ireland's Histories* (London, 1991), pp. 23-4.

II

The domestic woollen industry experienced contraction during the second half of the nineteenth century; it survived tenuously in pockets predominantly along the poorer western seaboard, notably in Donegal, Connemara and Kerry. In these poorer peripheral regions underemployment was common and people were unwilling to dispose of cash for items which could be made up at home. But the numbers of spinners and weavers working like this was rapidly declining, even prior to the 1840s, and thereafter this trend continued.

Table 5:4.

**NUMBER OF PEOPLE EMPLOYED IN
THE WOOLLEN INDUSTRY 1841-1911**

Year	Total Employed	Wool Spinners
1841	81,319	73,275
1851		
1861	16,679	12,447
1871	20,793	16,383
1881	7,710	
1891	6,630	
1900	5,450	
1911	4,767	

Source; Census of Ireland 1841-1911.

According to Rolleston, writing in 1907, domestic handloom weaving and spinning in wool were still holding their ground in Donegal, Gort and Conemara in Galway, and also in Kerry, Mayo, and many other districts. In these places the cloth that found its way onto the market was merely the surplus of a much larger amount produced for home use. But the trade was limited and only a shadow of what it had been during the first half of the nineteenth-century. South Donegal was the principal centre; a large amount from this district was exported to London, Paris, Melbourne and New York where the character of the cloth was sought after. From 1893, the Congested Districts

Board (CDB) helped to revive the industry by giving out new looms which more than trebled output.³⁹

The CDB and many others interested in Irish industrial development, thought that the revival of the cottage industry would assist industrial development in Ireland. This approach failed dismally. A more useful policy, it seems, would have been to give more support to the mechanisation of the industry in the poorer regions where domestic manufacture persisted. The CDB for example, provided half the capital to set up the Providence Woollen Mills in County Mayo in 1892.⁴⁰ The success of this venture indicates that similar loans may have led to the development of the factory industry elsewhere.

In contrast to the homespun industry, factory production made significant progress during the second half of the nineteenth century, manufacturing cloth for a population that was declining in numbers but increasing in wealth. With more disposable income by 1890 than in 1850, more fashionable machine-made fabrics were displacing traditional domestically manufactured cloth. The machine based industry had to compete with English imports. By importing machinery from British machine makers, many Irish manufacturers were able to take full advantage of the advances in the British industry. Irish manufacturers with commercial acumen could acquire the best technology from specialist English machine makers. This enabled them to raise their productivity and compete with English imports in the Irish market.

Between 1850 and 1890, the number of woollen mills in Ireland rose from 11 to 83, the number employed in the factory industry during the same period rose from 629 to 3,463 (see table 5:5).

³⁹ Coyne, W. (ed) *Ireland, Industrial and Agricultural* (Dublin, 1907), pp. 395-7. Mc Gill, P. 'The Irish Woollen Industry from Earliest Times to Donegal Homespun,' *Journal of the Donegal Historical Society*, 1 (1949), pp. 174-5.

⁴⁰ Ryan, J. 'Mother Bernard and the Providence Woollen Mills' *Studies*, xxxi (1942), pp. 233-4. For more information on these mills see Finlay, T. *Foxford and its Factory* (Dublin, 1910).

Table 5:5.

IRISH WOOLLEN FACTORIES 1850-1904

	Factories	Spindles*	Powerlooms	No's. Employed
1850	11			629
1861	42	23,274	123	1,037
1871	64			1,565
1878	76	40,493	411	2,022
1890	83	64,099	925	3,463
1904	100	68,374	1,023	

*Excludes double spindles.

Source: *Returns of Cotton, Woollen, Worsted Factories in the UK*, BPP 1850, xxxxi (745) pp. 10-11. BPP 1862, lv (23) p. 19. BPP 1871, lxii (440) pp. 72-3. BPP 1878-9, lxxv (384) p. 201. BPP 1890, lxxvii (328) pp. 12-17. BPP 1904, lxxxvii (293) p. 6.

Cork emerged as the main centre of the industry during the last quarter of the nineteenth-century. A number of the mills in this area made the successful transition to mechanised production, buying in British-made machinery. Mahony's in Blarney, with 5,638 spindles, was by far the most innovative company in the country, employing about 200 people in the mid-nineteenth century. It was the first company to mechanise all the processes of the manufacture. In 1852, the company purchased powerlooms at the Great Exhibition in London, and began manufacturing 'Blarney Tweed' which ultimately acquired an international reputation. Output continued to expand over the following decades, indicating that further mechanisation was successful. After a fire in 1869, the whole concern was entirely rebuilt with the latest machinery. The company could now compete both at home and abroad with the best British manufacturers. By 1896, the company employed 800 people operating 15,000 spindles and 150 powerlooms. This firm was untypical though; many of the Cork firms remained small working largely for local markets. But Mahony's success was emulated by a number of other larger firms which were set up in the region. These included mills at Dripsey established in 1875, and two large mills established in Douglas in 1882 and 1890.⁴¹

⁴¹ Bielenberg (1991), pp. 37-40.

Cork was one of the few traditional locations of the industry which made the successful transition to mechanisation. According to Thom's Directory of 1865, the woollen trade had entirely left Kildare and Wicklow (a traditional stronghold of the domestic industry), but factories had become established in Fermanagh, Limerick, Meath and Westmeath. The largest mill in these counties was the Athlone Woollen Company established in 1859. This company used English and American machinery to turn Irish wool (largely) into tweeds, serges, dress fabrics and coatings, much of which was exported to the UK, America, Europe and the Colonies. With an output of about fourteen thousand yards a week by 1890, the works covered an area of almost three acres and employed up to five hundred hands.⁴²

Outside Cork, the new mills established during the second half of the nineteenth century were often set up in areas with no great tradition in the industry. At Lisbellaw in County Fermanagh for example, woollen manufacture was first established on a domestic basis by a clergyman in 1848. A decade later two Scotsmen called Henderson and Eadie established the first modern woollen mill in Ulster in the town. They installed the best available machinery, adding a steam engine in the mid-1870s, and built up a trade in tweeds, friezes, serges, woollen shirtings, flannels, winseys, sheetings, shawls, blankets and rugs. The business was successful and by 1890 employed almost two hundred people. At this stage the number of mechanised woollen mills in Ulster had risen to 9.⁴³

The average size of woollen mills in Ireland was not very large. There were only four firms in 1908, with 5,000 or more spindles. These were Martin Mahony and Bros. Ltd., of Blarney, with 15,000 spindles and 100 looms; Athlone Woollen Mills Co., with 10,562 spindles and 102 fastlooms; O'Brien Bros. Ltd., St Patrick's Mills,

⁴² In Carrick on Suir for example an attempt was made to establish a large steam driven mill; up to 300 people were employed, but the venture failed in 1874. Power, P. *Carrick on Suir and its People* (Dublin, 1976), p. 123. Thom's Directory, (London, 1865), p. 831. Crawford, W. *Industries of the North 100 Years Ago* (Belfast, 1986), pp. 183-4.

⁴³ Gibbon (1969), pp. 62-8. Crawford (1976), p. 190. Almost all of the Ulster firms during this period were set upon sites used previously for grain milling, flax spinning or bleaching linen.

Douglas, with 5,000 spindles and 135 looms; and Hill and Sons, Ltd. of Lucan near Dublin, with 5,000 spindles and 70 looms.⁴⁴ Some of the concerns were very small and old fashioned. J. Clapham aptly described these as: 'the curiosities of the industry, the survivals of an earlier time'.⁴⁵ Most of these small establishments did not survive the first decades of the twentieth century.

The lack of technical knowledge in Ireland was a major problem for many of the smaller Irish woollen mills. This was one of the factors which prevented the industry from reaching its full potential. In the Parliamentary Commission on Irish Industry in 1884, Hill, the largest Dublin manufacturer, pointed out that there was a general lack of technical knowledge in Ireland, both among the capitalists and the operatives. He believed this was one of the chief constraints of the Irish woollen industry. He pointed out that when the working classes have; 'no previous idea of manufacturing, it becomes much more difficult for employers to compete with others who live in districts where the operatives for generations are working at this class of labour'.⁴⁶ In Cork, the manager of the Dripsey Woollen Mills in 1907 thought that: 'the absence of a technical training college in Ireland, and particularly in Cork, which is the [main] centre of the woollen industry, is a great drawback. Young fellows who are filling minor positions in the mills have no chance whatsoever of acquiring any technical knowledge of the business, and so they can get no promotion and foreigners must be imported for the principle posts. If these young men had a chance of attending evening classes we would have in a few years a splendid lot of trained hands who would put new life into many of the small mills which have almost died out through old-fashioned methods necessitated by the absence of skilled workers'.⁴⁷ Many mills were too small to warrant specialisation in the various tasks performed.⁴⁸ The general lack of specialisation and

⁴⁴ Oldham, C. *The Woollen Industry of Ireland* (Dublin, 1909), pp. 23-4.

⁴⁵ Clapham, J. *The Woollen and Worsted Industries* (London, 1907), pp. 14-15. 34 of them were spinning mills with only two carding sets from 150 to 200 spindles each. Some were still providing yarn to the domestic industry.

⁴⁶ *Report from the Select Committee on Industries in Ireland*, BPP 1884-5, ix, app. no. 26. p. 826.

⁴⁷ Bielenberg (1991), p. 40.

⁴⁸ O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming). The manager in Dripsey, was also a designer and salesman, the bookkeeper was also a dyer, and the foreman

knowledge in the whole sphere of design was also a major problem for those marketing Irish cloth, which was often noted for its durability, but not in terms fashion.⁴⁹

However, the evidence suggests that many Irish manufacturers overcame these disadvantages by employing specialist English or Scotch hands who were familiar with the technical details of production. Technology was also imported from specialist machine makers in Britain, thereby eliminating technical constraints. This technical transfer to Ireland from the capital goods sector in Britain, has strong parallels with developments in Norway. The mechanisation of the Norwegian textile industry after the 1840s also depended heavily on British machinery and technical expertise.⁵⁰ Overall, it is clear from the growth in the number of woollen mills in Ireland from only 11 in 1850 to 114 in 1902, that the second half of the nineteenth century was a period of growth for the mechanised industry, demonstrating that many manufacturers successfully organised the production and marketing of Irish woollens. The growth of the mechanised sector probably more than offset the decline of the moribund domestic industry.⁵¹

performed all the other specialist tasks; they could not afford to pay a separate manager, dyer, designer, book-keeper, traveller etc.

⁴⁹ Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1907), p. 401.

⁵⁰ Bruland, K. *British Technology and European Industrialization; the Norwegian Textile Industry in the Mid-Nineteenth Century* (Cambridge, 1989), pp. 1-36.

⁵¹ Coyne (1907), p. 401.

Chapter Six

THE COTTON INDUSTRY

I

During the British Industrial Revolution, cotton was the unrivalled leading industry in terms of the development of new technology within the factory system, and also in terms of total output after 1805. The dynamic growth of the English cotton industry after 1770 had a significant impact on the Irish textile trade. Part one of this chapter will trace the growth of the Irish cotton industry down to the 1820s. It will then account for the contraction of the industry in the decades that followed. Some consideration will also be given to how the development of the cotton industry in the north-east contributed to the process of industrialisation in that part of Ireland.

As the price of cotton clothing came down, the consumption of cotton clothing dramatically increased in Ireland. The amount of imported British cotton goods consumed in Ireland rose by a factor of fourteen between 1772 and 1792.¹ This growing demand for cottons provided a strong incentive for entrepreneurs to set up cotton manufactories in Ireland.

Cotton manufacture was initially an ancillary activity to the linen industry. During the 1760s and 1770s, cheaper cotton weft was incorporated into mixed cloths containing a linen warp. But during the last decades of the eighteenth century it became firmly established as a separate industry.² Once the technology for the mechanisation of the carding and spinning process had been successfully applied in England, there was little to prevent the diffusion of the new machinery into Ireland.

Mechanisation contributed to the declining price of cotton; by 1799, finished cottons cost half of their 1780 value. This broadened the market base for cottons making it a cheap and

¹ *Account of the Imports and Exports of Ireland*, BPP 1823, xv (472) p. 4-7.

² Dickson, D. 'Aspects of the Rise and Decline of the Irish Cotton Industry', in Cullen, L. and Smout, T. *Scottish and Irish Economic and Social History 1600-1900*. (Edinburgh, 1978), pp. 100-115.

fashionable alternative to linens and woollens. From the 1780s, a number of cotton mills were established in the vicinity of Dublin, Cork and Belfast and in a few rural locations.³ These were the main ports into which cotton wool was imported; they were also the main centres of demand and the commercial centres of the textile industry in Ireland.

The Irish parliament was eager to foster the new industry, granting bounties on the home sale of cotton in 1783 and on exports in 1784. It subsequently imposed very heavy duties on English imports (up to 50% on calicoes and 35% on muslins). The Linen Board and the Dublin Society also gave financial assistance through various grants and bounties.⁴ This provided favourable circumstances for the initial growth of industry. The parliament also made grants to a few manufacturers, notably Brooke's manufactory in Prosperous, Co. Kildare. But this scheme turned out to be Ireland's greatest eighteenth century white elephant absorbing large quantities of public funds, and closing in 1786 only six years after it had been established. Other manufacturers with less resources and more common sense, were more enduring. Many of them visited England observing how the manufacturers organised production in Lancashire, the main seat of the industry. They also hired English supervisors and artisans to set up and run their mills in Ireland. This facilitated the diffusion of the new technology into the main centres of the Irish industry.⁵

Until the mid-1820s, nearly all of the cotton made in Ireland was sold on the Irish market. Protection effectively reduced competition from British cloth to a minimal level until the 1820s; duties on cotton yarn and twist were repealed in 1816 and duties on all cotton cloth were entirely removed in 1824.⁶ Initially, Irish cotton manufacturers predominantly served local markets. But by the turn of the century markets had broadened and cottons were being sold across the country. The Belfast muslin manufacturers for example, sold a large part of their output during the first quarter of the nineteenth century directly to the shop keepers in the south and west of Ireland.⁷ Cotton was a more fashionable fabric than woollens; even in the west by

³ Dickson (1978), pp. 100-115. Bielenberg, A. *Cork's Industrial Revolution, 1780-1880* (Cork, 1991), p. 21.

⁴ O'Brien, G. *Economic History of Ireland in the Eighteenth Century* (Dublin, 1918), pp. 275-7.

⁵ Kelly, J. 'Prosperous and Irish Industrialization in the Late Eighteenth Century', *Journal of the Kildare Archaeological Society*, xvi (1985-6), pp. 441-467.

⁶ Geary, F. 'The Belfast Cotton Industry Revisited' *Irish Historical Studies*, xxvi (1989), p. 254.

⁷ Monaghan, J. 'The Rise and fall of the Belfast Cotton Industry', *Irish Historical Studies*, iii (1942), p. 8. Green, R. *The Lagan Valley 1800-1850* (London, 1949), pp. 95-111.

the turn of the century women commonly wore cottons on Sundays, gala days, weddings or other special occasions in preference to woollens (which were worn on most days). Young men and women wore cotton because it was more fashionable, particularly in the eastern half of the country.⁸

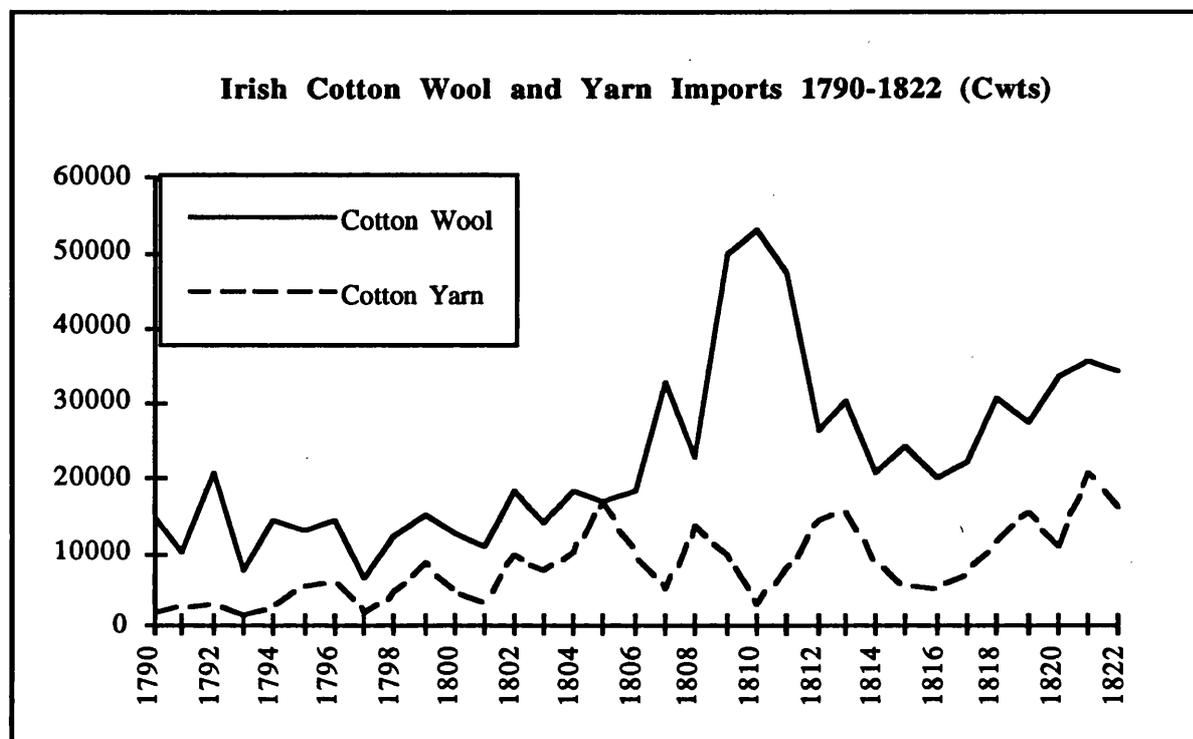


Figure 6:1. Source; *Account of Imports and Exports of Ireland*, BPP 1823, xv (472) pp. 4-7. and (318) pp. 4-7.

It is possible to get a picture of the growth of the spinning sector of the industry between 1790 and 1822, since all cotton wool used had to be imported (see figure 6:1). Some yarn was also imported from Britain. Despite some fluctuations, in general the Irish spinning sector was expanding between 1790 and 1822. Expansion continued briefly after this; imports of cotton wool rose from an average of 2,873,862 lbs for the years 1817-19 to 4,368,656 lbs for the years 1823-25. But after the 1826 Depression, the Irish spinning sector slackened off considerably, average imports of cotton wool for the years 1827-29 fell to 2,478,965 lbs. However it is probable that imports of yarn (which had increased from 1,279,374 lbs in the

⁸ Dutton, H. *Statistical Survey of Co. Clare* (Dublin, 1808), p. 179. Dutton, H. *Statistical Survey of Galway* (Dublin, 1824), p. 353. McPharlan, J. *Statistical Survey of Co. Mayo* (Dublin, 1802), p. 87. McPharlan, J. *Statistical Survey of Donegal* (Dublin, 1802), p. 66.

years 1817-19 to 2,510,303 lbs in 1823-25) continued rising during the second half of the 1820s because of the large amount of yarn being woven on Scottish account.⁹

Investment in large spinning mills took place very slowly initially. By 1785, there were only 4 water-powered cotton spinning mills in the country, rising to 7 in 1791; there were still only 16 by 1800. The supply of yarn in the early 1780s was probably largely provided by hand-turned and horse-powered jennies. This continued to be an important source of supply over the next decades. British yarn imports remained fairly negligible until the 1790s (see figure 6.1). Some idea of the spatial distribution of the industry can be gained from Dickson's regional breakdown of cotton wool and yarn imports. Between 1799 and 1801, Dublin accounted for over 51% of the cotton wool and yarn imports in the whole country. Belfast accounted for about 25% and Cork for a little under 20%. Dublin emerged as the leading centre of the industry in the eighteenth century. But by 1805-07, it was displaced by Belfast which already accounted for 8 of the 16 waterpowered spinning mills in the country in 1800.¹⁰

Investment in the industry by larger manufacturers in Dublin and Cork tended to be concentrated in the printing and finishing sector.¹¹ In Munster, Cork city was the main centre, and one manufacturer, Sadlier, dominated the industry during the last decade of the eighteenth century, employing up to 4,000 people directly. Sadlier's financial resources were largely invested in finishing and printing works, most the other manufacturers sold their goods to him to be finished, so he marketed the bulk of the cotton made in the region. In 1787, a manufacturer named Deaves invested £15,000 in building a large spinning mill in Blarney based on Arkwright's system. But in the depression of 1800-01 both Deaves and Sadlier went bankrupt as they were unable to survive the depression in the demand for cotton between 1799 and 1801. The industry in the city, which depended so much on Sadlier's business, never recovered; the number of cotton weavers declined from 2,000 in 1800 to only 400 by 1824.¹²

⁹ *Account of Imports and Exports of Ireland*, BPP 1823, xv (318) pp. 4-7. (472) pp. 4-7. Geary (1989), p. 254.

¹⁰ Dickson (1978), p. 108.

¹¹ *Ibid.*, p. 104.

¹² Bielenberg (1991), p. 25. There were a number of small spinners working in Blackpool, where many of the city's weavers lived. There were also many weavers in Glasheen where Sadlier's works were located. In the nearby village of Blarney there were also a few manufacturers using jennies.

During the first quarter of the nineteenth century Bandon, (an old centre of the woollen and linen industry) displaced Cork as the main centre of the cotton industry in Munster as larger and more sophisticated spinning mills were established there. Allman's, the largest, had £30,000 invested in a mill which contained 8,250 spindles. When the industry reached its peak in Bandon in the early 1820s there were 2,000 weavers working in and around the town, 1,500 of them working on cords; Bandon had become the main centre for producing corduroy in Ireland. Because of the cheapness of labour and the town's reputation for cords, Manchester agents were putting out yarn to weavers in the town in the 1820s. But cords were one of the first branches of the industry to succumb to the powerloom, and Bandon's cotton trade was almost entirely wiped out during the second half of the 1820s.¹³

In Dublin, a number of manufacturers previously engaged in woollen and linen manufacture converted into cotton production. In the early 1780s, a number of large manufacturers entered the industry; like Hamilton who set up jennies in Balbriggan and Lord Talbot who set up the first Arkwright mill in the region at Malahide.¹⁴ But by the turn of the century, the industry in Dublin was dominated by small manufacturers who were predominantly working in the Liberties (a working-class district to the west of the city). There were 62 manufacturers working in the city in 1800. 40 to 50 of these manufacturers were small master manufacturers who operated from 5 to 12 looms in the Liberties, selling the cloth themselves. 16 of the 62 manufacturers in the city were also spinners, although most of their spinning and carding operations were small. A few larger manufacturers also put out yarn to weavers working in the Liberties, and other parts of the city and county.¹⁵

¹³ Bielenberg, A. 'The Rise and Decline of a Textile Town; Bandon 1780-1840', *Journal of the Cork Historical and Archaeological Society Journal*, xcvi (1992), pp. 111-9..

¹⁴ Dickson (1978), pp. 100-115.

¹⁵ Royal Irish Academy, Holiday Collection, Ms 4 B 31. Harrison, R. *Dublin Quakers in Business 1800-1850*. (unpublished M. Litt, TCD, 1987). These included O'Brien and Mead of Merchant's Quay who made muslins, calicoes and cords, Greenham of Cork St., a spinner and dyer of cords, Jackson of Cork St., a spinner and manufacturer of cords and calico and also a calico printer and dyer, Maguire of Ardee St., Cotton of Francis St. and Ford of Cork St. O'Brien and Mead for example, took over the large spinning mill in Balbriggan and put out yarn to weavers in that town and in Garristown. Greenham of Cork St. built the large mill in Harold's Cross in 1808. Around 1810, he also took over the spinning mill in Celbridge (Temple mills) on the Liffey outside Dublin. When business was good Greenham put out yarn from his mills to about 1,600 weavers in and around the city. I would like to thank John Mc Hugh for drawing my attention to the Holiday Collection.

The cloth made in Dublin were generally the coarser types such as cords, checks and calicoes.¹⁶ The same could be said for Cork, but around Belfast muslin had displaced coarser cloths as the premier cloth type produced. Though there was greater investment in spinning mills in east-Ulster than in the south, Dublin continued to dominate the printing and finishing sector of the industry. Dublin had built up a substantial linen printing industry during the eighteenth century, because of its position as the principal centre for marketing Ulster linens. By 1760, there were linen printing yards at Leixlip, Lucan, Palmerston, Chapelizod and Islandbridge on the Liffey and at Rathfarnham, Milltown, Donnybrook, and Ballsbridge on the Dodder. There were also yards at Templeogue, Dolphin's Barn and Drumcondra. Most of these yards subsequently handled cottons. Undoubtedly, the high standards achieved in finishing cottons was a consequence of this earlier experience in linen printing. Art historians now acknowledge that Dublin was second only to London (and ahead of Paris) as a centre of innovation in printing textiles using copper-plates. Dublin accounted for 8 of the 23 printing and finishing works in the country based around the city in 1800, rising to 15 by 1812, and these were among the largest in the country.¹⁷

Judging from cotton wool imports, the spinning sector in Dublin reached its peak by 1810. Output fell back significantly during the final years of the war and by 1816, the number of looms operating in the city had been reduced to only 300. But a recovery was made and the industry held its own until the depression of the mid-1820s.¹⁸

Undercapitalization of the spinning sector which was technologically backward and the archaic nature of organisation within the weaving sector were becoming major problems for the Dublin industry by the 1820s when British imports began to rise. (see figure 6.1) The Director of the Bank of Ireland in 1830 was of the opinion that: 'the superiority of the English

¹⁶ Dickson (1978), pp. 100-115.

¹⁷ Longfield, A. 'Irish Linen and Cotton Printing during the Eighteenth century', *Journal of the Royal Society of Antiquaries of Ireland*, viii, (1937), p. 33. Chapman, S. *The Cotton Industry in the Industrial Revolution* (London, 1987), p. 60. Dickson (1978), pp. 104, 106, 114. With the rise of the cotton industry during the last decades of the eighteenth century Duffy, Byrne and Hamill of Ballsbridge (who were manufacturing, printing and dealing in cotton goods) emerged as the largest finishing concern in the city. By 1800, capital investment in Duffy's was estimated to be £21,000. Clarke, who established the Palmerston yard had also invested £20,000. Outside Dublin, Orr had invested about £30,000 in establishing the print-works at Stratford on Slaney in Co. Wicklow. Printing, finishing and selling cottons required high levels of investment.

¹⁸ Webb, J. *Industrial Dublin and the Dublin Silk Industry Since 1698* (Dublin, 1913), pp. 71-2.

manufacturer in machinery and capital renders it scarcely possible for the Dublin manufacturer to compete with him.'¹⁹

The 1825-6 depression in the British cotton industry marked the beginning of a rapid decline of most of the southern Irish cotton industry. The industry had vanished from Cork by the end of the 1820s; in Dublin there were still 6 spinning mills left in the vicinity of the city in 1835, falling to 3 by 1839. Only those which could compete with the British industry survived.²⁰

The finishing and printing trade became more concentrated in a dwindling number of larger firms. The number of firms in Ireland in this sector fell from about 23 in 1800 to 9 in 1833. By the latter year a few large firms in Dublin dominated this sector, finishing much of the muslins produced by the Belfast manufacturers and what ever remained of the Dublin industry.²¹

Duffy, the large printer in Ballsbridge, went bankrupt in 1833, having invested £200,000 in the business. A Kendal banker and merchant brought it back to life with an investment of a further £10,000. But the Dublin printing trade only lasted a few more decades. Duffy's, the last operative printers and finishers in the city, closed down permanently in 1850.²²

One of the exceptions to the general decline which the Irish cotton industry experienced from the mid-1820s was the Malcomson family of Portlaw, Co. Waterford. This venture differed in terms of scale and also in terms of the overseas markets which it sold in. The cotton industry in the north-east also developed in a different way than in the rest of the country from the outset. The linen industry provided cotton manufacturers with a host of weavers who could weave finer cottons than were commonly made in the south. The north-east therefore had higher levels of human capital in the weaving sector than the south.

¹⁹ Mokyr, J. *Why Ireland Starved* (London, 1985) p. 180.

²⁰ Harrison (1987), p. 44. Pim for example, who took over Greenham's spinning mill at Harold's Cross in 1824, employed technology which enabled him to maintain a sufficiently high level of productivity to compete. He had 5,000 mule spindles and 2,000 throstle spindles, in addition to powerlooms. The company prospered exporting coarse goods to both England and America.

²¹ Royal Irish Academy; Ms. 4 B 31, Haliday Collection. These included Henry of Islandbridge, Anderson of Love Lane and Waldron and Dodd of Rathgar and Duffy of Ballsbridge. Geary, F. 'The Belfast Cotton Industry Revisited', *Irish Historical Studies*, xxvi (1989), pp. 250-267. Dickson (1978), p. 106.

²² Registry of Deeds, Dublin, Anonymous Partnerships, volume ii, no. 259, 1834.

Although in the early stages, the levels of capital investment in individual concerns were smaller than in the south, they proved to be more enduring with a higher proportion of investment being concentrated in the spinning sector. Joy, Mc Cabe and Grimshaw set up the first spinning concern in east- Ulster in 1778. By the end of the 1780s a number of small manufacturers had set up in Belfast. The number of jennies used there rose from 25 in 1780 to 229 in 1791. The industry was also developing in the towns close to Belfast. In 1784, Grimshaw and a partner named Wilson built the region's first water-powered mill for spinning cotton twist using Arkwright's method at Whitehouse. Hannay built a mill at Bangor shortly after this and in 1790 Wallace established a spinning mill driven by a Watt engine in Lisburn. A second steam driven mill was set up in Lisburn in the following year. Other east-Ulster towns in which cotton mills were established in the following years included Glenavy, Randalstown, Cookstown, Castledawson, Buncrana, Mossley, Rough Fort, Ballyclare, Templepatrick, Stonyford, Lambeg, Ballyclare, Killyleagh, Glenanne, Newtonards, Carrickfergus and Larne.²³

A new class of spinning mill operatives emerged in these towns and in Belfast, quite apart from an army of weavers who were often recruited from the linen industry. Clearly, external economies were established with so many cotton spinning mills operating in this region. These included the development of specialist expertise in the supply of cotton wool and coal, in weaving, finishing and selling cloth, and in raising credit and in servicing machinery. Much of the human capital built up in these spheres subsequently passed on into the mechanised flax industry, so there was a degree of continuity in the whole process of industrialisation which was non-existent in the south. Much of the fixed capital investment and almost all of the human capital developed within the southern cotton industry simply died with the decline of the industry.

An important difference which emerged between the industry in the north-east and the south was that the northern manufacturers had begun to concentrate on muslin rather than calico by the turn of the century. The finer yarn produced required more refined weaving than the heavier calicos and cords which were more commonly made in the southern centres of the industry.

²³ Green (1949), pp. 95-8. Dickson (1978), pp. 100-115.

This made the cotton industry in the north-east less susceptible to competition from British powerloom weavers who were making inroads into the coarser branches of the industry by the mid-1820s. The tradition of weaving fine linen in Ulster made it easy to gain recruits for the muslin trade. Shortly after the turn of the century, north-east Ulster began to dominate the weaving sector of the industry. It was estimated that in 1802 there were about 10,000 cotton looms in Ulster, 7,400 in Leinster and 3,000 in Munster.²⁴

By 1800, 8 of the 16 waterpowered cotton spinning mills in Ireland were located in the vicinity of Belfast. Yarn was also being spun on jennies driven by horses or by hand. More significantly however, by 1811, there were 15 steam engines used for spinning cotton in the greater Belfast area.²⁵ Capital formation within the spinning sector of the industry had at this stage outstripped the southern centres of the industry.

Investment in individual cotton ventures in the north-east was not very great at the end of the eighteenth century. This can be seen when the anonymous partnerships became a common way for cotton manufacturers to raise capital. Between 1791 and 1798 six partnerships engaged in the cotton industry (including spinning, manufacture, and printing) were established in the north-east. The average joint stock of these companies was only £2000. 14 partnerships were set up in the area between 1801 and 1811 with an average joint stock of £2544,²⁶ which indicates that there was only a small increase in the scale of investment in individual concerns. This conclusion corroborates reasonably well with data which Geary (1981) has used which can be split into three periods from which averages can be made for employment and horse-power in each period.

It appears that there was a significant increase in the scale of investment in mills around Belfast after the Napoleonic war, judging by both the power used and increased employment (see table below). This coincides with a period of accelerated investment in the British cotton industry, which was raising productivity and making it more competitive. Between 1814 and 1816 cotton accounted for about 40% of the value of British exports. The number of spindles in the

²⁴ Warburton, J. Whitelaw, J. and Walsh, R. *History of Dublin* (Dublin, 1918), p. 972.

²⁵ Dickson (1978), p. 108.

²⁶ Registry of Deeds, Dublin, Anonymous Partnerships.

UK increased from 7 to 10 million between 1820 and 1830. Irish manufacturers who had not invested in improving their plant during the recovery of the industry between 1817 and 1825 ran into serious problems from the 1825-6 depression onwards; they used dated technology so their productivity was low and most of them went out of business.²⁷

Table 6:2.

COTTON MILLS BUILT IN AND AROUND BELFAST 1778-1825

OWNERS	DATE	HANDS	H.P.
JOY, M'CABE, M'CRACKEN	1778	99	16
WILSON, GRIMSHAW	1784	100	20
WALLACE	1791	60	15
WHITLA, STERLING	1794	50	15
<i>Average Employed: 77 Hands, Average HP: 16.5</i>			
BELL	1801	150	60
M'CRACKEN	1803	80	10
VANCE	1803	120	30
HOW	1804	150	40
BELL	1805	-	14
BOOMER (2 MILLS)	1805	450	50
M'COLLOUGH (2 MILLS)	1806	250	36
LEPPERS (2 MILLS)	1810	430	70
M'CRACKEN	1810	90	10
<i>Average Employed :101 Hands, Average HP: 26.6</i>			
MULHOLLAND	1816	500	120
STEVENS	1821	360	100
COWAN	1821	200	50
HOW	1824	130	25
MARTIN	1824	300	100
COWAN	1825	150	40
<i>Average Employed: 273 Hands, Average HP: 72.5</i>			

Source; McCall, H. *Our Staple Manufacturers* (Belfast, 1855), p. 157. *Repeal of the Union* (Hansard (Commons) 3rd series, xxii, 1834) pp. 1263-4.

Geary has demonstrated that a number of mills in the Belfast area continued to operate successfully after the mid-1820s. What was different about the Belfast cotton industry was that there had been greater capital investment in the spinning sector than elsewhere in Ireland. Geary has shown that in terms of average employment and horse-power, the Belfast mills compared favourably with manufacturers in Britain in the early 1830s. He has also argued that even if productivity in Belfast was lower, this, and higher fuel costs could be offset by cheaper

²⁷ Geary (1989), pp. 250-267. Geary, F. 'The Rise and Fall of the Belfast Cotton Industry', *Irish Economic and Social History*, viii (1981), pp. 30-49.

labour costs. Wages were the largest single cost element within the industry and this is where Belfast had an advantage; wages in Belfast appear to have been only about 70% of those in Lancashire. The mill-owners in Belfast employed even more unskilled female and child labour than in Lancashire. The ratio of male\female in Belfast was 1:2 while in Lancashire it was 1:1. Lancashire labour was more expensive than Belfast and it seems reasonable to assume it was more skilled. But the mills in Belfast (like Glasgow), could continue to compete, because labour was cheaper even though it was probable that productivity was lower.²⁸

After the 1826 depression, there was a general contraction in the spinning sector of the Irish cotton industry, particularly in the south. There were only 26 spinning mills in the whole country by 1835. Only one spinning mill survived in the Cork region at Bandon. There were only 3 mills in Dublin by the end of the 1830s. Even in Belfast, the post-1826 recovery was short lived; according to Geary's estimate the number of cotton mills in the Belfast area fell from a peak of 21 in 1825, to 15 in 1833. By 1835, the number of mills in the whole of Counties Antrim and Down (which incorporates Belfast and its hinterland) had fallen to only 12. Of these twelve, only 7 were located in the immediate neighbourhood of Belfast. The fortunes of the industry further deteriorated in the 1840s and by 1850, the number of spinning mills in the region had been reduced to only 3 (all located in Antrim).²⁹

The weaving of muslin survived in Belfast for long after the 1826 depression. Cheap labour attracted a number of Scotch houses which put out muslin yarn to cotton weavers in the Belfast area during the 1820s. In 1825, for example, an Irish cotton weaver got half the amount of pay for the same amount of piece work as his Scottish counterpart. Because of the rapid growth of this trade, by 1825, Ireland had become a net exporter of cotton cloth. Exports, according to Geary, rose to over 12,000,000 yards in 1830, which was probably its peak. Much of the yarn for these weavers came from Glasgow and Lancashire so they do not tell us anything about the spinning sector of the industry. This impressive performance in the weaving sector (based on cheap labour), had been sharply reversed by the mid-1830s. By 1835, Irish exports had

²⁸ *Ibid.*, pp. 30-49.

²⁹ *Return of Factories in UK*, BPP 1836, xlv (138) p. 90. BPP 1850, xlii (745) p. 10. Geary (1981), pp. 30-49. Geary (1989), pp. 250-267.

plummeted to a mere 1,039,088 yards, while imports had risen dramatically to 14,172,000 yards (see table 6.3).

Table 6:3.

IRISH IMPORTS AND EXPORTS OF COTTON CLOTH FROM AND TO GREAT BRITAIN, 1820-1835. (YARDS)

	IMPORTS	EXPORTS
1820	1,819,176	516,717
1821	2,827,285	406,687
1822	2,749,124	556,046
1823	3,392,924	3,840,699
1824	4,452,506	6,418,645
1825	4,996,885	10,567,458
1830		12,000,000
1835	14,172,000	1,039,088

Source; *British Cottons Imported and Exported To and From Ireland*, BPP 1825, xxi (189) p. i. *Second Report of Railway Commissioners* BPP 1837-8, xxxv, app. B, no. 10. p. 92. Geary, F. 'The Belfast Cotton Industry Revisited' *Irish Historical Studies*, xxvi, (1989), p. 255.

Although a few mills survived in Belfast area and a number of cotton weavers working on muslin continued to do work on Scottish account, the industry experienced a significant downturn in the first half of the 1830s, and subsequently during the 1840s. Technical innovation and investment in the British industry, led to higher productivity levels in Britain, which gradually eliminated the advantage of cheap labour in Belfast. Reflecting on the 1830s some years later (in 1848), a leading banker in Belfast pointed out that:

'we were not able to compete with Manchester and Glasgow in the spinning of cotton...our cotton mills have been converted into linen mills, there are some remaining but they are not doing much; we have a good deal of weaving and bleaching and things of that sort connected with the cotton manufacture but the yarn for that purpose is all imported and a good deal is done on Scotch account.'³⁰ As prices and profit margins fell, many of the Belfast spinners in preference to making further investment in cotton, saw flax spinning as a more lucrative business proposition with a higher rate of return on the capital invested.

³⁰ Ollerenshaw, P. 'Industry, 1820-1914'. in Kennedy L. and Ollerenshaw, P. *An Economic History of Ulster* (Manchester, 1985), p. 67. Crouzet, F. *The Victorian Economy* (London, 1982), pp. 196-9.

The size of British cotton mills increased significantly during the first half of the nineteenth century when average capacity increased by a factor of thirteen.³¹ The evidence on the Belfast region suggests that the size of mills increased gradually up to the end of the Napoleonic war, increasing more rapidly between then and the mid-1820s (see table 6.2). In Ireland, the average size of the surviving mills became continuously larger thereafter; average employment rose from 150 in 1835 to 303 in 1862.³² What was the reason for this increase in size? Because of the lack of business records it is difficult to prove that economies of scale were the main motive for building larger mills, but it is also difficult to see any other reason for this growth in scale over time. As time proceeded it became increasingly difficult for smaller mills to survive in Ireland, particularly in the absence of the external economies enjoyed by the smaller Lancashire mills who worked in specialist niches alongside the larger mills. Economies of scale were widely recognised within the industry; Gabriel Shaw for example, a partner in a firm of London commission agents stated in 1833 that savings made by operating on a large scale within the cotton industry were considerable: 'a difference of three to four percent between operating with £20,000 and £40,000, and these savings maybe greatly increased.' Even as early as the mid-1780s, the Cork manufacturer Sadlier found; 'from experience that its the large quantity manufactured that would enable us to sell at low prices.'³³

While it is true that the British industry was not dominated by a few larger firms, it is also true that from the end of the Napoleonic war, the average size of firms in Britain was increasing. Loyd-Jones and Le Roux who studied the changing size of firms in the Manchester area between 1815 and 1841, concluded that small and large labour-force firms lost out in relative importance to medium sized firms. The decline of smaller firms increased rapidly in the 1820s; they tended to be more vulnerable and prone to bankruptcy in the sharp fluctuations which occurred in the industry. By 1830, the industry was dominated by firms of over 150 people. Improvements in productivity led to a vigorous weeding out of inefficient or under-capitalised firms.³⁴ Decline within the Irish industry must be understood in this context.

³¹ Chapman, S. *The Cotton Industry During the Industrial Revolution* (London, 1987), p. 59.

³² *Factory Returns UK*, BPP 1836, xlv (138) pp. 90-1. BPP 1862, lv (23) p. 19.

³³ Bielenberg (1991), pp. 21-30. Chapman, S. 'Financial Restraints on the Growth of Firms in the Cotton Industry, 1790-1850', *Economic History Review*, xxxii (1979), p. 55.

³⁴ Loyd-Jones, R. Le Roux, A. 'The Size of Firms in the Cotton Industry', *Economic History Review*, xxxiii (1980), pp. 74-78. Howe, A. *The Cotton Masters 1830-1860* (Oxford, 1984), p. 12.

External economies which manufacturers enjoyed when working in areas where there were many other manufactures were of major importance. The services of machine builders, repairers and other ancillary industries working close at hand was an important advantage, quite apart from a large population of skilled workers familiar with the industry. The external economies gained by manufacturers operating in a concentrated geographical area seems to be the most plausible explanation for the increasing tendency of the British industry to become concentrated on Lancashire. At the end of the eighteenth-century this area embraced about 70% of the British cotton industry, by 1835 it accounted for 90%, to the detriment of other centres of the industry like the east-midlands, north-Wales, and east-Ulster. Lancashire adopted new machinery earlier than other regions, it was the main centre of innovation within the industry. It was close to Liverpool where the bulk of the cotton was imported and cloth was exported. Liverpool was also the centre of the chemical industry which serviced the industry. Manchester also displaced London as the main international marketing centre for both yarn and goods. Hudson notes that considerable external economies accrued to Lancashire because of the specialist services of its regional infrastructure, including the transport system, the supply of raw materials, machinery and the availability of specialist mercantile, legal, financial and credit facilities associated with the industry.³⁵

Marketing became more specialised after the Napoleonic war, but more particularly after the 1826 depression. Increasingly it became the specialised function of a small group of London merchants who received the necessary market information from commission agents permanently resident in export markets.³⁶ The English manufacturers therefore also had advantages in the sphere of marketing since they had greater financial resources which enabled them to offer better credit terms to Irish retailers than Irish manufacturers.

The inability of most of the Irish manufacturers to compete hardly seems surprising. Without significant protection being implemented by the state they operated within, manufacturers all over Europe found it hard to compete with the technological lead and the external economies which the British had built up during this period. It seems evident that the union duties in

³⁵ Crouzet (1982), p. 205. Hudson, P. *The Industrial Revolution* (New York, 1992), p. 121.

³⁶ Chapman (1979), p. 54.

Ireland had reduced British competition to a minimal level until the 1820s (the last of them being removed in 1824). The Belfast Chamber of Commerce attributed the decline of the spinning and printing sectors of the industry principally to the removal of the union duties and the introduction of steam navigation; the latter enabled shop-keepers to order a greater variety of goods from Manchester and Glasgow.³⁷

The growth of mechanised cotton spinning in the greater Belfast area between the 1780s and the 1830s had a more enduring impact on the region's textile industry than in the rest of the country. Through cotton production, manufacturers and artisans became familiar with mechanised spinning technology which subsequently played an important role in the mechanisation of the linen industry. The system of putting out yarn to weavers was first introduced within the cotton industry and subsequently in linen. It created the first generation of factory workers in Belfast and brought about a certain degree of commercial centralisation within the region's textile industry. Much of the fixed capital formation within the cotton industry subsequently passed into the linen industry when mills were converted for flax spinning after the the wet spinning process had been introduced in the late 1820s.³⁸ The growth of the cotton industry in the north-east initiated the first phase of industrialisation. Much of the human capital which had been developed within the cotton industry also passed into the linen industry, thus providing a significant element of continuity in the development of mechanised textile manufacture in the north-east, in contrast to the south.

³⁷ Ollerenshaw (1985), p. 68.

³⁸ Green (1949), p. 111. Green, R. *The Industrial Archaeology of Co. Down* (London, 1962), p. 5.

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The decline which beset the Irish cotton industry during the 1830s, continued during the 1840s. The number of mills fell from 24 to 11 between 1839 and 1850 and the number of hands working in these concerns fell from 4622 to 2937. The geographical pattern of change within the industry during this period is evident from the following table.

Table 6:4.

COTTON MILLS IN IRELAND 1839-1850.

	MILLS		NO EMPLOYED	
	1839	1850	1839	1850
Antrim	10	3	2000	616
Down	3	-	587	-
Armagh	2	1	210	143
Dublin	3	3	342	365
Kildare	1	1	247	180
Wexford	1	1	91	106
Waterford	1	1	1011	1362
Queens	1	-	50	-
Louth	-	1	-	165
Cork	1	-	55	-
Mayo	1	-	29	-
TOTAL	24	11	4622	2937

Source; *Returns of Factories, UK*, BPP 1839, xlii (41) pp. 334-5. BPP 1850, xxxxi (745) p. 10.

The major area of decline within the industry during the 1840s was in east-Ulster; in counties Antrim, Down and Armagh the number of mills fell from 15 to only 4. What little remained of the industry in Connaught and Munster died out. In Leinster, however, the industry held its own and employment in cotton mills increased from 1741 to 2178. There was no competition for capital resources from linen in Leinster, in contrast to Ulster. The survival of the industry in Leinster during the 1840s lends some support to Geary's argument that the decline of cotton spinning in east-Ulster was not inevitable. The cause of the Ulster exodus from cotton spinning, was in his view a result of the superior opportunities for making profits in the emerging flax spinning sector.³⁹ But one might add the higher profits to be made in flax spinning were partly a consequence of the diminishing profit margins in cotton spinning. By 1848, a leading Belfast banker noted that: 'we were unable to compete with Manchester and

³⁹ Geary, F. 'The Rise and Fall of the Belfast Cotton Industry, Some Problems,' *Irish Economic and Social History*, viii (1981), p. 32.

Glasgow in the spinning of cotton...our cotton mills have been converted into linen mills, there are some remaining but they are not doing much; we have a good deal of weaving and bleaching...but the yarn for that purpose is all imported and a good deal is done on Scotch account.⁴⁰ The Irish finishing and printing sector was also gradually displaced, by the superior colour, design and finish of their much larger English and Scottish rivals.⁴¹

Because of the low cost of weaving fine cottons in east Ulster relative to Scotland and England, there were still 12,000 to 15,000 muslin weavers working within a ten mile radius of Belfast in 1838. They were mostly located in the vicinity of Newtownards and Bangor, in Ballymacarrett (the Co. Down suburb of Belfast), and along the Lagan valley between Lisburn and Moira. About half of them were working for Scottish houses; they had effectively become a satellite of the Glasgow industry. But this trade also gradually declined in importance until it was finally swept away by the cotton famine of 1862-3. Sewn muslin and embroidery also became important in areas where the cotton industry had been prominent, notably in Antrim and Down. It was also dominated by Scottish employers.⁴² This trade gave employment to 300,000 people all over Ulster and in some parts of Connaught and Munster. Before it declined in the 1860s, the annual value of the manufactured article was estimated to have been worth about £500,000.⁴³ But the emergence of shirt making in west-Ulster from the 1840s, centred largely on Derry, was perhaps the most important development within the cotton sector in Ulster.

From small beginnings, shirt making in the Derry region slowly gained momentum, initially as a cottage industry and subsequently in supervised workshops. In 1853, Tillie and Henderson established the Foyle factory which became the largest shirt making establishment in Ireland employing 1,500 hands by the 1890s. The number of factories increased from 5 small concerns in the 1850s to 38 by the turn of the century, by which time shirt making employed 80,000 people in the counties of Londonderry, Donegal, and Tyrone. The various parts of the

⁴⁰ Ollerenshaw, P. 'Industry 1820-1914', in Ollerenshaw P. and Kennedy L. (ed) *An Economic History of Ulster 1820-1939* (Manchester, 1985), p. 67.

⁴¹ Green, R, *The Lagan Valley 1800-1850*, (London, 1949), p. 109.

⁴² *Ibid.*, pp. 105-7.

⁴³ Murphy, J. *Ireland, Industrial Political and Social* (London, 1870) p. 45.

shirts were made in factories in Derry, and to a lesser extent in Strabane, and these were then made up by rural outworkers.⁴⁴

In Dublin by 1878, Pim's at Harold's Cross was the only cotton manufacturer still operating, and even they closed in the early 1880s. In the Report on Irish Industry in 1884, one witness noted that the calico from Manchester was better finished than that from Pim's factory, even though the quality of Pim's calico was better. The external economies enjoyed by the Manchester finishing trade was the most important factor in explaining the increasing inability of Irish printers to compete. The lack of external economies was generally recognised within the Dublin printing trade,⁴⁵ and it seems probable that it had a similar impact on the spinning and weaving sectors. O'Grada argues that there is no doubting the importance of these economies of agglomeration which gave British producers a competitive advantage.⁴⁶ The importance of economies of scale in this context also need to be considered.

Like Gatrell, Geary questions the importance of substantial economies of scale prior to the 1840s. But in the decades that followed, economies of scale certainly became more important and the size of Irish mills increased. The factory returns from 1835 to 1862 indicate that the average number of hands employed in Irish cotton mills was increasing, rising continuously from 150 to 303.⁴⁷ The closure of the smaller mills and increased vertical integration are the main explanations for this growth in average size. Firms in Ireland which lacked the external economies enjoyed by Lancashire firms could reduce this disadvantage to a limited extent by vertical integration. The most prominent and successful firm operating in Ireland during this period, Malcolmsen's of Portlaw, was vertically integrated. Its size also enabled the owners to reap greater scale economies than other Irish concerns.

The large mill at Portlaw, county Waterford, was built in the mid-1820s by David Malcolmsen who had previously been extensively involved in corn milling. The success of his factory

⁴⁴ O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming). Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1907), pp. 417-9. *Industries of Ireland*, Part 1, (London, 1891), p. 149.

⁴⁵ *Report on Select Committee on Industries, BPP 1884-5*, ix (745), p. 10. Duffy, the last Dublin calico printer who closed in 1850, said that if he had three or four neighbours he would have done better.

⁴⁶ O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming).

⁴⁷ *Factory Returns, UK*, BPP 1836, xlv (138) p. 90. BPP 1839, xlii (41) pp. 334-5. BPP 1850, xxxii (745) p. 10. BPP 1862, lv (23) p. 19.

provides an interesting contrast to the general decline of the Irish cotton industry in the decades that followed. The firm combined both power spinning and weaving from the outset.⁴⁸ Initially the company sold its output locally, but by 1840 cottons were being exported to England, and by the mid-nineteenth century it was being exported via Liverpool to India, China, the USA and the colonies. The USA, was the company's main sales outlet.⁴⁹

By 1860, the machinery included 940 powerlooms and 30,292 spindles all of which were driven by three large steam engines and a series of powerful waterwheels. Employment reached 1412 by 1862.⁵⁰ An idea of the size of the firm's operation can be had from the fact that by 1846 already it consumed about one-third of the total amount of cotton wool imported into Ireland.⁵¹ Size enabled it to achieve economies of scale.

**Table 6:5.
EMPLOYEES WORKING AT PORTLAW 1853**

Carding and preparation	150
Spinners and reelers	350
Weavers, beamers, and sizers	590
Mechanics and carpenter	160
Bleachers and dyer	100
Handy hands, clerks etc	90
Labourers, about	60
TOTAL	1,500

Source; Maguire, J. *The Industrial Movement in Ireland* (Cork, 1853), p. 165.

Malcomson's business empire included a steam navigation business, textiles, shipbuilding, fishing, mining, a large part of which was outside Ireland. Family business interests experienced something of a downturn after 1858 when the senior partner, Joseph Malcomson died. The Portlaw venture continued to operate reasonably successfully judging by

⁴⁸ Power, P. 'The Portlaw Cotton Factory', *Journal of the Waterford and South-East of Ireland Archaeological Society*, (1910), p. 59. Power, P. *History of Waterford* (Cork, 1990), pp. 139-140. Maguire, J. *The Industrial Movement in Ireland* (Cork, 1853), pp. 164-6.

⁴⁹ By 1828, £60,000 had been invested in the venture, rising to £100,000 by 1846. By this time a canal was cut to the river Suir so cotton wool could be brought by barge right into the works and the manufactured cotton could be brought back to Waterford. Employment stood at 734 by 1835, rising to 1,362 by 1850. *Factory Returns, UK*, BPP 1836, xlv (138) p. 90. BPP 1850, xliii (745) p. 10. Dickson (1978), p. 111. *Slater's Directory*, 1846. National Library. P. 6935, Notes on the Malcomson Family.

⁵⁰ *Factory Returns, UK*, BPP 1862, lv (23) p. 19.

⁵¹ National Library; P. 6935. Notes on the Malcomson Family. Marmion, A. *History of the Maritime Ports of Ireland* (London, 1860), p. 559. O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming). By the 1860s, consumption was approaching 2,000,000 lbs and from this about 6,000,000 yards of calico were made per annum. All the cotton wool and cloth was shipped in Malcomson's own vessels. Production was vertically integrated.

employment levels recorded in the factory returns until the mid-1870s, despite a period of disruption during the American civil war when cotton supplies were curtailed. But from 1867, the Bank of Ireland kept a close watch on their account suspecting financial problems. By 1876, many of their ventures were losing badly. Creditors became alarmed when bills which were due were not paid; they began to call in their loans, and the Malcomson's empire collapsed with liabilities exceeding half a million pounds. But it is still unclear if the Malcomson's cotton interest failed, or was dragged down by other unprofitable ventures in which the family was implicated. The tariff of over 40% on cotton imports into the US which was first imposed in 1861 may have been a significant factor as the US was the major market for the output of the Portlaw factory.⁵²

CONCLUSION

There seems to be little dispute that external economies in the Lancashire industry explain much of the decline in cotton production elsewhere in Britain, and in Ireland. The evidence presented in this chapter for Ireland suggest that economies of scale were important for the surviving firms, particularly from the 1820s. Although many small firms survived in Lancashire after the 1840s, they fulfilled specialist functions which did not compete with the larger firms which reaped economies of scale in the production of common cloth types. Even though a number of economic historians have questioned the importance of economies of scale in the cotton industry before the mid-nineteenth century, they seem to have been widely recognised by British manufacturers.⁵³

Given that all over Europe, cotton manufacturers found it difficult to compete with British manufactures without significant protection, the deterioration of the industry in Ireland during this period hardly seem surprising. The only advantage Ireland had was the low cost of labour. Geary points out that this accounted for about 33% of total costs within the spinning and

⁵² After the Malcomson's bankruptcy, the Portlaw works were then taken over and reopened as the Portlaw Spinning Company but this never achieved the success of its predecessor. It continued to operate without success until 1904, O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming).

⁵³ Chapman, S. 'Financial Restraints on the Growth of Firms in the Cotton Industry 1790-1850', *Economic History Review*, xxxii, (1979), pp. 50-69. At the end of the eighteenth century Sadlier, the Large Cork manufacturer noted that 'we find from experience that its the large quantity manufactured that would enable us to sell at low prices'. Bielenberg, A. *Cork's Industrial Revolution, 1780-1880*, (Cork, 1991), p. 22.

weaving sector in 1833; wages in mills in Belfast at this time were only 70% of wage levels in Lancashire.⁵⁴ As technology improved and powerloom weaving was introduced, labour's percentage share of the costs fell. Lower productivity in Ireland (because of the lack of external economies) probably offset the advantage of cheaper labour in Ireland.⁵⁵

Labour costs were a more important factor in the shirt making industry. This accounts for the rapid growth of this industry during the second half of the nineteenth century in north-west Ulster where wages were very low. By 1891, there were over 15,000 seamstresses and shirtmakers in counties Derry and Donegal. But even this branch of the industry contracted in the face of foreign competition and changing fashions; by 1911, employment in the industry in Derry and Donegal had fallen to under 8,000.⁵⁶

Despite the growth and stagnation of the Derry shirt making industry, the Irish cotton industry experienced contraction during the second half of the nineteenth century. By 1889, there were only seven cotton manufacturers operating in the whole country. External economies and economies of scale were the major factors which enabled British producers to undermine Irish producers. External economies included the concentration of skilled labour in the manufacturing districts, a machine manufacturing and servicing industry close at hand, financial services (including better credit facilities), expertise in dyeing and finishing cottons, superior facilities for purchasing cotton wool and marketing cloth. British manufacturers produced a wider range of cloths which were more fashionable and better finished than those made in Ireland, ranging from the cheapest massed produced goods for the poorer sections of society to those of the highest quality and price. Ireland's only advantage in cotton production was cheap labour, and this is why shirt-making was the only remaining sector of the industry of any consequence after the end of the nineteenth century.

⁵⁴ Geary, (1981), pp. 40-2.

⁵⁵ This was certainly the case in France for example, where labour was cheaper than in Britain. The cloth produced in France was about 40% more expensive according to a person familiar with the industry in both England and France. He estimated that the average French hand did 20% less than a British hand and the French machinery was on average 25% less efficient. Pollard, S. Holmes, L. *Documents of European Economic History, The Process of Industrialization*, (Cambridge, 1969), volume i, pp. 279-292.

⁵⁶ O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming).

Chapter Seven

THE LINEN INDUSTRY

Linen was Ireland's most important industry; its manufacture provided the basis for industrialisation in the north-east of Ireland. The main aim of the chapter will be to explain the major factors which gave Ulster advantages over other regions in the UK in the production of fine linen.

I

The most significant feature of Ireland's linen industry by the end of the eighteenth century, was the large export trade which had gradually been built up from about 2 million yards in 1713, to over 47 million yards in 1796. In the years 1796-97 linen, flax and hemp accounted for over 56% of the value of all Irish exports. This distinguished it from other industries in Ireland, as its development was not dependent on the Irish market. The growth of Irish linen production during the seventeenth and eighteenth centuries was heavily concentrated in Ulster. By 1784, the province accounted for over four-fifths of the output of the industry.¹

There had been a tradition of flax cultivation in Ireland prior to the Ulster plantation, but newcomers during the plantation brought capital and a range of new skills into the industry from Scotland, England and the Continent. They were also familiar with the trade networks in other countries and the types of cloth which would sell in foreign markets which was important for the subsequent development of the export trade. From the late seventeenth century, linen cloth and yarn became the main commodity exported from Ulster. Participation in extra-regional markets made the industry more resilient and dynamic, and linked the Ulster economy closely into the expanding British market. By 1740, Ulster linens were out-selling linens from the continent on the London market. The growth of demand for linen in Britain and its colonies was the vital dynamic factor which brought about an expansion of the industry in the Ulster countryside. Ulster was able to exploit this growth in British demand more effectively than the

¹ Gill, C. *The Rise of the Irish Linen Industry* (Oxford, 1925), pp. 341-2, 161. Dickson, D. *New Foundations 1660-1800* (Dublin, 1987), p. 101.

rest of Ireland because of the closer trade networks the Ulster planters had with Britain. Milward and Saul conclude that whatever the origins and causes of rural industrialisation within Europe generally during this period, its extent was largely determined by market factors.² In an Ulster context, exports were the key to market expansion.

If exports facilitated market expansion, what other causal factors help to explain the competitiveness of Ulster linen? Harte argues that duty free access to the British market (the largest free-trade area in Europe and the fastest growing in the eighteenth century) was critical. In 1696, the English parliament enacted that Irish linens should enter the British market free of all duties, to reduce British dependence on foreign linens and encourage the settlement of foreign Protestants in Ulster. This gave Ulster manufacturers an important advantage over their continental rivals, which was further enhanced from 1705, when the Navigation Acts were overruled and Irish linens could be exported to the colonies. Irish linens could enter British and colonial markets duty free, while continental rivals in these markets were obliged to pay duties which made them less cost competitive than Irish linens. This official support was crucial for the gradual development of the Irish industry as it gave the export trade sufficient time to develop to a level by the mid-eighteenth century, which enabled it compete in terms of both cost and quality with the major Continental linen producers, Germany and Holland. Aside from market factors, Clarkson isolates entrepreneurial skills, technical improvements and labour costs as other important factors in the development of the industry. Emigrant weavers from Britain brought the manufacturing and marketing skills, in addition to some capital. The Quakers established a prominent network among these early weavers. The Church of Ireland and to a lesser extent the Huguenots built up similar networks. These Protestants, according to Clarkson, had entrepreneurial skill and raised the cloth quality to a standard which was acceptable in the English market. Landlords also eagerly assisted the growth of the industry during the eighteenth century as it increased income on their estates. They helped provide adequate market facilities for spinners and weavers and often provided housing at cheap rents.

² Gill (1925), p. 144. Crawford, W. 'Ulster Land owners and the Linen Industry', in Ward, J. Wilson, R. (eds), *Land and Industry and the Industrial Revolution* (Newton Abbot, 1971), pp. 117-144. Milward, A, and Saul, S. *The Economic Development of Continental Europe 1780-1870* (London, 1979), p. 103.

In addition, they improved the transport infrastructure by building roads and canals. The Irish Linen Board had been set up in 1711 to promote the industry all over Ireland, and Landlords also gave legislative support to the industry in the parliament in Dublin from 1723.³

Linen manufacture was particularly suited to Ireland, since most processes within it (with the exception of bleaching and finishing) were labour intensive rather than capital intensive. Labour was cheaper in Ireland than in Britain, so this gave Ireland a major advantage in linen production, and explains why linen was cheaper in Ireland than in Scotland and England. The cultivation and spinning of flax, and the weaving of yarn into cloth were activities which were well suited to smallholders in Ulster, as these activities could supplement farming, taking up the slack periods in the farming calendar when there was a low demand for agricultural labour. From the 1740s, yarn spinning began to spread westward into Connaught and also into north Leinster. This increased the yarn supply to the weaving districts in Ulster.⁴

Facilities for bleaching and finishing also tended to be located more in east- and central Ulster from an early stage. The core markets within the industry also lay within this area, in a triangle linking Belfast, Dungannon and Armagh. The commercial and economic impact of the industry was therefore deeper and more sustained in Antrim, Down, Armagh and Londonderry than in the remaining counties in the province. The numbers engaged in the industry in the province give some indication of its importance; 478,000 people worked in agriculture in Ulster at this stage compared to 496,000 in manufacturing, (of whom 381,000 worked in textiles).⁵

The principal distribution centre of the industry for most of the eighteenth century was Dublin where merchants financed the trade with England. The northern linen drapers had insufficient resources to purchase cloth from weavers and wait for remuneration from English buyers.

³ Harte, N. 'Protection in the English Linen Trade', in Harte N. and Ponting, K. (Eds), *Textile History and Economic History* (Manchester, 1973), pp. 92-4. Crawford (1971), p. 125. Dickson (1987), p. 125. Clarkson, L. 'The Environment and Dynamic of pre-Factory Industry in Northern Ireland', in Hudson, P. (ed), *Regions and Industries* (London, 1989), pp. 259-63.

⁴ Gill, p. 31, 47. Cullen, L. *The Emergence of Modern Ireland* (Dublin, 1983), p. 57. Crawford, W. *Domestic Industry in Ireland* (Dublin 1972) p. 76. Crawford, W. 'Economy and Society in South Ulster in the Eighteenth Century' *Clogher Record*, (1975), p. 247. Clarkson (1989), p. 263.

⁵ Smyth, W. 'Locational Patterns within the Pre-Famine Linen Industry', *Irish Geography*, (1975), p. 99. Clarkson (1989), p. 253.

Instead they received an immediate cash payment from the Dublin factors who in turn sold the cloth in London. However a number of Ulster factors began by-passing Dublin and dealing directly with London. London credit facilities were superior to those offered in Dublin; in 1812, London merchants could offer 8 months credit while those in Dublin could only offer 2.⁶ Through this credit system Ulster drapers and bleachers could draw on capital resources from outside the region to provide working capital for the industry.

A complex commercial system evolved in the numerous markets around Ulster during the course of the eighteenth century, which enabled those engaged in the industry to exchange flax, yarn and unbleached cloth. Drapers bought cloth from weavers in the markets, and then got a bleacher to finish it on a commission basis before taking it to Dublin or shipping it to London. Slowly, however, bleachers began to purchase cloth directly at the linen markets since they had sufficient capital. After the finishing process had been complete, they sold the cloth directly to factors in Dublin or London. So bleachers effectively took control of the latter stages of production and the primary stages of marketing, which significantly increased their wealth and power within the industry.⁷

Irish bleachers were among the first to use oil and vitriol, from the early 1760s; chemicals speeded up the whole bleaching process. The adoption of water-powered machinery was already well underway by the mid-eighteenth century, including the use of rub boards, wash mills and beetling engines. From the 1760s, there was a gradual increase in the size of bleachgreens. The bleaching trade became more concentrated in a smaller number of large firms; the number of bleachgreens in Ulster fell from over 350 in 1787 to 130 by 1830. The installation of machinery required a larger capital outlay than previously; according to L'Amie a new class of capitalist bleachers was emerging at this time, who were capable of financing such outlays. From the mid-eighteenth century, the industry became more specialised; productivity

⁶ Crawford (1972), p. 4. Gill (1925), p. 177. London University Library, Ms 622, Evidence on State of Linen Industry in 1774. According to Payne who gave evidence many of the Irish manufacturers [presumably bleachers]; 'were people of good fortune many of whom had resources here on the opulent factors in London'.

⁷ Green, R. *The Industrial Archaeology of Co. Down* (Belfast, 1963), p. 2. McCutcheon, W. *The Industrial Archaeology of Northern Ireland* (New Jersey, 1984), pp. 288-292. Crawford, W. 'Drapers and Bleachers in the Early Ulster Linen Industry', in Cullen, L. Butel, P. (eds) *Negoce et Industrie en France et en Irlande Aux xviii et xix Siecles* (Paris, 1980), pp. 113-9.

levels rose as more machinery and new techniques were applied (including the use of chemicals). This led to a reduction of the costs incurred, which assisted the competitiveness of Irish linens internationally. Bleaching and finishing in Ireland was carried out efficiently in cost terms and the standard of the finish in general had a good reputation on the international market.⁸

Drapers and bleachers provided the link between independent manufacturers and the market. They purchased webs from the weavers at markets all over the country. In Ulster there were about 60 of these linen markets by the end of the eighteenth century, but the bulk of the trade was carried out in Armagh, Lisburn and Lurgan. Crawford has demonstrated that the production and sale of cloth in brown linen markets in Ulster remained largely in the hands of independent weavers right up the 1820s, when machine spun yarn began to be used in the Ulster industry. Prior to this development, even the large bleachers purchased their cloth through agents at the public markets. The weaving and spinning process was predominantly organised along traditional lines until the 1820s. The market was still the point of mediation between the manufacturing sector and the bleachers.⁹

It can be seen from market sales, that there was no major shift in the geography of the industry towards east Ulster between 1783 and 1821. Armagh Down and Antrim accounted for a lower percentage of the Ulster total in 1821 than in 1783. This lends support to Crawford's argument that the traditional organisation of the manufacture and sale of linens persisted until the 1820s. Weaving remained concentrated in Antrim, Armagh, Down, Londonderry and Tyrone throughout the eighteenth and early nineteenth century, while Cavan, Donegal, Monaghan concentrated on spinning yarn for the weaving districts.

⁸ Amie, L. *Chemicals in the Eighteenth Century Irish Linen Industry* (Unpublished MSS, 1984, QUB), pp. 234-7. Mc Cutcheon (1984), pp. 292-3.

⁹ Crawford, W. 'The Evolution of the Linen Trade in Ulster', *Irish Economic and Social History*, xv, (1988), pp. 33-51.

Table 7:1.

VALUE AND PERCENTAGE OF TOTAL SALES OF LINEN IN ULSTER

1783-1821

	1783	1821	1783	1821
ANTRIM	£263,200	£345,504	21.5%	16.7%
ARMAGH	£288,600	£570,348	23.6%	27.5%
CAVAN	£68,200	£116,626	5.6%	5.6%
DONEGAL	£16,040	£33,076	1.3%	1.6%
DOWN	£149,560	£214,199	12.2%	10.3%
FERMANA'	£4,100	£23,386	0.3%	1.1%
L'DERRY	£99,820	£231,219	8.2%	11.2%
MON'AN	£104,000	£142,952	8.5%	6.9%
TYRONE	£231,040	£395,809	18.7%	19.1%
TOTAL	£1,224,560	£2,073,122	100%	100%

SOURCE; Crawford, W. *Domestic Industry in Ireland* (Dublin, 1972), pp. 78-80. Horner, J. *The Linen Trade in Europe* (London, 1920), p. 198.

The development of the Ulster linen industry during the eighteenth century displays many characteristics highlighted by the proponents of the theory of proto-industrialisation. The industry was predominantly a rurally based manufacture carried out by families who generally combined flax cultivation and spinning and/or weaving, with farming. The expansion of the industry was export led.¹⁰ Almquist's work on the 1841 census has demonstrated that there was a strong correlation in Ireland between rural domestic industry, population density, smaller holdings and a lower average age of marriage and higher fertility. Population in Ulster rose from about one million to two million people between 1760 and 1841, making it the province with the highest population density in Ireland. Finally, Almquist argues that the transition to full industrialisation occurred in east Ulster, which was precisely the area where pre-industrial textile production had been most intense. Armagh in the heart of the linen triangle, was the county with the highest population density.¹¹

Proto-industrial theory has been extended to include the concept of 'de-industrialisation'. Collin's work has demonstrated that emigration from Ireland was greatest, from regions where the linen industry experienced decline, notably counties Donegal, Derry, Tyrone, Cavan,

¹⁰ Clarkson, L. *Proto-Industrialization; The First Phase of Industrialization* (London, 1985), pp. 15-18.

¹¹ Almquist, E. 'Pre-Famine Ireland and the Theory of European Proto-Industrialization; Evidence from the 1841 Census', *Journal of Economic History*, xxxix (1979), pp. 699-719. Clarkson (1989), p. 265.

Monaghan, Leitrim, and Longford. These were the areas where households had been predominantly engaged in cultivation of flax and the spinning of yarn which was sold locally and then taken to Armagh, Down and Antrim to be woven. But with the introduction of machine-spun yarn, the demand for hand-spun yarn gradually declined. Thereafter, the yarn supply was increasingly controlled by manufacturers and bleachers who put it out to weavers. Since manufacturers and bleachers with capital were concentrated in east Ulster, the weaving sector also began to become more concentrated in this area. From the late-1820s, many household members in this region (notably females) previously engaged in spinning turned to weaving; machine-spun yarn was more even than hand-spun yarn and required less strength and skill to weave.¹² Weaving therefore continued to be a household activity until well into the second half of the nineteenth century. The mechanisation of the spinning sector, began in the late 1820s.

The theory of proto-industrialisation has provided some useful comparisons with other European regions which had a large pre-industrial rural textile industry. But it fails to provide any explanation or insights into the dynamics of transition from cottage-based rural industry to urban-based factory industry in east Ulster. Clarkson and Collins point out that the theory ignores the many urban dwellers who worked within the industry in the towns of east Ulster prior to mechanisation.¹³ The introduction of the more mechanised cotton industry further complicates the picture. The conclusion that proto-industry either leads to industrialisation or to de-industrialisation is not very helpful. Another weakness of the model in the Irish context is that it ignores the development of a number of centralised bleachworks from the eighteenth century; capital formation in this sector of the industry and the wealth accumulated by bleachers was critical for the subsequent development of the industry. These issues cannot be ignored in any attempt to understand the growth of mechanised flax spinning in the region.

One way to gain some more refined insights into the transition to mechanised flax spinning is to look at the backgrounds of the entrepreneurs who established the first generation of

¹² Collins, B. 'Proto-Industrialisation and Pre-Famine Emigration', *Social History*, vii (1982), pp. 127-146.

¹³ Clarkson, L. Collins, B. 'Proto-Industrialisation in an Irish Town: Lisburn, 1820-21' viii Congress International D' Histoire Economique, (Budapest, 1982), pp. 1-20.

mechanised flax spinning mills (using the wet spinning process) in Ulster. Of the 27 flax spinners operating in the province at the beginning of 1836 at least 12 had been either previously engaged in the region's cotton industry or were spinning flax in mills previously used for manufacturing cotton. Most of the remaining innovators who became engaged in wet spinning were bleachers and/or dry spinners engaged in the linen industry.¹⁴ This group of cotton manufacturers, linen bleachers and dry spinners who initiated the wet spinning process in east Ulster had sufficient capital to build spinning mills, in addition to a sufficient knowledge of the technical and commercial requirements of factory production (human capital). This combination of resources was grafted onto the existing linen manufacturing and marketing infrastructure of the province, contributing significantly to the dynamics of industrialisation.

The bleaching trade and the associated chemical industry had already become industrialised and concentrated in east Ulster during the eighteenth century. By 1800, Belfast was the commercial centre of the linen industry and a large network for selling Irish linen on the international market had been established long before the spinning process became mechanised. Belfast was also the main centre of mechanised cotton spinning in Ireland. Much of the fixed capital invested in cotton manufacture in and around the city was shifted into linen production during the 1830s.¹⁵ Because of the existence of a cotton industry, the city already had an extensive workforce accustomed to working in spinning mills. In addition it had skilled artisans who were familiar with textile machinery, and a number of foundries and engineering establishments which could manufacture or repair machinery and steam engines. Like the woollen industry in Yorkshire, or the cotton industry in Lancashire, a whole range of external economies had historically evolved within the linen industry of east Ulster. These growing external economies gave the region strong advantages over other European linen manufacturing regions.

¹⁴ The list of 27 flax spinners in 1836 is from Young, R. *Historical Notices of Old Belfast* (Belfast, 1896), p. 255. Information on the background on these flax spinners has been drawn from the following sources; McCutcheon (1984), pp. 283-324. Gribbon, H. *The History of Waterpower in Ulster* (Newton Abbot, 1969), pp. 81-109. Green (1963), pp. 1-35. Takei, A. *The Early Mechanisation of the Ulster Linen Industry 1800-1840* (unpublished M. Litt, TCD, 1989), pp. 1-206. A bound volume of articles in the Linen Hall Library, Belfast by Lawlor H. and Beck J. from the *Journal Fibres Fabrics and Cordage*.

¹⁵ Geary, F. 'The Rise and fall of the Belfast Cotton Industry, Some Problems', *Irish Economic and Social History*, viii (1981), pp. 30-49.

The lower cost of labour in Ireland relative to Britain was an important factor in the development of the Irish linen industry. Arthur Young, writing in the 1770s, estimated that labour accounted for 60% of the costs of producing an acre of flax, so lower labour costs would have reduced the final cost of the raw material which was an extensive part of the gross value of linen cloth. In the largest Belfast linen mill, flax accounted for almost 40% of the value of gross output in 1837 (see table 7: 3). The available evidence suggests that in all the labour intensive activities associated with scutching, spinning and weaving the cost of labour was lower in Ireland. This difference in labour costs is apparent in the early mechanised spinning mills; Belfast wages were lower than in the English or the Scottish centres of the industry (see table 7:2).

Table 7.2
INDEX OF WEEKLY WAGES IN UK FLAX MILLS IN 1833

	LEEDS		SCOTLAND		BELFAST	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
UNDER 21	24.6	26.6	24.6	26.8	16.6	20.9
OVER 21	100	34.9	78.4	34.9	78.0	26.1

18 SHILLINGS=100

Source; Boyle, E. *The Economic Development of the Irish Linen Industry, 1825-1913* (unpublished Ph D, QUB, 1977), p. 40.

In cost terms, Ulster manufacturers enjoyed the lowest wages in the UK. Linen was the lowest paid textile manufacturing industry in the UK and it became increasingly difficult for other manufacturers in Britain to produce linen at such low costs.¹⁶ But clearly this was not the only variable in explaining industrialisation in the north-east. Low wages alone did not help the development of a mechanised textile industry in the south of Ireland for example. But in Ulster, where there was a strong tradition of commercial linen production for international markets the advantage could be fully exploited. The skills in linen manufacture which had been built up in the region could be purchased by manufacturers at low cost, relative to other industrial regions in Great Britain. Linen was an industry which was slow to succumb to mechanisation so labour inputs remained high. Weaving remained unmechanised until the 1850s.

¹⁶ Cohen, M. 'Working Conditions and Experiences of Work in the Linen Industry: Tullylish, Co. Down', *Ulster Folklife*, xxx (1984), p. 18.

The first wet spinning mills in Ireland were established by bleachers in Ulster between 1825-28 after the wet spinning technique had been successfully applied in England. But most of these ventures were small and had only a limited degree of success. In 1828, the Murlands of Castlewellan, Co Down established a larger wet spinning mill and made a commercial success of the new technology. The Mulholland brothers, who increased the scale of wet spinning further, were the first cotton manufacturers to venture into flax spinning. In 1829 they completely refitted a burnt out cotton mill with 8,000 spindles for this purpose; the immense profits it subsequently yielded to the owners, led a number of other cotton manufacturers to convert into flax spinning. By the mid-1830s, linen had displaced cotton as the main employer of factory labour in the Belfast area. By then flax spinning mills were being established in a number of towns and villages all over Ulster.¹⁷

Large quantities of British machine spun yarn began to be imported into the region from Britain after the mid-1820s. Imports of linen yarn rose from less than half a million pounds in 1825 to about eleven million pounds in 1835.¹⁸ The growing demand for machine-spun yarn in Ulster and the potential profits that could be made from its manufacture provided a major incentive for manufacturers to invest in wet-spinning technology. In view of the number of manufacturers transferring from cotton into linen during the 1830s, it seems evident that flax spinning was becoming a more lucrative business proposition than cotton spinning. It became easier for Ulster based flax spinners to compete with British flax spinners than it was for Ulster based cotton spinners to compete with British cotton spinners.

Initially Ulster lagged behind Leeds in the production of fine yarns. But the Ulster manufacturers were closing the gap during the 1830s. Once the technical constraints had been overcome, the Irish manufacturers had advantages. This can be seen from Kane's comparison of the costs of Mulholland's spinning mill in Belfast with the costs of running a similar mill in England in 1837.

¹⁷ Ollerenshaw, P. 'Industry 1820-1914', in Kennedy L. and Ollerenshaw, P. (eds) *An Economic History of Ulster* (Manchester, 1985), pp. 69-70.

¹⁸ *Report of the Railway Commissioners BPP 1837-8*, xxxv, app. B. no. 10, p. 92.

Table 7:3.

PERCENTAGE COST BREAKDOWN OF MULHOLLAND'S SPINNING MILL IN 1837 COMPARED TO SOME EQUIVALENT COSTS IN ENGLAND.

	MULHOLLAND COSTS	ENGLAND % OF GROSS OUTPUT	% OF GROSS OUTPUT
WAGES	£10,400	13.0%	16.9%
FUEL	£3,042	3.8%	2.3%
FLAX *	£31,500	39.4%	-
OTHER	£35,058	43.8%	-
ANNUAL OUTPUT	£80,000	100%	100%

SOURCE; Kane R. *The Industrial Resources of Ireland* (Dublin, 1845), p. 65. *quantity of flax consumed by Mulhollands in 1837 comes from Takei, A. *The Early Mechanisation of the Irish Linen Industry, 1800-1840* (unpublished M. Litt, TCD, 1989), p. 109. (in 1841 flax cost £45 a ton, Kane (1845, p. 330)

According to Kane, the very highest quality Irish flax fetched 15 shillings a stone in 1844, and 36 shillings a stone had been paid for high quality imported flax.¹⁹ But it is difficult to tell if the Irish flax was equal to the imported material in terms of quality. The transport costs of importing Leeds yarn certainly gave local manufacturers some advantage.

Once power spinning had become established, a number of bleachers and mill spinners began to put out mill-spun yarn to weavers. The control of the yarn supply was a critical factor in determining changes in the organisation of the industry. Large manufacturers increasingly took control, initially importing mill spun yarn from England and subsequently using Irish yarn when it became fine enough. With access to extensive credit from financial institutions, these larger manufacturers gradually displaced smaller manufacturers and independent weavers from the late 1820s onwards.²⁰ Hand spinning also began to contract during this period.

Remuneration for hand spinning fell by 90% between 1815 and 1836, and by 1846 it had been completely abandoned in the major linen producing counties.²¹

¹⁹ Kane, R. *The Industrial Resources of Ireland* (Dublin, 1845), p. 330.

²⁰ *Report on Handloom Weavers*, BPP 1840, xxx (43), pp. 591-676.

²¹ Boyle, E. *The Economic Development of the Ulster Linen Industry 1825-1913* (unpublished Phd, QUB, 1977), p. 48. Solar, P. 'A Belgian View of the Ulster Linen Industry in the 1840s', *Ulsterfolklife*, xxxiv, (1988), p. 18.

The industry experienced a technical and organisational transformation during the 1830s and 1840s. It became possible to produce fine yarn mechanically. Hand spinning therefore declined drastically in the major linen producing counties between the mid-1830s and the mid-1840s as factory production began to predominate.²² It is probable that well over half of the 516,224 textile hand spinners enumerated in the Irish census of 1841 were flax spinners. By 1851 the number of handspinnners had fallen to 111,771.²³ According to Moxhet, a Belgian who made a report on the Irish linen industry, hand spinning had been completely abandoned in the major linen producing counties by 1846.²⁴ The number of flax spinning mills in Ireland had risen from 22 in 1835 to 69 by 1850; employment in these mills during the same period rose dramatically from 3370 people to 21,121.²⁵

Once the technological problems connected with the wet spinning of fine linen yarns had been overcome and applied in north-east Ulster, it was in cost terms an extremely viable location for mechanised flax spinning.²⁶ Labour was cheap in Ireland, which gave east-Ulster an important cost advantage over the remainder of the UK. The export trade in Ulster linen was already well established. In addition, the region was well endowed with technical and commercial expertise in all the various processes within the industry. Significant capital resources had already been committed to the industry, notably in the bleaching and finishing processes.

In terms of capital resources, the bleachers were the dominant group within the industry during the first quarter of the nineteenth century. They were the major buyers of brown linens at the markets and the principal exporters of cloth. By 1816, all of the brown linen markets in the four north eastern counties of Antrim, Down, Armagh, Derry and also much of Tyrone were supplying the heavy concentration of bleachers on the rivers Lagan, Bann and Callan.

Effectively the bleachers were the axis of a whole range of commercial transactions within the industry from the collection of linen at the markets through to bleaching finishing and exporting

²² Green, R. *The Lagan Valley, 1800-1850* (London, 1949), p. 116. Solar, P. 'The Irish Linen Trade 1820-1852', *Textile History*, xxi (1990), p. 57.

²³ Census, 1841, 1851.

²⁴ Solar (1988), p. 18.

²⁵ *Persons employed in mills and factories, UK*, BPP 1836, xlv (138) p. 92. BPP 1850, xlii (745) p. 19.

²⁶ Boyle (1977), p. 40.

cloth. Although the size of the average bleachgreen continued to increase, the number of greens in Ireland continued to decline from about 130 in 1830 to just over 40 in the mid-1850s.²⁷

According to Gill, machine spinners displaced bleachers as the principal employers of labour in the industry between 1830 and 1850. A number of bleachers moved into flax spinning setting up vertically integrated concerns; this occurred at Bessbrook, Gilford and Banbridge for example.²⁸ When the technological problems of wet spinning fine yarn had been overcome, price was the determining factor in the struggle between the hand spinners and the machine spinners. Between 1830 and 1852 the price of fine yarn dropped by almost 70%. It was impossible for hand spinners to compete with this. Geographically, flax spinning shifted its location; hand spinning had traditionally been widely dispersed across the northern half of the country. By the end of the 1830s, the three east Ulster counties, Antrim, Armagh and Down accounted for 30 of the 40 mills in Ireland and 80% of total employment in the mill spinning sector (see table 7:4).²⁹

Table 7:4.

THE GEOGRAPHY OF IRISH FLAX SPINNING, POWER AND EMPLOYMENT IN 1839.

	MILLS	STEAM (HP)	WATER (HP)	EMPLOYMENT
DUBLIN	1		60	297
KILDARE	1		60	205
ANTRIM	23	764	333	5976
ARMAGH	4		118	518
DOWN	3	52	284	725
DERRY	2	25	60	214
MEATH	1		44	168
MON'HAN	2		48	139
LOUTH	2	115		589
TYRONE	1		70	159
TOTAL	40	928	1052	9017

Source; *Factory returns, UK BPP 1839, xlii (41), pp. 336-9.*

²⁷ Green, R. *The Lagan Valley 1800-1850* (Manchester, 1949), pp. 74, 79, 92-3, 122.

Gill (1975), pp. 315, 322. McCutcheon (1984), pp. 292-3. Smyth (1975), p. 104.

²⁸ Gill (1985), p. 322.

²⁹ *Factory Returns, UK BPP xlii, 1839 (41), pp. 336-9.* O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming).

Table 7:5.

FLAX SPINNING MILLS IN IRELAND 1835-1850

	MILLS	HORSE POWER	NO EMPLOYED
1835	25		3681
1839	40	1,980	9017
1847			17088
1850	68	3,366	20983

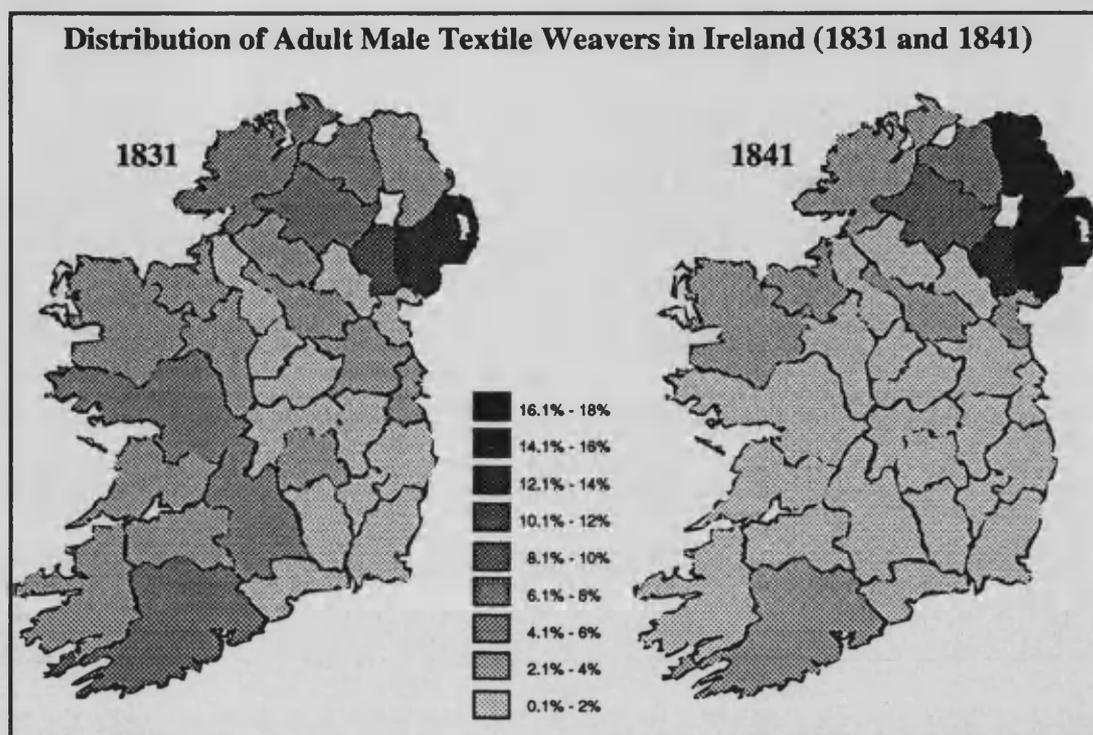
Source; *Factory Returns, UK* BPP 1836, xlv (138) p. 92. BPP 1839, xlii (41) pp. 336-9. BPP 1847, xlvi (294) p. 8. BPP 1850, xlii (745) p. 19.

The organisation and geography of the weaving sector of the industry was changed radically by the advent of mill spinning. It became increasingly difficult for independent weavers to work on their own account, so many began to work for mill spinners or manufacturers who paid them a fixed rate for weaving yarn into cloth. Therefore the weavers lost control over the sale of the cloth and very little was sold in markets by the 1840s (except in the areas where very fine linen was made such as Lurgan, and Portadown). Instead the spinners or manufacturers had it finished on their own account or sold it on to bleachers who had sufficient resources to finish and market the cloth. The control of the yarn supply and the sale of the cloth had therefore passed from the family unit to manufacturers with larger financial resources. Consequently the geography of the weaving population became more concentrated. Since over two-thirds of the weavers in Ireland were linen weavers it is possible to get some idea of the changing geography of the weaving sector by looking at changes in the distribution of all textile weavers in 1831 and 1841 (see figure 7:6).

The maps indicates that there was a growth in the relative importance of Antrim, Down, Armagh, Derry and Tyrone as weaving centres during the 1830s when the spinning process began to become more mechanised. In contrast to Ulster, the figures for the provinces of Munster, Leinster and Connaught indicate that textile weaving in these provinces had stagnated and experienced a relative decline (with the exception of the coarse linen industry in Drogheda, Co Louth). The southern centres of the linen industry, which predominantly made coarse linens, declined after 1826. Traditional methods of production persisted in these areas and they

were unable to compete on the international market with the mechanised coarse linen industry.³⁰

Figure 7:6.



Source: Census, 1831, 1841.

Since linen production was very export orientated, exports are the best index of the industry's growth. As a consequence of the Act of Union, separate export figures for Ireland were phased out in mid-1820s. However this problem has been overcome by Solar's reconstruction of the linen export statistics from 1825 onwards. In national terms, the period between 1790 and 1845 was one of slow growth up to the mid-1820s, despite significant fluctuations in the industry. Despite a decline in the second half of the 1820s and early 1830s, growth resumed thereafter.

³⁰ Durie, A. and Solar, P. 'The Scottish and Irish Linen Industry Compared, 1780-1860', in Mitchison R. and Roebuck, P. (eds) *Economy and Society in Scotland and Ireland* (Edinburgh, 1988), pp. 211-221. Crawford, (1972), p. 43. Lewis, S. *Topographical Dictionary of Ireland* (London, 1837) i, pp. 333, 643, ii, p. 523.

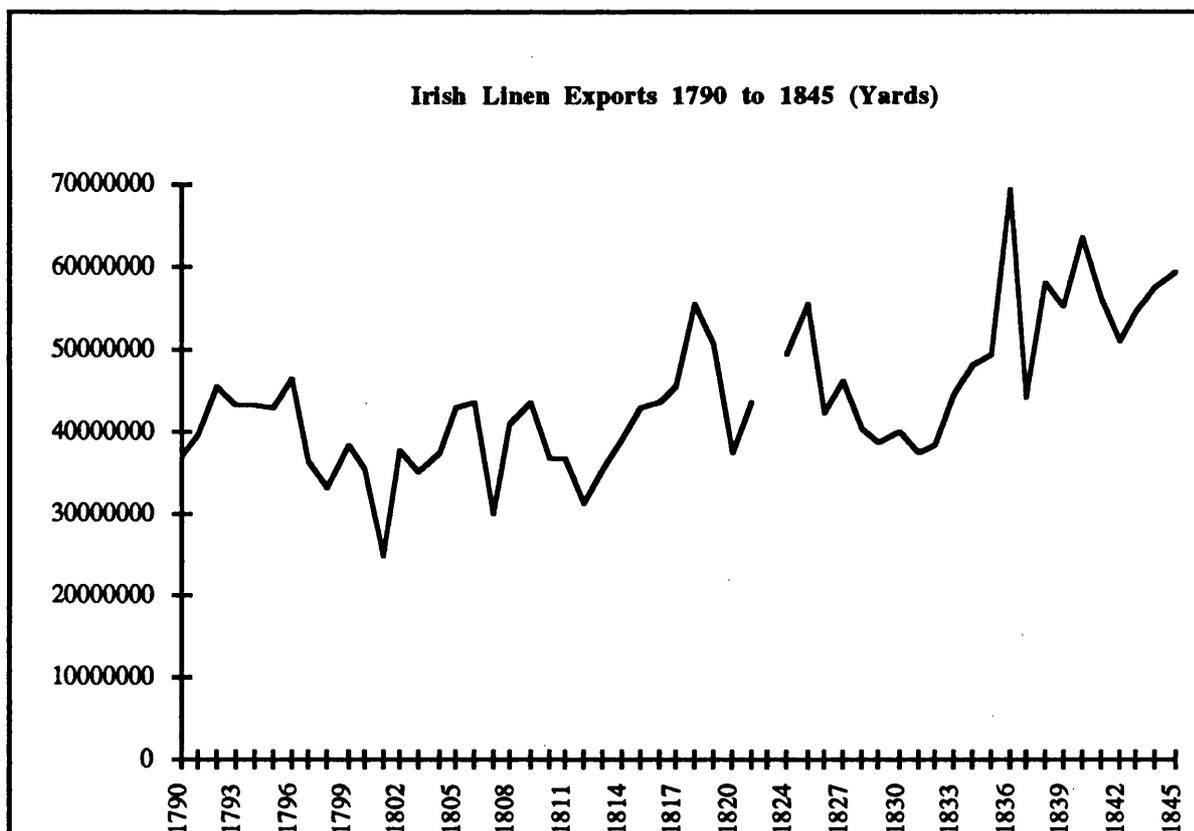


Figure 7:7. Source; Gill, C. *The Rise of the Irish Linen Industry* (Oxford, 1925), Solar, P. 'The Irish Linen Trade, 1820-1852', *Textile History*, xxi (1990), pp. 57-85.

As the coarse linen trade declined all over Ireland during the 1820s, the importance of Belfast, the hub of the fine linen industry, increased enormously. During the second half of the decade there were improvements in banking and in transportation (steam navigation) and the competition for resources from the cotton industry began to recede. Available resources in the Ulster textile industry therefore began to shift increasingly towards fine linen production where Ulster had comparative advantage over other linen manufacturing centres in Britain, notably in terms of labour costs combined with the high level of human capital which had been built up within the industry. Solar's figures indicate that there was probably only a modest increase in output between the 1820s and the 1840s in terms of yards.³¹ But the shift away from coarse linen production meant that there was probably some increase in the average value per yard, which offset the fall in linen prices; this would have led to an increase in the value of total

³¹ Solar, P. 'The Irish Linen Trade, 1820-1852', *Textile History*, xxi (1990), pp. 57-85.

output. The industry had adjusted successfully to mechanised flax spinning which led to further concentration in east Ulster.

There had been significant changes in the international market for linen between the 1790s and the 1840s. At the end of the eighteenth century linen had been used for towelling, bedding, furnishing, sailcloth and sacking and clothing (notably for peasants and slaves). By the mid-nineteenth century, cheaper cotton cloth had displaced linen for many of these purposes. But fine Ulster linen had become a fashionable fabric in hot climates. From the 1820s, there was a shift in the destination of UK linen; the trade to South America and the West Indies contracted, while there was a simultaneous increase in the trade with the USA.³² This shift coincides with the decline in the coarse linen trade across rural Ireland from the 1820s and an increase in the relative importance of the fine linen trade centred on Belfast. In a UK context, east Ulster benefited from this shift in the nature of demand, as it specialised in the finer branches of the industry.

II

During the second half of the nineteenth century, the bleaching sector of the industry became increasingly concentrated in a smaller number of more highly capitalised concerns along the major Ulster rivers. As in spinning and weaving, bleaching by the mid-nineteenth century had become increasingly concentrated in east Ulster. In county Armagh, bleaching was predominantly concentrated on the river Callan. In county Down, many bleachers, spinners and manufacturers were located along the river Bann and on the river Lagan, between Lisburn and Belfast. This was the most important concentration of bleachers in the country.³³ The number of bleachgreens fell from about 130 in 1830, to only 20 in 1903, but these were very large and the total amount of cloth bleached was far greater than in 1830.³⁴

³² Boyle (1977), p. 204. Harte (1973), pp. 108-9.

³³ Smyth, W. 'Locational Patterns and Trends within the Pre- Famine Linen Industry'. *Irish Geography*, 1975, p. 104. Green (1949), pp. 92-3, 122. Green, R. *The Industrial Archaeology of Co. Down* (London, 1969), pp. 6-7.

³⁴ McCutcheon (1984), pp. 292-3. Lloyd Paterson, R. 'The British Flax and Linen Industry' Ashley, W. (ed) *British Industries* (London, 1907), p. 143.

Even in the mid-nineteenth century, many of the weavers in Ulster still combined farming with weaving. But they did not remain unaffected by the mechanisation of the spinning sector. At this stage most of them had become implicated in the commercial arrangements of the mill owners and bleachers who had come to dominate the industry.³⁵ With the advent of power spinning it became increasingly difficult for the independent weaver to acquire a supply of yarn; many of them began to be supplied by mill spinners or manufacturers who paid them a fixed rate for weaving it into cloth. By the mid-1840s, very little cloth was being sold in the linen markets, the traditional channel through which weavers had disposed of their cloth (except in areas where very fine linen was made such as Lurgan, Waringstown and Portadown). Manufacturers, who now owned most of the cloth produced, sold it to bleachers who finished and marketed cloth. Alternatively, manufacturers had the cloth finished on their own account and handled marketing themselves. Both these aspects of the industry required significant financial resources and those who sold finished cloth required strong international marketing networks.³⁶

Effectively the introduction of mill spun yarn into the industry started off the erosion of the family unit of production. The control which the rural weaver and his family had traditionally had, over both the yarn supply and the sale of the cloth, passed into the hands of men with larger capital resources. By the 1850s, the spinning sector of the industry had become more capital intensive and less labour intensive. This accounts for the major fall in the number of hands employed in the industry and widespread emigration from the regions where hand spinning had been an important source of income. But despite the major social dislocations caused by the decline of hand spinning, the output of the industry was not declining. Growth is evident during the first half of the 1850s; the value of exports of linen from Belfast rose sharply from £2,667,100 in 1851 to £3,954,540 in 1856.³⁷

Although powerlooms were slowly introduced by a number of Irish firms from the 1850s, they were not extensively adopted in the Irish industry until the 1860s, and even then it was not

³⁵ Green (1949), p. 123.

³⁶ Solar (1988), pp. 18-24.

³⁷ National Library, Ir. 387 b. 2. Belfast Harbour Commissioners. Imports and Exports.

applied to finer linens. Because of the technical difficulties associated with weaving fine yarn mechanically, and the low price of labour, handloom weaving continued in Ireland long after this. With increased emigration, wages began to rise in the decades after the famine, and investment in powerloom weaving for coarser ranges of cloth began to increase. In Ulster alone the number of factories with powerlooms rose from 1 in 1850 to to 54 by 1875, the actual number of powerlooms in the same period rose from 34 to 9,710. But the weaving of fine cloth mechanically only began in the 1880s.³⁸

Increased investment in mechanisation raised the productivity of the Irish linen industry. The growing size of Irish mills and the rising number of vertically integrated concerns helped manufacturers to achieve economies of scale. The concentration of all aspects of the industry in east Ulster also created significant external economies. These included an experienced and skilled labour force, from those engaged in all aspects of machine spinning and powerloom and handloom weaving. Ulster had the best linen bleaching facilities in Europe. Belfast also had a number of innovative machine builders and repairers working in close proximity with the major linen manufacturers. The city was also the commercial centre of the industry with all the necessary services for marketing of linen internationally. All of these factors helped east Ulster to build up advantages over rival linen producing regions, enabling it to become the principal linen manufacturing district in the world.

Table 7:8.

LINEN MILLS IN IRELAND 1839-1914

	no of mills	no of spindles	no of powerlooms	moving steam	power water	total employed
1839	40	-	-	928	1,052	9,017
1850	69	396,338	58	2,285	1,095	21,121
1868	143	905,525	12,969	21,595	3,466	57,050
1878	144	808,695	19,611			56,342
1889	162	840,448	25,555			64,475
1905	160	812,925	32,851			
1914		955,471	37,293			73,000

Source; *Factory Returns, UK*, BPP 1839, xiii (41) pp. 336-9. BPP 1850, xlii (745) p. 19. BPP 1890, lxxvii (328) p. 22. BPP 1905, lxxii (290) pp. 2-3. Riordan, J. *Modern Irish Trade and Industry* (London, 1920), pp. 110-1. Murphy, J. *Ireland Industrial, Political and Social* (London, 1870), p. 43.

³⁸ Cohen, M. 'Working Conditions and Experiences of Work in the Linen Industry; Tullylish, County Down', *Ulsterfolklife*, xxx (1984), p. 3. Gribbon, H. *The History of Waterpower in Ulster* (New York, 1969), p. 101.

The fixed capital investment and the human capital which had been built up within the industry by the 1860s, enabled manufacturers to take full advantage of the shortage of cotton during American Civil War. This shortage created an abnormal demand for linen. The number of mills rose from 79 in 1862 to 90 in 1868, and the workforce rose from 35,500 in 1862 to 57,000 during the same period.³⁹

The unusually high profits made during the 1860s, led to the establishment of a number of new firms, even outside the heartland of the industry in east-Ulster. This expansion was terminated in 1873-74, by the end of the international boom. At this stage it was estimated that the total capital employed in the industry was about £20,000,000 and annual output was worth about £8,000,000.⁴⁰

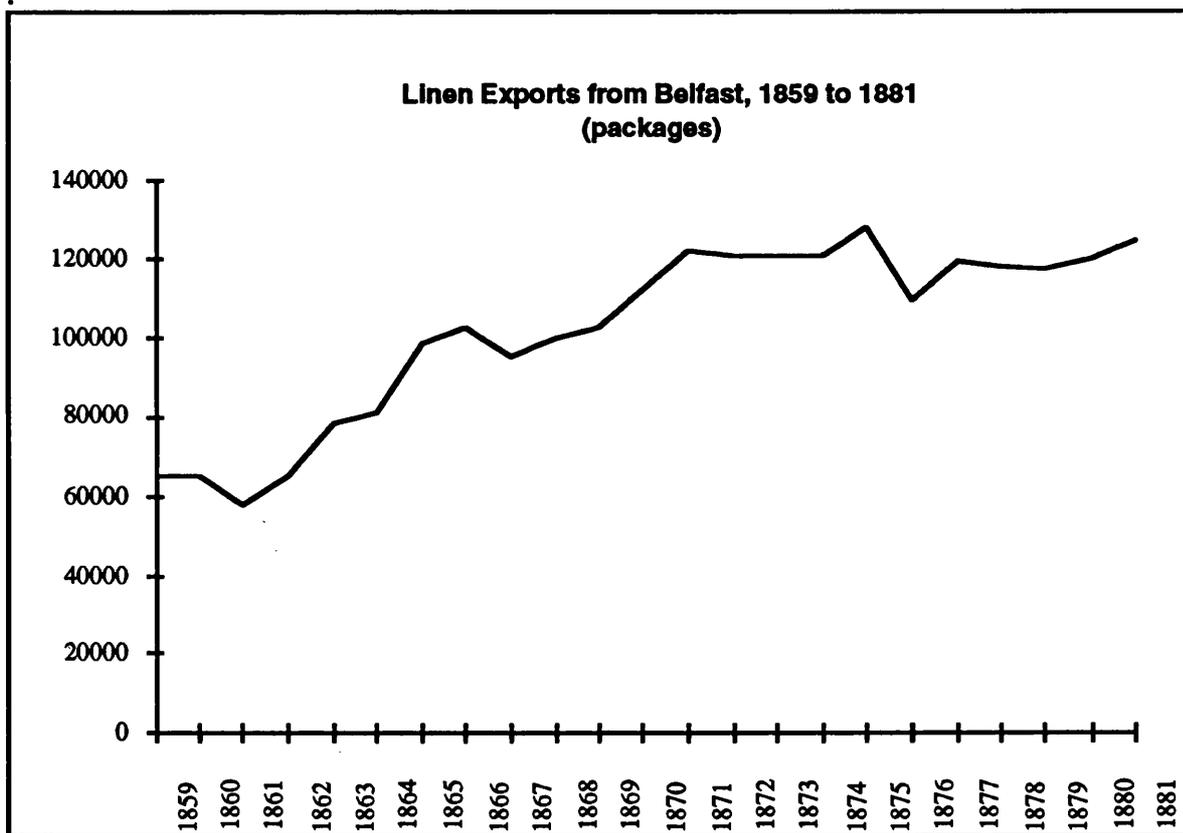


Figure 7:9. Source; National Library, Ir, 387 b. 2. Belfast Harbour Commissioners.

³⁹ Boyle (1977), pp. 91-3.

⁴⁰ Linen Hall Library, Belfast, BPB 1874.18. Statement Concerning the Linen Trade of Ireland, p. 2.

Output declined in the mid-1870s, but recovered during the second half of the decade. Already peak nineteenth century spindlage (964,000) had been reached in 1870. Thereafter the spinning sector suffered a period of stagnation, followed by severe competition from continental producers (notably Russia). By the end of the century the estimated capital employed in the industry had been drastically reduced to £12,000,000,⁴¹ reflecting the grossly inflated value assigned to the industry's assets during the boom years.

By 1890, yarn prices were half of what they had been in the 1860s. Spinners suffered from this price decline which had been created by the major over-capacity in the European industry, created during the boom of the 1860s and early 1870s. In the 30 years after 1868, 36 linen firms became insolvent in Ulster, and a further 18 closed down, and 18 passed into new ownership. Firms engaged in powerloom weaving however, did somewhat better as they benefited from the lower cost of yarn, so investment in this sector therefore continued to expand. This finally finished off handloom weaving; with the exception of about 2500 handlooms left in Ulster which were used for weaving very fine linens.⁴²

The size of firms became larger during this period, which strongly suggests that there were economies of scale. The move towards increased vertical integration also suggests that there were advantages in this type of organisation. The poor performance within the spinning departments of these firms could be offset by better conditions within weaving and bleaching. Between 1860 and 1914, all but one of the five companies which dominated the Irish industry, (the York Street Spinning Company, the Brookfield Linen Company, William Ewart and Son, the Linen Thread Company, and the Ulster Spinning Company), carried out all aspects of linen manufacture from flax spinning right through to finishing and retailing cloth (the exception being the Linen Thread Company). The large number of medium and smaller sized firms tended to specialise which made them more vulnerable to the frequent fluctuations in demand, particularly during the last quarter of the nineteenth century. The larger firms tended to market

⁴¹ Lloyd-Patterson, p. 120.

⁴² Ollerenshaw, P. 'Industry, 1820-1914' Ollerenshaw, P. Kennedy, L. (eds), *An Economic History of Ulster* (Manchester, 1985), pp. 80-4. Crawford, W. *Irish Linen and Some Features of its Production* (Belfast, 1910), p. 9.

wider ranges of cloth in geographically dispersed markets which made them less vulnerable than smaller firms during recessions.⁴³

Although there had been little merger activity (except in linen thread) there had been a significant shift to vertical integration. But the persistence of a large number of smaller firms into the present century indicates that there was a significant niche within the industry for specialists who were not vertically integrated.⁴⁴ This specialisation in the many different branches of the industry by many smaller companies, who produced comparatively small quantities of each article, prevented other countries like the US from imitating goods produced in Ulster, as it was not cost effective to produce such a diverse range of cloth types on a large scale.⁴⁵

By the end of the nineteenth century the bulk of the flax supply which had previously been grown in Ireland was imported. The main cause of the decline of Irish flax cultivation was a rise in the cost of agricultural labour after the Famine. This led to a situation where Russian flax could be acquired more cheaply by Irish spinners than that grown in Ireland.

Table 7:10.
FLAX GROWN IN IRELAND

1860	128,595 ACRES
1870	194,893 ACRES
1880	157,534 ACRES
1895	95,202 ACRES
1900	47,451 ACRES

Source; Lloyd Patterson, R. 'The British Flax and Linen Industry , with Special Reference to Its Position in Ireland', in Ashley, W. (ed), *British Industries* (London, 1907).

Production during the nineteenth century had moved from being a widely dispersed rurally-based domestic industry using local raw materials and energy resources to being concentrated in factories located predominantly in north-east Ulster using imported flax and coal. Bleaching and finishing also became more concentrated in east-Ulster. The reputation of Ulster bleachers

⁴³ Caskey, A. *Entrepreneurs and Industrial Development in Ulster 1850-1914* (M. Phil, UU, 1983), pp. 35, 131-6, 141-2.

⁴⁴ O'Grada, C. A. *New Economic History of Ireland; 1780-1920* (Oxford, forthcoming).

⁴⁵ Crawford (1910), p. 19.

was so good by the end of the century that large quantities of cloth were sent there from Belgium, France and Germany to be bleached.⁴⁶

The demand for linen had also changed; at the beginning of the nineteenth century it had been a common household fabric sold in British and colonial markets. But cotton displaced linen in most clothing types as it was cheaper. Linen however, was more suitable for hot climates and it was more sought after for household items like sheets and table cloths, despite its higher cost; by the end of the century it was a luxury item. At the beginning of the century most exports had gone to Britain on English account. By 1900, three-quarters of all exports went direct to the U.S.A. At this stage, more attention was paid to direct marketing of linens overseas. Cloth was no longer just sold after it had been bleached; in the last quarter of the century the "making up" trade became established in Ulster, so that by 1892 there were over 85 firms engaged in making handkerchiefs, pinafores, collars, cuffs, shirts, underclothing, bedding etc.⁴⁷ This created more added value in Ulster than simply exporting cloth.

Why did the industry become more concentrated in north-east Ulster in the decades after mechanisation? We have already noted the concentration of production in the north during the eighteenth century. The entrepreneurial and artisanal skills (human capital) built up during this rural proto-industrial phase of development were of critical importance in the subsequent stage of industrialisation. The international marketing network was established during this period so the industry was not dependent on the small Irish market. The capital accumulated by linen merchants and bleachers during this period could be used for the successful commercial application of new techniques; first in bleaching and finishing before the end of the eighteenth century. This group, together with the east Ulster cotton spinners also played a prominent role in the mechanisation of flax-spinning from the end of the 1820s; and finally in powerloom weaving from the mid-nineteenth century onwards. As the industry evolved in the region, economies of agglomeration were created which made it a more favourable location for production than more remote centres of the industry.

⁴⁶ Riordan, J. *Modern Irish Trade and Industry* (London, 1920) p. 115. Ollerenshaw (1985), pp. 83-4. On cost of labour in growing flax see *Seventh Annual Report of the Flax Supply Association, 1873* (Belfast, 1874), p. 16.

⁴⁷ Boyle (1977), pp. 106, 206-112, 224.

In accounting for the success of the Ulster linen industry how much credit should be given to the quality of entrepreneurs in the region? In a thesis challenging conventional views about the ability and dynamism of Ulster entrepreneurs, Caskey has argued that by and large their performance was unremarkable.⁴⁸ This argument does not stand up when applied to the linen industry. While one must agree with Caskey, that prevailing economic circumstances and conditions on the international market had a more important effect on events than the quality of local entrepreneurs, it still took entrepreneurs with a certain amount of flare to take advantages of these favourable circumstances. Ulster's traditional association with linen and the proximity of the region to the most dynamic industrialised textile producing regions in the world both played a significant role in assisting the industrialisation of the north east. Cheaper wages relative to England and Scotland, gave the region comparative advantages over other regions in the production of linen. Mechanisation took place much more slowly in the linen industry than in cotton. Even by 1910, the number of workers in a cotton mill would have been about one quarter of those working in a flax mill with the same number of spindles. The turn off from a flax spindle was much lower than that of a cotton spindle. Labour inputs were therefore higher and capital costs per spindle were also higher within linen.⁴⁹

Entrepreneurs had to overcome the disadvantages which linen faced in competing with cotton and fully exploit the fact that cotton was not always the perfect substitute. Despite the contraction in the demand for linen on the world market in the last quarter of the nineteenth century, with improved marketing techniques, greater productivity, and the growth of the "making up" trade, linen producers in Ulster managed to continue their dominance and even increase their share of the world market for linen. In relative terms, the performance of the Ulster linen industry during the nineteenth century was exceptional, and some credit for this must go to the entrepreneurs engaged in the manufacture and marketing of linen in east Ulster.

⁴⁸ Caskey (1983), pp. 35-203.

⁴⁹ Crawford (1910), p. 21. A cotton mill could be erected in 1910 for under 28 shillings a spindle, a flax mill would have cost between eight and six pounds a spindle.

Table 7:11.

A COMPARISON OF SPINDLES AND POWERLOOMS IN DIFFERENT COUNTRIES 1874-1912

	SPINDLES (000)		POWERLOOMS	
	1874	1911-12	1874	1911-12
IRELAND	905	946	19,331	36,942
FRANCE	620	567	10,000	-
AUSTRIA-HUNGARY	415	297	-	-
BELGIUM	320	315	1,100	3,400
RUSSIA	150	368	2,000	14,438
GERMANY	327	278	7,000	7,000
ITALY	54	126	200	1,800
ENGLAND	270	50	3,048	-
SCOTLAND	317	160	17,419	-
HOLLAND	8		1,200	-

SOURCE: *Eight Annual Report of the Flax Supply Association, 1874* (Belfast, 1875). Boyle, E. *Economic Development of the Irish Linen Industry* (Unpublished Phd, QUB, 1979), p.103. Riordan, J. *Modern Irish Trade and Industry* (London, 1920), p. 107.

One of the early innovators within the industry, and the most consistently successful were the Mulhollands, who were the first of the cotton spinners to convert to flax spinning.⁵⁰

They gained all the necessary technical information from Leeds with the assistance of John Hind (the son of a prominent Manchester cotton spinner) who became their manager. The large mill was redesigned by him using the best available designs from Leeds and commenced flax spinning in 1830. It was an immediate success as already large quantities of machine-made yarn were being imported into Belfast from Leeds.⁵¹ Large profits were made in the early years and the Mulhollands became very wealthy.

⁵⁰ The family had been involved extensively in manufacturing muslins at the end of the eighteenth century. In 1824 they completed the construction of a large six storey cotton mill at York St., which was destroyed by fire in 1828. The Mulhollands decided that; 'as the English and Scotch competition in the cotton-spinning business was so great, and as the linen trade was the natural business of Ireland, it would be advisable in rebuilding the mill to adapt it for the spinning of flax by machinery, which was accordingly done. Benn, G. *A History of the Town of Belfast* (London, 1880), ii, pp. 129-30.

⁵¹ By 1833, the mill contained 8,000 spindles, driven by a 100 hp steam engine and employed 660 persons. The success of the company led to an expansion to 15,300 spindles in 1837, and two more steam engines were installed. Employment rose to 900 and when in full production the mill spun 700 tons of flax into yarn per annum. The family also established another large flax spinning mill in Durham St. in 1832, and by 1840, they had a third in operation on Francis St. The Mulholland brothers were also involved in a number of other flax spinning ventures during the 1830s including the Blackstaff Mill in Belfast, and Herdman's in Sion Mills. Takei, A. *The Early Mechanisation of the Irish Linen Industry 1800-1840* (unpublished M. Litt, TCD, 1989), pp. 108-9. 159.

The financial organisation of the firm was overhauled in 1845, at which time the York Street Flax Spinning Mill had a capital of £80,000 which was divided into 800 shares of £100 each. The mill then contained 19,388 spindles and was still the largest in Ireland.⁵² Growth continued and in 1864 the York Street Flax Spinning Company became the first limited liability linen firm in Belfast with a nominal capital of £500,000.⁵³ This was a very successful flotation as the company made large profits during the boom years during the American Civil War boom when the supply of cotton was curtailed and the demand for linen increased. This facilitated the extension of the company's activities. Powerlooms at this stage were still only capable of weaving coarse cloth, so the finer cloths were still woven domestically (predominantly in Antrim, Down and Armagh). The York Street Company became the chief buyer of fine cloth which it bleached and sold. The major extension of the firm's trade is evident from new branches which the company opened in Paris in 1870, New York in 1871, London in 1874, Berlin in 1876 and Melbourne in 1882. The vertically integrated company was now the largest firm of flax spinners, linen manufacturers and distributors in the world.⁵⁴

By 1879, there were 29,972 spindles being operated by the company. Benn in his history of Belfast noted that the large profits made during the American War enabled the company to build up a considerable reserve fund and it was then the only company in the trade whose shares still commanded a premium on the market. By 1890, the reserve fund was over £300,000 in value. For several years prior to 1885 the firm had managed to pay a dividend of 13.5%. This according to one of the directors was because they sensibly retained most of the abnormal profits made during the American Civil War.⁵⁵

By 1890, the company employed 4,000 people directly. It also employed additional people in the countryside in embroidery and fancy work, in addition to those employed at the bleachworks at Muckamore, Co Antrim.⁵⁶ The company was consistently profitable between

⁵² *Northern Whig*, 15 April 1845.

⁵³ *Return Relating to Joint Stock Companies* BPP 1866, lxvi (429) p. 96.

⁵⁴ The plant was also dramatically improved during this period; new mills and a weaving factory were built at York St. In 1879, the company acquired the Milewater mill for £28,100 and in 1883 the Muckamore bleachworks in Co. Antrim were acquired for £28,000. Lawlor, H. 'The Rise of the Linen Merchants, The Mulhollands and Hinds of Belfast', *Fibres and Fabrics Journal*, x, (1943), pp. 322-3.

⁵⁵ Benn (1880) ii, pp. 129-30. Ollerenshaw (1985), p. 79.

⁵⁶ The works contained 55,000 spindles and 1,000 powerlooms driven by several sets of steam engines with an

1864 and 1914, which was unusual within the industry at large. The company benefited from the wide range of cloth it manufactured. One commentator noted that firms with a large production like York Street operated in every market in the world, both in the purchase of flax and in selling their cloth. These firms were less susceptible to depression because their product range was more diverse and sales were geographically more widely dispersed.⁵⁷

* * *

During the 1830s and 1840s, the spinning sector of the industry made the successful transition from a domestic cottage industry to a mill based industry centred predominantly in east Ulster. The high level of human capital built up gradually within the industry since the seventeenth century and the low level of wages were the two key factors which explain Ulster's dominance of the UK linen industry. These two factors enabled Ulster linen to compete on international markets in terms of both quality and cost. The introduction of the wet spinning process during the second half of the 1820s initiated the first phase of industrialisation in north-east. Although cotton spinning played a role by introducing mechanised textile spinning to the region initially, it had been almost entirely displaced by linen spinning by the mid-1840s. The preference given to linen in terms of capital resources and industrial locations further assisted the industrialisation of the industry at the expense of cotton. The process of industrialisation and urbanisation which was underway in the north-east by the 1840s, depended almost entirely on linen and its ancillary industries.

It is clear that the quantity of linen produced in Ireland increased during the second half of the nineteenth century. Exports from Belfast (which accounted for most of Irish linen production) rose during most of this period (see figures 7:9 and 7:12).

aggregate horse-power of 2,500. Crawford, W. (ed) *Industries of the North* (Belfast, 1968), p. 26.
⁵⁷ Caskey (1983), p. 132. Crawford, W. (ed) *Industries of the North* (Belfast 1986), p. 26. By 1890, they made fronting linens, interlinings, family linens, printed linen shirtings, printed dress linens and lawns, dress goods, diapers, damasks, clothes and napkins, huckabacks, towels, sheetings and pillow linens, glass cloths, roughs, elastic canvas, furniture coverings, drills and ducks, hollands, buckrams, stair drills, paddings, cambrics, handkerchiefs, creas, platillas, Bretanas, silesias, Irlandas and many more.



Figure 7:12. Source; National Library; Ir, 387 b. 2. Belfast Harbour Commissioners.

Although the relative importance of the linen industry within the industrial sector had declined, it was still Ireland's most important industry in 1907 with a net value of over 4.8 million pounds. Output of cloth only increased from 230 million yards in 1907 to 234 million in 1912, but the value of the making up trade doubled during the same period raising the net value of the whole industry.⁵⁸ The industry had become more mechanised and more centralised during the second half of the nineteenth century and Ulster had increased its market share, despite the fact that world consumption of linen was declining. Although cheap labour had been an important advantage for Ulster during the early stages of mechanisation, by the end of the nineteenth century the industry in east Ulster had external economies and a larger critical mass which gave it advantages over other linen manufacturing regions. East Ulster's dominance of the linen industry, was similar in this respect to Yorkshire's and Lancashire's dominance of the woollen and cotton industries respectively.

⁵⁸ *First UK Census of Production (1907)*, BPP 1912, vol cix (cd. 6320), p. 354. *Final Report of the Third UK Census of Production -(1924)* (HMSO, 1931), ii, p. 57.

Chapter Eight

OTHER INDUSTRIES

This chapter will summarise the major developments and trends in some other industries. Most of these were small, but the food processing sector was important, however research in this sphere is extremely limited; it has therefore been placed in this chapter. The various industries discussed below have little in common, but their inclusion will contribute to a fuller discussion of the entire industrial sector in the conclusion.

I

Ia) THE TANNING TRADE.

Tanning became an important industry in many Irish towns during the eighteenth century; by 1796, there were 876 operative tanners in the whole country. The number of yards fell dramatically over the following decades to 476 in 1823. The concentration of the industry in larger yards accounts for some of the decline in numbers. But the burden placed on the industry by the excise was probably the most significant factor in bringing about this decline; from 1798 tanners in Ireland were taxed on the size and number of pits they possessed rather than on the amount of leather they tanned. This forced tanners to speed up the process which led to a deterioration in quality. In 1813, another act specified that licenses should only be granted to tanners using tanpits which covered at least 400 cubic feet in total. This eliminated many tanners from the trade, particularly in smaller rural towns.¹ These changes in the excise laws further encouraged the tendency for the industry to become more concentrated in bigger yards in the larger towns.

Cork had emerged as the main centre of the industry by the early 1820s. Although there were fewer tanners operating in the city than in Dublin, the yards in Cork were bigger on average, total employment was higher and the industry was growing. The number of tanners in Cork

¹ Barry, R. 'The Resources of Ireland', *Catholic Bulletin*, x, (1920), pp. 101-107.

rose from 44 in 1822 to 46 in 1835, employment in these yards during the same period rose from 427 to 615.²

Table 8:1.

THE DISTRIBUTION OF THE IRISH TANNING INDUSTRY IN 1822.

	TANNERS	PERSONS EMPLOYED
DUBLIN	91	398
ARMAGH	10	67
ATHLONE	9	44
BALTIMORE	7	22
CAVAN	13	64
CLONMEL/KILKENNY	25	136
COLERAINE	23	62
CORK	44	427
DROGHEDA	23	96
DUNDALK	11	68
ENNIS	4	14
FOXFORD	9	31
GALWAY	2	29
LIMERICK	8	30
LISBURNE	23	152
LONDONDERRY	17	59
LOUGHREA		12
MALLOW	11	51
MARYBOROUGH	17	75
NAAS	10	34
NEWRY	12	84
SLIGO	21	84
STRANGFORD	9	34
TRALEE	9	24
TRIM	11	67
WATERFORD	15	64
WEXFORD	21	67
WICKLOW	21	51
TOTAL	476	

Source; *Fourth Report on Revenue in Ireland* BPP 1822, xiii, app. 58, pp. 342-370.

Many of the larger towns in Ireland had one or more tanyards. The industry was widely dispersed geographically; but the province of Leinster dominated with 1056 people employed in 243 tanyards. Munster was next in importance with 632 employed in 98 tanyards. In Ulster, there were 458 people employed in 94 tanyards and in Connaught, there were 200 employed in 41 tanyards (see table 8:1).

² Bielenberg, A. *Cork's Industrial Revolution* (Cork, 1991), p. 81.

Conditions in the industry improved in 1824 when the method of levying duty was changed; thereafter tanners simply paid duty on the amount of leather they tanned. 6,907,884 lbs of leather was tanned in Ireland in 1825, rising to 7,315,744 lbs in 1827.³

It is difficult to gauge the periodisation of the decline of the tanning trade since it varied in different regions. In Dublin city, the number of tanners fell from 91 to 60 between 1822 and 1836, while employment in the industry fell from about 400 people to under 350. In Cork, the main centre of the industry, output had passed its peak before the 1840s. This decline accelerated during and after the Famine. The number of tanyards in Cork fell from 48 in 1840 to only 16 in 1852. It seems probable that the industry was contracting in most of the country in the years before the Famine. British penetration of the Irish market for boots and shoes became more pronounced during the 1840s, and the growing exportation of live cattle during the 1830s reduced the number of hides available to Irish tanners. Imports of British sole leather and prepared uppers during the 1840s undermined much of the tanning trade; British imported leather was cheaper because they processed it more quickly.⁴

Ib) THE PAPER INDUSTRY

The paper industry experienced growth in Ireland during the eighteenth century, particularly in the last decades. There were about 50 paper mills in the country by the 1780s. Dublin was the main market for paper, so from an early stage it dominated the industry. Cork and east Ulster were also important centres. The Dublin mills were located on the outskirts of the city on the rivers Liffey, Camac and Dodder. Although a few mills close to Dublin produced fine paper, most of the output of the Irish industry was not of a high quality. It was used for wall paper, packing and for shop paper. Hardly any paper was exported from Ireland and high quality paper continued to be imported from England.⁵

³ *Return of Duty paid on Tanned Leather* BPP 1828, xxii (134) p. 1.

⁴ Bielenberg (1991), pp. 82-4. O'Brien, G. *The Economic History of Ireland From the Union to the Famine* (London, 1921), p. 377. Webb, J. *Industrial Dublin Since 1698* (Dublin, 1913), pp. 91-5.

⁵ Shorter, A. *Paper-Making in the British Isles* (Newton Abbot, 1971), pp. 226-36. English and Dutch technology was imported into some of the Irish mills, in Dublin a few mills were remodelled and enlarged by English workmen. In 1791, an English traveller who visited the mills in Chapelizod and Saggart near Dublin noted that they were equal to any he had seen in Holland and England. O'Brien, G. *The Economic History of Ireland in the Eighteenth Century* (London, 1918), pp. 285-6.

Irish mills tended to be smaller than those in England. At the beginning of the nineteenth century the total output of the Irish industry was about one twentieth of that in England; average output per mill was about half of that in England. The industry continued growing slowly until the end of the the Napoleonic War. Output diminished between 1814 and 1823, so that by the early 1820s it was not much greater than it had been in 1807. There were 42 registered mills in Ireland in 1822, rising to 47 in 1824,⁶ an indication that the industry was recovering from the post-war recession.

Table 8.2.

PAPER MILLS IN IRELAND AND AMOUNT OF PAPER ON WHICH DUTY PAID

	No of Mills	Amount on which duty paid (lbs)
1831		1,771,827
1832		2,179,303
1833		2,397,080
1834		2,374,403
1835	57	2,702,352
1836		
1837		3,248,182
1838	60	3,554,879
1839	55	3,462,529
1840	52	3,591,472
1841	50	3,991,472
1842	49	4,053,429
1843	50	4,723,107
1844	52	4,557,306
1845	50	5,562,104

Source; *Number of Paper Mills in England, Scotland, Ireland*, BPP 1861, lviii (256) p. 1. Riordan, J. *Modern Irish Trade and Industry* (London, 1921), p. 168. *Thom's Directory*, 1846.

The industry experienced growth over the next decades. The number of mills rose to a peak of 60 in 1838, and the output of the industry continued to rise, despite a fall in the number of mills. This indicates that average output per mill was increasing significantly during this period, and larger mills were beginning to displace their smaller rivals as the industry became more concentrated in fewer larger units of production (see table 8.2). In these larger mills, machines began to replace processes previously carried out by hand, particularly in Dublin.

⁶ O'Brien (1921), pp. 367-369. Shorter (1971), pp. 226-36.

Many of the smaller mills which persisted in using the traditional technologies began to close down.⁷

With mechanisation, production became even more concentrated in the main centre of demand. By 1845, the mills in and around Dublin accounted for over 61% of the industry's output. North-east Ulster was the next region in order of importance; taking in Belfast, Coleraine and Armagh, this region accounted for over 22% of output. Cork accounted for over 9% (see table 8.3). The Irish paper industry became more mechanised and concentrated in larger mills between 1790 and 1845. A growth in output was accompanied by a significant improvement in the quality of Irish paper.

Table 8.3.

PERCENTAGE OF TOTAL OUTPUT OF PAPER PRODUCED IN EACH REGION OF IRELAND IN 1845.

ARMAGH	3.2%
BELFAST	11.4%
COLERAINE	0.3%
LONDONDERRY	0.3%
BANDON	0.3%
CLONMEL	0.3%
CORK	9.5%
LIMERICK	1.4%
WATERFORD	0.2%
GALWAY	3.7%
DUBLIN/NAAS	61.5%

Source; *Return of Duty on Paper in the UK*, BPP 1850, xxxiii (233) pp. 4-5.

Ic) THE GLASS INDUSTRY

Prior to the 1780s, the small Irish glass industry was largely based in Dublin. Much of the glass used in Ireland was imported from Britain. But from 1780 onwards the industry entered a period of pronounced growth; glass houses were established in Cork, Belfast, Waterford and

⁷ Shorter (1971), pp. 226-36.

Newry. There were two reasons for this. Firstly, a duty was imposed on glass manufactured in Britain (but not in Ireland). Secondly, the restrictions on Irish glass exports (imposed in 1746) were removed in 1780.⁸

By 1785, there were 9 glass houses in Ireland; 6 of these were for flint glass, 2 for bottles and 1 for window glass. Three-quarters of the glassworkers in these houses came from England. They brought the recipes for compounding glass and the best techniques then available from English centres of the industry.⁹

The industry produced pre-dominantly for the home market, displacing English imports.¹⁰ The manufacture of bottles increased during the Napoleonic war, experiencing a decline in the post-war years from which it only began to recover at the end of the 1820s. Exports accounted for about 16% of the bottles produced between 1814 and 1823.(see figure 8:4)

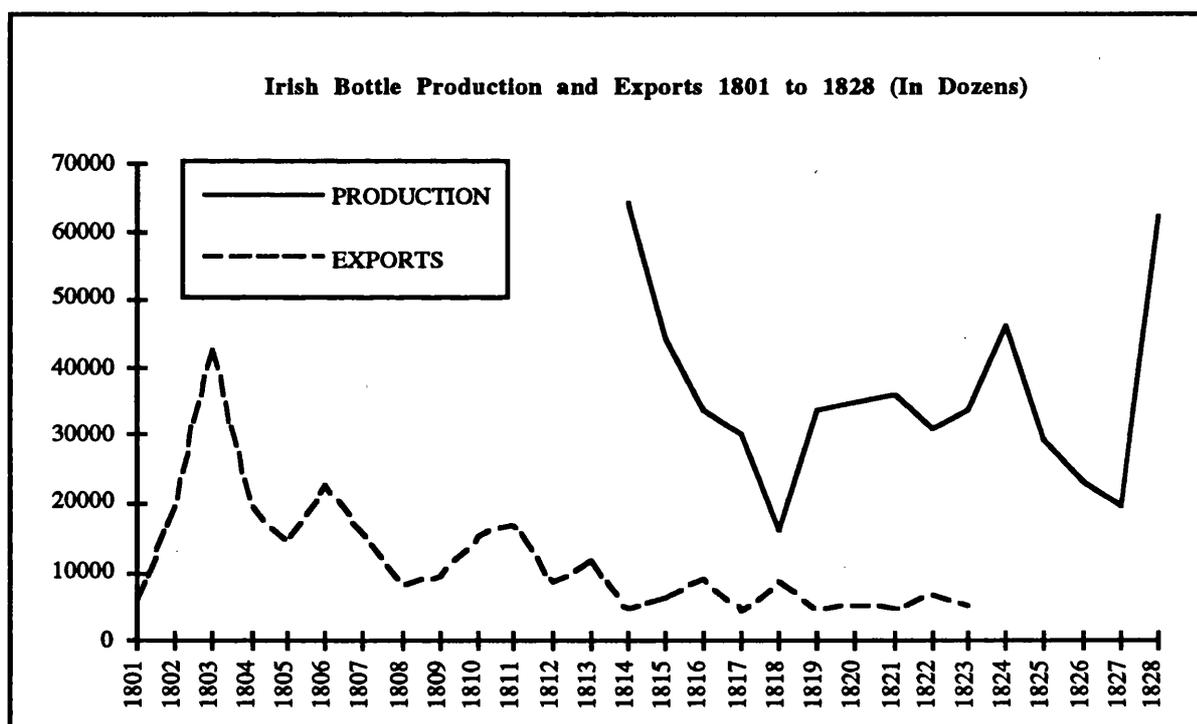


Figure 8:4. Source; Murray, A. *Commercial Relations between England and Ireland* (London, 1903), pp. 443-4. *Duty Charged on Glass in Ireland*, BPP 1839, xlv (370) p. 8.

⁸ Westropp, D. *Irish Glass* (Reprint Dublin, 1978), pp. 37-204.

⁹ *Ibid*, 37-204.

¹⁰ *Ibid*, pp. 37-204.

In a recent study Ross has argued that the better conditions enjoyed by the Irish glass industry after 1780, came to an end with the Act of Union in 1800. Ross has shown that it was unlikely that much Irish glass was exported to England, although poor quality glass was smuggled over to England during this period because of the existence of glass duty there. When this duty was extended to Ireland in 1825, the trade in smuggled glass ceased according to the chairman of the English Board of Excise. The main market for Irish glass was in Ireland. Ross incorrectly argues that the Irish industry declined after 1800 in both quality and quantity. The chairman of the English Board of Excise (whom Ross cites) stated in 1835 that since the removal of the duty in 1825 some of the smaller houses in Ireland have gone out of business, but; 'with respect to the better houses, not only has the extent of their trade increased, but the quality of the manufactured articles has, I understand, very much improved. Almost all the articles of luxury, for the use of the better classes were imported, I have understood, from England but latterly I believe the Irish manufacturers have begun to supply a considerable portion of them'.¹¹

Other work on the Irish flint glass industry demonstrates that it was slowly expanding during the first quarter of the nineteenth century. The number of glass houses in Ireland rose from 9 in 1785 to 11 in 1825; during the same period most of them increased in size.¹²

¹¹ Ross, C. 'The Excise Tax and Cut Glass in England and Ireland 1800-1830', *Journal of Glass Studies*, xxiv, (1982), pp. 57-64.

¹² Westropp (1978), pp. 37-204. Bielenberg (1991), pp. 84-8.

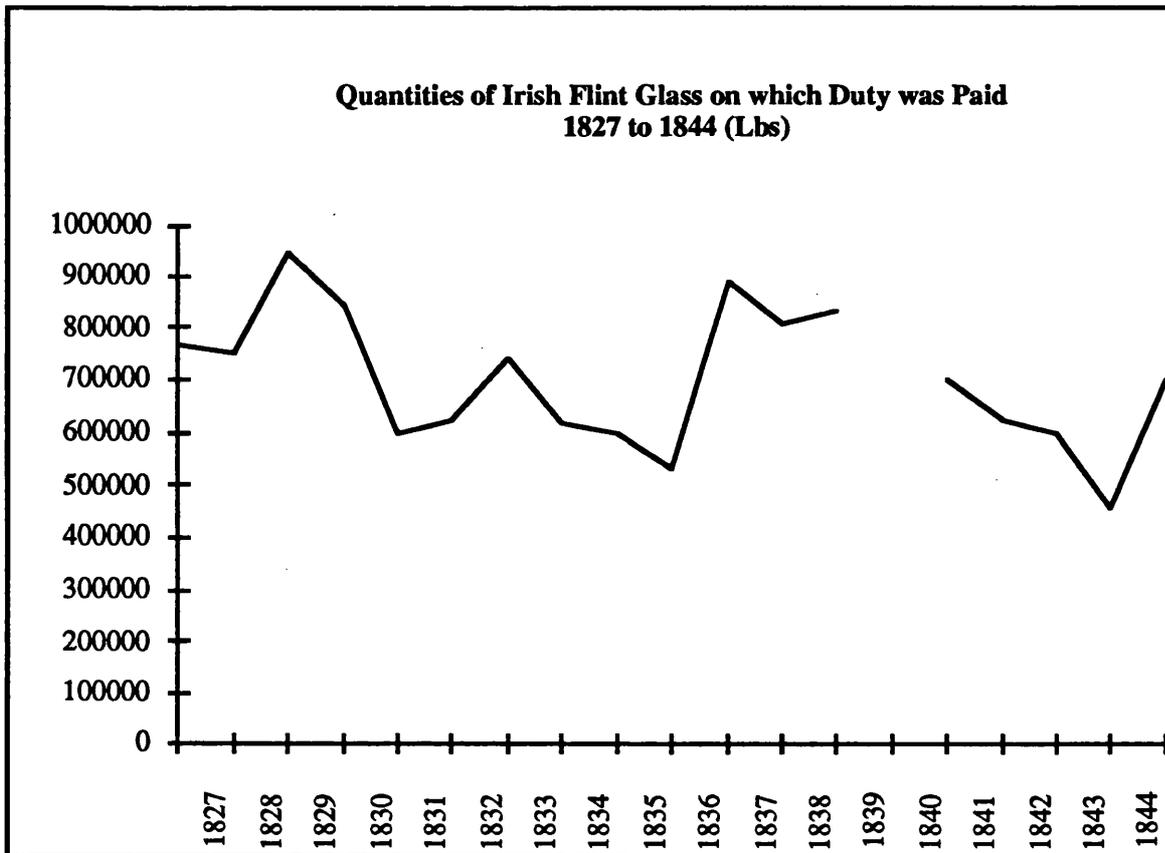


Figure 8:5. Source; *Duty Charged on Glass in Ireland*, BPP 1839, xlvi (419) p. 8. BPP 1846, xliv (214) pp. 4-5. O'Brien, G. *Ireland from the Union to the Famine* (London, 1921), p. 364.

The excise returns provide evidence that the production of flint glass did not go into immediate decline after 1825 as Westropp suggests. The excise returns show a recovery in the late 1820s, followed by a recession which deepened until 1836, which was then followed by another recovery in the late 1830s. From the early 1840s, the flint glass industry declined, despite a minor recovery in 1845 (see figure 8.5).

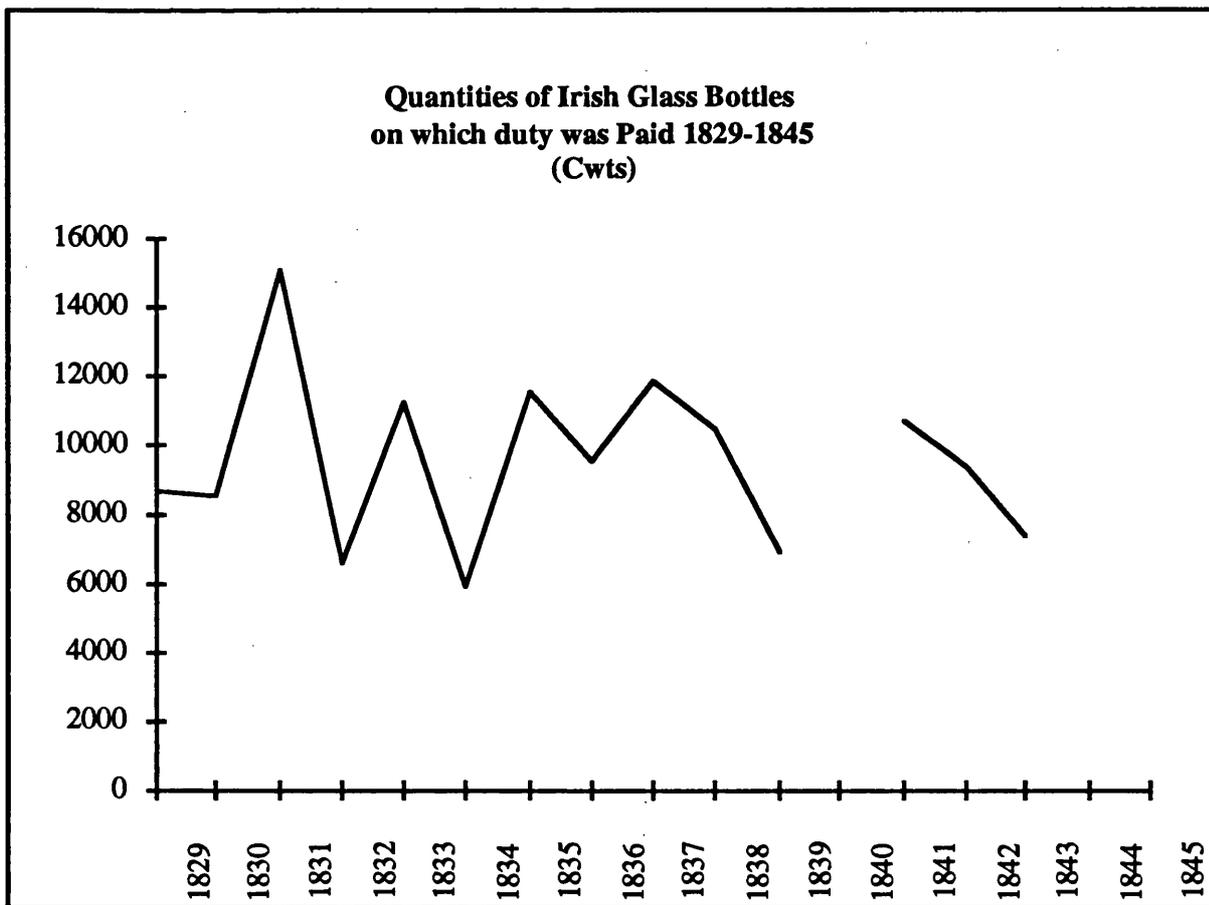


Figure 8:6. Source; *Duty Charged on Glass in Ireland*, BPP 1839, xlvi (419) p. 8. BPP 1846, xlv (214) pp. 4-5. O'Brien, G. *Ireland from the Union to the Famine* (London, 1921), p. 364.

The number of glass houses only fell from 11 in 1825 to 10 in 1832 (hardly evidence of a major decline). In the latter year the 4 Dublin based houses dominated the industry, accounting for 44% of total output. The Cork houses accounted for almost 22% and those in Belfast for 15%, while Gatchell's in Waterford, accounted for over 13%.

Table 8:7.

DUTY PAID BY GLASS MANUFACTURERS IN IRELAND IN 1832

O'CONNELL, CORK	£1958	8.7% of total.
ROYNANE, CORK	£2917	13%
CREAN, DUBLIN	£2491	11.1%
MULVANY, DUBLIN	£3476	15.5%
FORBES, DUBLIN	£546	2.4%
COSTELLO, DUBLIN	£3390	15.1%
MC CUNE, NEWRY	£1269	5.7%
MC CONNELL, BELFAST	£1651	7.4%
KANE, BELFAST	£1694	7.6%
GATCHELL, WATERFORD	£3002	13.4%
TOTAL	£22,394	100%

Source; Westropp, D. *Irish Glass* (Reprint Dublin 1978), p. 139.

The first major setback for the industry occurred in the mid-1830s when the number of operative glass houses fell to 6. Two houses in Belfast and two in Dublin closed down during this recession.¹³ But the total output of the industry recovered after the slump in the mid-1830s (see figure 8:5), which indicates that the remaining houses must have increased their output. The surviving houses probably produced cheaper glass products to compete with growing imports of cheap English cut glass in the 1830s and 1840s.¹⁴

The fate of the industry over the following decades can be briefly summarised. In Cork, the Waterloo Glass House closed in 1835 and the Terrace Glass Works survived until 1841.¹⁵ By the 1840s, the industry in Belfast was controlled entirely by Kane, who had purchased the rival house (the Belfast Glass Works at Peter's Hill) in 1840, and had them closed down before the end of the decade. Flint glass continued to be made at Kane's works at Ballymacarrett. In 1850, this house was taken over by O'Connor and Ross. According to Westropp flint glass probably ceased being made here in 1868, but the manufacture of bottles continued in Belfast. A glassworks continued to operate in Newry until 1847. In Dublin, the Irwins (who had taken over Mulvany's interest in the industry) carried on the manufacture at Ringsend until 1847, and at Potter's Alley until the mid-1850s, when the Pugh Brothers took over and continued operating these works. A bottle manufactory at the North Wall also survived. This was probably Forbe's Glass Bottle Works which was still operative in 1844. Gatchell's works in Waterford closed in 1851.¹⁶

It can be seen therefore, that the industry did not decline as rapidly as Ross, O'Brien, and Westropp suggest. O'Brien claimed that the number of glass houses had fallen to 3 by the mid-1840s.¹⁷ It is clear from the preceding paragraph, that at least 2 glass houses were operating in Dublin at this time and 2 in Belfast, 1 in Newry and 1 in Waterford. These houses produced as much flint glass and more bottles in 1842, than the 10 houses working in 1832. But the production of glass experienced serious reversals after this. Bottle production plummeted and

¹³ *Second Report Railway Commissioners*, BPP 1837-8, xxxv, App. B, no. 14, p. 97.

¹⁴ Westropp (1978), p. 164.

¹⁵ Bielenberg (1991), pp. 84-8

¹⁶ *Condition of Poorer Classes in Ireland*, BPP 1836, xxx), App. c, Part 2, p. 9. Westropp (1978), pp. 113, 132, 209, 234. Warren, P. *Irish Glass* (London, 1981), pp. 34-5.

¹⁷ O'Brien (1921), p. 363.

flint glass production also experienced decline during the second half of the 1840s. By 1852 the number of operative glass houses in Ireland had been reduced to only three.¹⁸

The production of flint glass in Ireland was a craft-based industry. Its demise, was typical of a number of craft-produced consumer products which were undermined by competition from mass produced goods manufactured in England. With the declining price of glassware produced in larger and more specialised English glass factories with higher levels of productivity, it became increasingly difficult for Irish glassware to compete. A number of houses tried to adopt new technology (like steam powered cutting machinery) to increase their productivity and reduce prices. But already by the mid-1830s, English glassware (and tinware) were making significant inroads into the Irish market for ordinary glassware.¹⁹ The demand for quality cut glassware also seems to have been undermined by British imports during the second half of the 1840s. By 1852, all that was left of the industry was a flint glass manufactory in Belfast and one in Dublin, and a glass bottle works in Dublin. Glass was therefore one of the early industrial products to succumb to British competition.

Id) THE FOOD PROCESSING INDUSTRIES; PROVISIONS

Since the Irish economy was dominated by agriculture, it is hardly surprising that food processing became an important industry during the eighteenth century. As British trade with America and the West Indies developed, Ireland built up a profitable niche in provisions during this period, notably in beef, butter and pork. In a number of the larger ports, notably in Cork, capital investment in food processing increased significantly between 1770 and 1800.²⁰ The decline in the transatlantic trade from the 1780s, was offset by the needs of the British army and navy during the Napoleonic War. By 1803, exports of Irish provisions were estimated to

¹⁸ Westropp (1978), p. 142.

¹⁹ Bielenberg (1991), pp. 84-8.

²⁰ Dickson, D. *New Foundations, Ireland 1660-1800* (Dublin, 1987), pp. 118, 124.

be worth (in current prices) about 4 million pounds; over 1.7 million of this was butter.²¹ Cork dominated this trade in butter, beef and pork.

Exports of beef and pork declined in the decades after the Napoleonic War. But this was more than offset by the growing exports of butter, bacon and hams to Britain.

Table 8:8.

EXPORTS OF PROVISIONS FROM IRELAND 1801-1825

	BEEF Barrels	PORK Barrels	BACON/HAMS Cwts	BUTTER Cwts
1801	79,239	81,601	21,161	304,666
1805	111,673	110,425	95,073	294,415
1809	126,176	136,568	167,122	385,953
1813	139,732	141,771	234,606	461,514
1817	129,510	133,095	191,025	397,965
1821	77,955	141,211	366,209	472,944
1825	73,135	108,141	362,278	474,161

Source; Donovan, J. *The Economic History of Livestock in Ireland* (Cork, 1940), p. 159.

Butter prices declined between 1800 and 1840, but the value of the trade did not; the number of firkins received at the Cork butter market (the main centre of the Irish trade) rose from an annual average of 253,000 between 1815 and 1820 to 314,000 firkins between 1847-1851.²²

Bacon curing began to become organised on a factory basis from 1820. In that year, Matterson's was established in Limerick and Shaws set up a factory there in 1831. Two years later, Lunham's established a factory in Cork and Denny's also opened during this period.²³ Limerick, Cork, Waterford and Belfast emerged as the main centres of the factory trade.

²¹ Burke, J. *Outline of the Industrial History of Ireland* (Dublin, 1921), pp. 187-8.

²² Donnelly, J. 'Cork Butter Market'. *Studia Hibernica*, xi, (1971), pp. 41, 77.

²³ O'Donovan, J. *The Economic History of Livestock in Ireland* (Cork, 1940), p. 273. Burke (1921), p. 191.

Ie) CORN MILLING.

From the mid-eighteenth century, corn milling technology became much more sophisticated. A number of large mills were built in Ireland which utilised this new technology. These mills produced flour for markets beyond their immediate hinterland. The bounty on flour sent to Dublin encouraged this development.²⁴

The expansion of cereal production in Ireland and a growing demand for flour and oatmeal increased capital formation within the milling industry; between 1759 and 1790, 248 corn mills were built in Ireland.²⁵ The industry continued to expand during the first half of the nineteenth century. The Napoleonic blockade led to an increase in British demand during the war years. Irish millers retained their foothold in the British market after the war, the corn laws protecting them from foreign competition. With the assistance of the steam navigation, exports of flour and meal increased dramatically over the following decades.

Table 8:9.

**EXPORTS OF FLOUR AND OATMEAL FROM IRELAND 1803-42.
(3 YEAR ANNUAL AVERAGES)**

	FLOUR (cwt)	OATMEAL (cwt)	TOTAL (cwt)
1803-5	59,928	29,170	89,098
1814-6	43,173	154,268	197,440
1825-7	208,601	329,289	537,891
1836-8	1,160,161	946,022	2,114,702
1842-4	642,447	1,469,592	2,112,039

notes; some of the totals include other types of meal. 1836-8 and 1842-4 are exports to Great Britain only (which accounted for the bulk of exports) Source; *Exports of grain, meal and flour from Ireland, 1801-28*. BPP 1828, xviii (319) pp. 2-9. *Exports of grain, meal and flour from Ireland to England and Scotland* BPP 1839, xlvi (27) pp. 2-7. *Exports of grain meal and flour from Ireland to GB*, BPP 1845, xlvi (435) p. 1.

The large amount of capital invested in building corn mills during this period, indicates that the demand for oatmeal and flour on the home market was also increasing. By 1835, there were

²⁴ These new mills shelled and sifted grain prior to being ground. After going through the grinding process, the flour was bolted mechanically. Grain and flour could also be moved around these concerns using mechanical hoists and elevators. Cullen, L. 'Corn Milling in Ireland During the Eighteenth Century', *Irish Economic and Social History*, iv, (1977), p. 9.

²⁵ Daly, M. *Social and Economic History of Ireland Since 1800* (Dublin, 1981), p. 67.

almost 2,000 corn mills in operation in Ireland (see table 8:10).²⁶ The milling industry was probably at peak output in these years as Irish population was reaching its highest levels for the nineteenth century and British exports were also at their highest at this time. The home trade consumed the lion's share of the meal and flour produced.

Table 8:10.
CORN MILLS LISTED IN EXCISE DISTRICTS IN IRELAND IN 1835

MARYBORO	106	ARMAGH	102
NAAS	109	LONDONDERRY	284
DUBLIN	(40)	COLERAINE	97
KILKENNY	52	LISBURN	186
DUNDALK	148	CLONMEL	80
DROGHEDA	171	LIMERICK	(57)
WEXFORD	86	WATERFORD	48
ATHLONE	174	TRALEE	35
SLIGO	77	CORK	47
FOXFORD	34	MALLOW	36
GALWAY	10		

Source; *Second Report Railway of the Commissioners* BPP 1837-8, xxxv, app B. No. 14, p. 97. National Archives, Griffith's Valuation Millbook for Limerick lists 77 corn mills. 6 Inch Ordinance Survey 1841 lists 40 mills in Co. Dublin. This list records 669 mills in Ulster excise districts, which accords reasonably well with 657 waterpowered corn mills recorded by Griffith's Valuation in the six counties of what is now Northern Ireland. McCutcheon, A. 'The Corn Mill in Ulster', *Ulsterfolklife*, xv, (1970), p. 75.

Oatmeal was produced largely in Ulster and Connaught where there was a proliferation of small country concerns with 2 or 3 millstones. Flour, in contrast, largely came from Leinster and Munster. There were concentrations of larger mills with between 6 and 10 stones (often using steam power) in or near the larger ports on the east coast and in the south. These ports provided both the largest markets in Ireland and easy access to the export trade. But Clonmel, situated inland, was the largest flour milling centre in Ireland, exporting most of its flour through Waterford.²⁷ The geography of the industry is evident from the port of origin of exports in table 8:11.

²⁶ *Report of the Railway Commissioners*, BPP 1837-8, xxxv, app. B. no. 14, p. 97.

²⁷ Mc Cutcheon, W. 'The Corn Mill In Ulster', *Ulsterfolklife*, xv, (1970), pp.74-5. Bielenberg (1991), pp. 41-49. Cullen (1977), p. 24.

Table 8:11.

THE PORT OF ORIGIN OF FLOUR AND MEAL EXPORTS FROM IRELAND TO GB 1824-38

	OATMEAL (cwt)		WHEATMEAL (cwt)	
	1824	1838	1824	1838
Dublin	10,358	142,075	20,694	146,148
Wexford	514	4,308	2,151	5,478
Waterford	8,654	22,577	160,412	663,412
Cork	6,032	9,394	45,859	252,820
Limerick	2,285	51,830	668	30,315
Galway	7,340	-	-	10,220
Westport	3,580	1,860	-	1,458
Sligo	2,307	168,432	-	-
Londonderry	4,221	67,516	220	60
Coleraine	5,187	13,786	-	-
Belfast	20,679	25,772	1,506	5,662
Newry	1,457	77,988	655	18,556
Dundalk	6,682	213,960	3,554	11,220
Drogheda	20,878	319,589	4,062	114,674
Total	100,174	1,119,087	239,781	1,260,253

Source; Corn and Meal Exports from Ireland to GB, BPP 1828, xviii (319) pp. 2-9. Grain, Malt and Flour Exported to GB from Ireland, BPP 1839, xlvi).

In point of size and technical sophistication, many of the larger Irish mills compared favourably with the best English mills. The largest in the country was Alexander's mill in Millford Co. Carlow; it had 22 millstones and could produce £195,000 worth of flour in a year by the 1840s. The millwork was done by Fairbairn, the famous Manchester millwright.²⁸ English and Scottish millwrights carried out many of the larger contracts for this type of work.

In conclusion, the growing domestic demand for meal and flour was the main reason for the expansion of the Irish milling industry between 1790 and 1845. In addition, Irish meal and flour continued to have a privileged position in the British market until the repeal of the corn laws in 1846. This growing demand provides the explanation for the significant growth which took place within the Irish milling industry during this period

* * *

²⁸ O'Grada, C. *Ireland Before and After the Famine* (Manchester 1988), p. 32.

Some broad conclusions regarding developments in the food processing sector between 1790 and 1845 may be drawn from the preceding sections. The evidence presented corroborates reasonably well with the conclusion of the Railway Commissioners who claimed in 1837 that the 'progressive improvement' of the Irish food processing industries were everywhere visible.²⁹ It seems evident that the growth of the bacon curing and butter trades at least offset the declining trade in beef and pork in the three decades prior to the Great Famine. Tobacco probably held its own, with 291 manufacturers in Ireland in 1835, the industry only began to expand with the growth in tobacco consumption after 1845. Undoubtedly, sugar refining declined during this period. The refineries succumbed to competition from larger producers in British ports in which raw sugar arrived directly from the colonies.³⁰ But overall, the growth of grain milling must swing the argument in favour of growth in this sector as a whole.

²⁹ *Second Report of the Railway Commissioners on Ireland*, BPP 1837-8, xxxv, part one, pp. 9-18. For a more pessimistic view see Mokyr, J. *Why Ireland Starved* (London, 1985), p. 14.

³⁰ Cullen, L. *An Economic History of Ireland from 1660* (London, 1972), pp. 138, 144-5.

II

IIa) FOOD PROCESSING: THE MILLING INDUSTRY.

Although Ireland exported large amounts of wheat and some flour to Britain during the first half of the nineteenth century, the market for flour by the mid-nineteenth century remained predominantly regional rather than national or international. The repeal of the Corn Laws and the transport revolution prepared the ground for a radical change in the supply of wheat and flour on the UK market as foreign supplies gradually began to undermine Irish exports and the Irish domestic trade. The first recorded Irish grain yield in 1847 indicates that 12,291,000 cwt of wheat was harvested. Net imports in that year were 1,530,000 cwt. The milling industry had reached its nineteenth century peak at this stage and in the following years millers experienced rapid reversals. The dramatic fall in the wheat harvest during and after the Famine (which never subsequently recovered) indicates that bread was an important part of the pre-Famine diet.

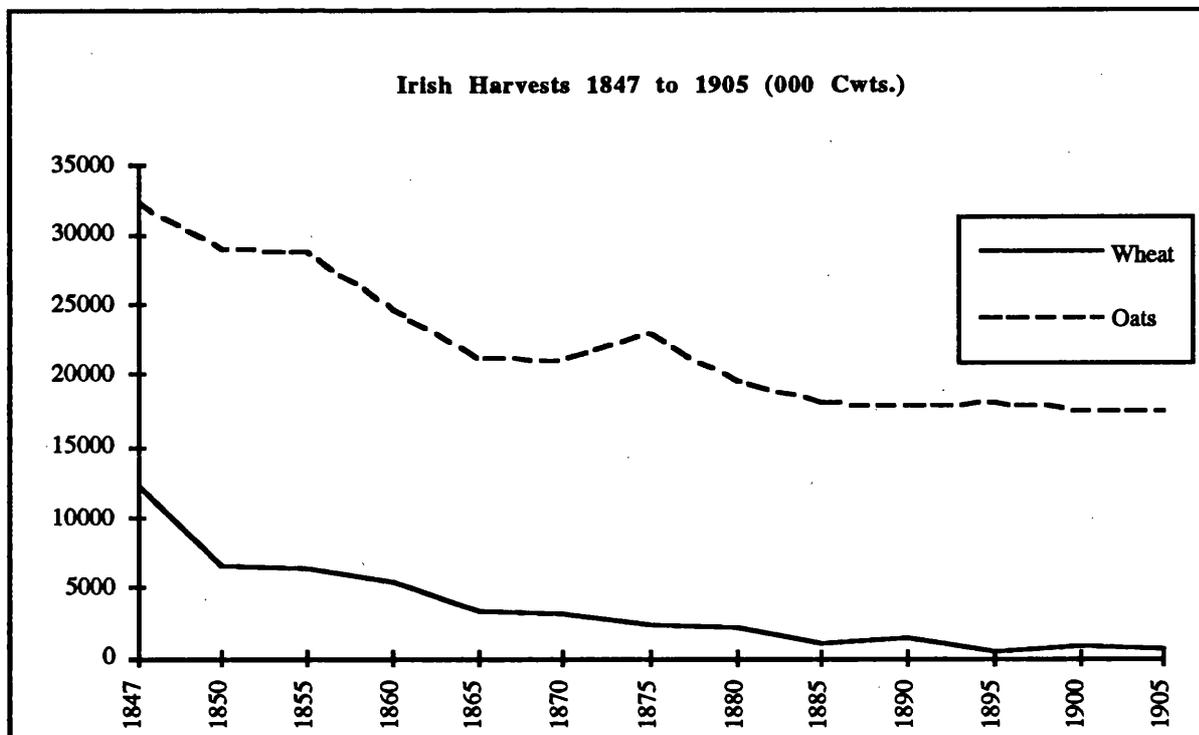


Figure 8:12. Source; Mitchell, B. *British Historical Statistics* (Cambridge, 1988) pp. 198-9.

Solar estimates that exports only accounted for a little over a fifth of wheat production in Ireland between 1840-45. By 1864, the wheat harvest at 3,675,000 cwt was less than a third of what it had been in 1847. Net imports of wheat in 1864, at 5,909,000 cwt, were far larger than the Irish harvest.³¹ So imports had now become the most important source of the wheat supply. These circumstances had a significant impact on the geography of Irish flour milling leading to a decline in inland locations of the industry and an increase in and around the major ports. In the growing port of Belfast, for example, there was a steady increase in milling capacity; Davidson's Bridge Mills were opened in 1852, Macaulay and Co. began operating the steam flour mills in Steam Mill Lane in 1858. The Phoenix Flour Mills opened for business in 1861 on Great Georges St. and in 1868 the Brookfield Flour Mills began to operate on Crumlin Rd. Mc Cammon's mill in King St. which had been initially set up for grinding maize in 1848 was also converted for flour milling during this period.³²

Oatmeal milling declined somewhat during this period, although much less dramatically than flour milling. The harvest in 1864 yielded 21,872,000 cwt compared to 32,258,000 in 1847. Exports of oatmeal rose from 331,000 cwt in 1847 to 838,000 cwt in 1864.³³ Local markets were still vital to the industry. Most of the corn at this time was milled and consumed fairly close to where it was grown. In 1837, the Railway Commissioners found that grain for the Belfast market rarely came from a distance of over 30 miles from the town.³⁴ Many of the larger mills therefore tended to be located reasonably close to urban centres where bread and oatmeal was a significant part of the diet. A surviving ledger from this period for the Manor Mills, for example, which were located in Maynooth, Co. Kildare (which lies within 30 miles of Dublin), indicates that this concern did a substantial trade with Dublin clients which complimented its local trade.³⁵

³¹ Mitchell, B. *British Historical Statistics* (London, 1988) p. 198. Solar, P. *Growth and Distribution in Irish Agriculture before the Famine* (Unpublished Phd, Stanford, 1987) p. 340.

³² Green (1967), p. 42.

³³ Mitchell (1988), pp. 198-9. Solar, P. *Growth and Distribution in Irish Agriculture Before the Famine* (unpublished PhD, Stanford, 1987), pp. 340-1.

³⁴ Green, R. 'History of the Belfast Grain Trade', *Belfast Natural History Society Proceedings*, viii, (1967), p. 39.

³⁵ National Archives; Kld 8/2/1, Ledger, Manor Mills, Maynooth 1854/66.

The decline of population in post-Famine Ireland damaged the business of many small corn mills which depended on rural markets. A number of mills diversified by milling maize. Maize was imported during the famine years as a relief measure, but many millers having introduced new machinery found it profitable to mill maize for animal feeds.

Table 8:13.

FOREIGN MAIZE IMPORTS (000 CWT)

	DUB	BELF'T	CORK	LIM'ICK	DERRY	WATFORD	TOTAL
1870							5738
1875	523	708	1336	475	645	1139	4826
1880	1004	1257	1408	913	1284	1160	7026
1885	1069	1430	1083	955	1159	1088	6784
1890	1721	2413	2137	1159	1069	1264	9763
1895	1355	1677	1126	741	994	883	6776
1900	1183	3540	1395	915	1102	793	8928
1905	924	3827	1113	890	490	684	7928
1905*	1049	4663	1878				13125

* Total imports including those from Britain.
Source: *Thom's Directory*, 1870 to 1907.

This was the beginning of the provender trade which expanded significantly during the second half of the nineteenth century because of the growing importance of livestock within the Irish economy. The provender trade enabled a number of mills to survive the contraction in the other branches of the industry. It conveniently complemented whatever trade in oatmeal and flour could be retained. Indian corn imports which had been negligible in the early 1840s, had risen to 5,922,000 cwt by 1866.³⁷

Stone milled flour did not keep in good condition for very long which was one factor which helped local mills to retain local markets. Once built, mills could be maintained with limited costs and brought back into production for a short period to undertake the milling of the local harvest. Although wheat production continued to decline throughout the second half of the nineteenth century, oat production remained more stable; decline was largely limited to the third quarter of the century. Oats remained the staple crop in Irish agriculture; this, and the advent of

³⁷ Mc Cutcheon, W. 'The Corn Mill in Ulster', *Ulsterfolklife*, xv-xvi (1970), p. 76. Solar (1987), pp. 233-4

provender milling, explains the survival of many mills in the face of adverse conditions within the flour milling industry from the late 1870s. The number of corn mills only fell gradually from just under 2,000 in 1835 to 1,482 in 1891.³⁸

Table 8:14.

FOREIGN WHEAT IMPORTS 1870-1905 (000 CWT)

	DUB	BELF'T	CORK	LIM'ICK	DERRY	WAT'F'D	TOTAL
1870							6717
1875	3691	1566	2749	1068	162	674	9910
1880	3157	1172	1914	840	202	457	7742
1885	3230	1714	1486	1031	224	551	8236
1890	2422	1087	1357	1251	120	312	6549
1895	1805	553	1543	1465	19	369	5754
1900	1314	202	1083	1221	243		4072
1905	2332	1223	1006	1174	56	301	6092
1905*	2523	1548	1399				7503

*Total imports including those from Britain.
Source: *Thom's Directory*. 1872-1907.

Even flour milling remained reasonably remunerative down to the mid-1870s, at which time the amount of wheat milled in Ireland was not significantly less than in 1847 (imports offset much of the declining Irish wheat yield). But the amount of wheat milled in Ireland gradually declined thereafter; by 1895, the throughput was roughly half of what it had been in 1875. The decline of the industry was a consequence of rising imports of flour and a declining population. Nowhere was the decline of the industry more evident than in Clonmel where a number of the major milling concerns went out of business in the late 1870s. The town had been the premier milling centre in Ireland during the first half of the nineteenth century.³⁹

The two major factors which led to a change in the nature and geography of the industry were imports of foreign corn (facilitated by the transport revolution which reduced transit costs) and the introduction of the new roller milling technology. Imports of wheat and maize had gradually been increasing since the Famine. The introduction of roller milling abroad had a

³⁸ *Second Report of the Railway Commissioners*, BPP 1837-8, xxxv, app. B, no. 14, p. 97.
Agricultural Statistics for 1891, BPP 1892, lxxxviii (c. 6777) p. 25.

³⁹ Burke, W. *History of Clonmel* (Clonmel, 1907), pp. 183-4. Cullen, L. 'Eighteenth Century Flour Milling in Ireland', *Irish Economic and Social History*, iv (1977), p. 24. Commission on Irish Industries, BPP 1884-5 ix (Q. 7331) p. 401.

devastating impact on the Irish industry from the end of the 1870s; Irish millers were slow to adopt the new technology so flour produced in these foreign mills began to find a ready market in Ireland. This coincided with extremely poor Irish grain harvests, which fell in total value terms from 54 million pounds to under 23 million pounds between 1875 and 1879.⁴⁰

Roller milling was radically different than the traditional method of using millstones. The main advantage of the new system was that it required less motive power to grind a given quantity of corn and it also produced a greater proportion of finer white flour. The diffusion of the new technology was confined predominantly to Hungary and the US by the mid-1870s. British mills were slow to adopt the new technology, and the first complete set of roller mills in England was only installed in 1878 at Mc Dougall's mills in Manchester. Even ten years later only about 20 British mills had installed the new technology from an estimated total of over 10,000.⁴¹

By the 1880s, the importation of American wheat and flour had stifled most of what remained of Irish flour exports to the British market. Separate figures for Ireland were not kept during this period but it is evident from surviving Harbour Commissioners' returns that this trade suffered significant reversals. In Cork for example flour exports averaged 100,482 bags per annum between 1871 and 1879, with peak exports of 155,321 bags in 1877. Thereafter decline was dramatic, exports averaged only 33,885 bags in the nine years ending in 1888. The new technology adopted in America and the significant reduction in shipping costs meant that American flour could be sold in Ireland at competitive costs. Another disadvantage was that Irish grain had a higher moisture content than American; Irish grain required kiln drying which gave the Americans further cost advantages.⁴² From the early 1880s, the Americans also began to make inroads into the Irish market for flour; imports doubled in the three years ending in 1884.⁴³

⁴⁰ Burke, J. *Industrial History of Ireland* (Dublin, Revised edition, 1921) p. 318.

⁴¹ Perren, R. 'Structural Change and Market Growth in the Food Industry: Flour Milling in Britain, Europe, and America, 1850-1914' *Economic History Review*, xliii (1990), pp. 423-4.

⁴² Bielenberg (1991), pp. 47-8.

⁴³ *Commission on Irish Industries*, BPP 1884-5, ix (Q. 5518), p. 297.

The first miller in Ireland to install the new roller system was S.S. Allen of Midleton in 1867. But this venture and a few others failed. It was only in 1879 that an Irish miller, Messrs Shackleton of Carlow, first made a commercial success of the new system.⁴⁴ Over the following decade a number of Irish mills were either converted or built for roller milling. In Belfast in 1881, D and W Carmichael built the Dufferin Mills in Duncrue St. and by 1884, the new system had also been installed in mills on Meadow St. and the Falls Rd. both of which were owned by Andrews and Sons. Others who adopted the system in Ulster included Wilson of the Foyle Mills in Derry, Scott's Omagh Mills in Co. Tyrone, and Walker's Mills in Newry, Co. Armagh. At this stage one of the larger mills in Galway had been converted for roller milling. By 1891, there were two such mills in the port of Cork; Furlongs on Lapp's Quay (with 19 sets of rollers) and Mc Mullen's on Margaret St. (with 17 sets).⁴⁴ In Limerick, James Bannatyne and Sons built the City Roller Mills in 1885. The Custom House Mill in Dublin was converted for roller milling in the following year.⁴⁵

A few large companies successfully re-organised and turned the changes in the corn supply and the technology of the industry to their favour. From 1880, R.H. Hall of Cork for example, a large international grain dealer, opened new offices in Belfast, Dublin and Waterford and extended their business. By the turn of the century, the industry was becoming increasingly concentrated in the large steam driven roller mills based in the major ports which milled imported grain. There were six large roller mills in the port of Cork alone by 1908.⁴⁶ The growth in the number of these large mills led to a revival within the Irish milling industry after the turn of the century. These firms increasingly undermined the flour and maize milling trade of the smaller country mills.

The changes in the industry are evident from the falling amount of wheat grown in Ireland and increased imports; the Irish wheat harvest fell from 3,675,000 cwt in 1864 to 710,000 cwt in 1907. Imports of wheat during the same period rose from 5,967,000 cwt to 7,147,511 cwt.

⁴⁴ Scott, W. *A Hundred Years A Milling* (Dundalk, 1951), p. 153.

⁴⁴ Bielenberg (1991), p. 47. *Commission on Irish Industry* BPP 1884-5, ix, (Q. 5641) p. 304. (Q. 7353), p. 403. Green, (1967), p.43.

⁴⁵ Daly, M. *Dublin, The Deposed Capital* (Cork, 1985) p. 35. Stewart, D. 'Mills and Millers', *Old Limerick Journal*, ii (1980), p. 23.

⁴⁶ Bielenberg (1991), p. 48.

Imports in the latter year were therefore about ten times the size of the Irish harvest. The oat harvest of 17,166,000 cwt in 1907, was not significantly less than in 1864, when the yield was 21,872,000 cwt. Oatmeal production kept many of the smaller rural mills in business. The Brinny Mills near Bandon in Co. Cork for example ceased producing white flour at the end of the nineteenth century, as they were unable to compete with American imports and the produce of mills in the port of Cork. Instead they concentrated thereafter on grinding or crushing oats and barley on commission for local farmers for animal feeds, in addition to producing some wholemeal flour. The growing importance of maize milling for animal feeds is evident from the rise in maize imports from 2,200,000 cwt in 1864 to 15,147,026 cwt in 1907.⁴⁷ Even though part of this rise was due to the maize used within the distilling industry, the importance of the industry is evident from the fact that Ireland by 1907, accounted for half the UK output of maize meal,⁴⁸ reflecting the importance of the livestock trade within the Irish economy.

With the exception of oats and some barley for animal feed, most of the corn for the Irish milling industry was imported by the end of the nineteenth century. A large part of the industry had re-organised and relocated into larger mills in the major ports. According to Perren, costs per sack in 1900 fell substantially as production moved towards 12 sacks an hour, thereafter the decline in costs was very gradual.⁴⁹ Significant economies could therefore already be achieved in medium to large sized plants using roller mills which enabled them to displace smaller mills in their hinterland. This suited conditions in Ireland where millers largely depended on the home trade which was not a substantial market, but large enough to sustain a number of modern mills.

Although many smaller country mills using the traditional milling technology closed, it is important not to forget the growing output of large highly capitalised and technically sophisticated roller mills by the beginning of the Twentieth century. Rural milling declined during the second half of the nineteenth century, but some of this decline was offset by the

⁴⁷ Mitchell (1988), pp. 198-9, Solar (1987), p. 231, 234. Blake, J. 'Brinny Mill', *Bandon Historical Society Journal*, vi, (1990), p. 42.

⁴⁸ Green, R. 'Industrial Decline in the Nineteenth Century', in Cullen, L. (ed) *The Formation of the Irish Economy* (Cork, 1969), p. 100.

⁴⁹ Perren (1990), p. 433.

growth of milling in the larger ports. There was a major increase in the amount of maize milled in Ireland since the mid-nineteenth century, and this would have more than offset the decline in oatmeal production. The amount of wheat milled after the turn of the century was not significantly less than in the 1850s, the only difference being that it was mostly imported. Riordan in 1920 noted that 'no Irish industry has had to face fiercer competition from outside these shores, and has done it more successfully in the long run than the Irish flour milling industry'.⁵⁰ While the actual quantity of all types of corn milled in Ireland had not declined, the net value of the industry had declined during the second half of the nineteenth century because of the fall in cereal prices and the growth of maize milling.

Iib) BACON CURING

During the second half of the nineteenth century, bacon curing became more centralised in the towns of Waterford, Limerick, Cork and Belfast. The growth of the industry is evident from the growth in exports of bacon and ham from 3,404,000 cwt in 1850 to 10,824,000 cwt in 1900.⁵¹ Irish bacon had a very good reputation on the London market in which the main competition was from Hamburg and America. Irish producers had two advantages over these rivals; Irish bacon had a better reputation in terms of taste and it was cheaper.⁵²

In 1860, Waterford dominated exports of Irish bacon to London, while Belfast built up a good trade with Lancashire and the north of England. Limerick built up a similar trade to that of Belfast, but it also had an extensive home trade, as did Cork.⁵³

Methods of curing changed radically in the 1860s when brine was pump injected into the meat instead of piling it in beds of salt. This improved the taste of the product. The size of a number of the plants increased. Lunham's of Cork, for example, handled 30,000 pigs per annum by 1878; the figure more than quadrupled over the next decade. The two Limerick firms of Shaw and Materson had a massive combined turnover of two million pounds by 1876. Both firms

⁵⁰ Riordan, J. *Modern Irish Trade and Industry* (London, 1920), p. 88.

⁵¹ Solar (1987), pp. 151, 155.

⁵² Daly, J. *Glimpses of Irish Industries* (Dublin, 1889), pp. 13-4.

⁵³ Riordan (1920), pp. 79-81.

had continuously invested in expansion and kept pace with the latest techniques. By using ice the two firms could go on curing through the summer season which had previously not been possible. The Munster curers drew pigs south of a line from Dublin to Galway. Much of the bacon cured in this region was sold on the London market.⁵⁴

By 1902, there were 20 bacon curing factories in the country employing over 1,600 people; these factories dealt with about 850,000 pigs per annum. At this stage pig breeding had been significantly improved to the advantage of curers. Limerick was the largest centre of the industry and its output was about equal to Waterford and Cork combined. Next came Belfast and there were also a number of smaller centres of the industry in Londonderry, Dublin, Tralee, Enniscorthy, Dundalk, Ballymena and new Ross. Denmark had become the major rival in the British market in the last decades of the nineteenth century. But the Irish industry was still a little larger than the Danish industry in 1902.⁵⁵

The performance of the Irish bacon curing industry during the second half of the nineteenth century was reasonably good. The industry was export oriented, it therefore had to compete on the British market with the US and Denmark. A large part of the industry became centralised in more highly capitalised plants which used the latest techniques. This enabled the industry to survive and expand to meet the growing demand for meat on the British market. Growing per capita income in Ireland also increased the demand for bacon and ham on the home market. By 1920, it was estimated that about 37% of the pigs reared in Ireland were consumed on the home market.⁵⁶ Ireland had advantages over rival producers as it had a tradition of pig breeding, and in terms of taste Irish bacon was highly rated and it was cheaper. Undoubtedly, the industry experienced some growth during the second half of the nineteenth century.

⁵⁴ Daly (1989), pp. 14-16. O'Donovan, J. *The Economic History of Irish Livestock* (Cork, 1940), pp. 273-4.

⁵⁵ Riordan (1920), pp.80-1. Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1902), pp. 241-257.

⁵⁶ Riordan (1920), p. 82.

IIc) OTHER FOODS.

Baking and biscuit making became an important industry during the second half of the nineteenth century. Most large towns had a bread bakery. By 1907, the net value of the output of these trades was greater than milling and bacon curing combined.⁵⁷ Dublin was the major centre of baking, biscuit making and confectionery. Initially the industry largely supplied local needs with very limited changes in the methods of production. Between the 1860s and the 1890s baking became more centralised in a smaller number of larger production units. Boland's of Dublin for example, completed a major extension to their Capel St. plant in 1888 and in the following year the three other large bakeries in the city, Johnston, Mooney and O'Brien merged into one firm. These firms then began to introduce the latest baking technologies thereby increasing productivity.⁵⁸

George Baker and Co. of Cork, established in 1844, was the pioneer of machine biscuit making in Ireland. But as in baking, Dublin became the major centre of the industry. W. and R. Jacob and Co. established their Dublin plant in 1851, became the largest biscuit making firm in Ireland. The process was highly mechanised and Jacob's secured a significant niche in the British market for biscuits by 1883, when the firm became a public company. By the turn of the century the firm was among the top five biscuit manufacturers in the UK employing over 2,000 people rising to 3,000 in 1911. As a consequence of the success of the firm, Ireland built up a large net export trade in biscuits.⁵⁹

The manufacture of butter, which had traditionally been a farm based industry, gradually became centralised in creameries after the introduction of the centrifugal separator in the early 1880s. O'Grada concludes that although the diffusion of the creamery system was slow relative to Denmark (Ireland's main competitor in the British market) they made up lost ground subsequently by adopting the new methods which the Danes had established. The creamery

⁵⁷ First UK Census of Production (1907) BPP cix, 1912-3 (cd. 6320) p. 503.

⁵⁸ Daly (1989), pp. 32-3.

⁵⁹ *Ibid.*, pp. 32-3. Riordan (1920), pp. 92-3.

system spread initially in Limerick, the premier dairying county. By 1906, there were 800 creameries in Ireland.⁶⁰ Solar's work demonstrates that the export trade in butter to Britain at this stage was not much different in terms of quantity than it had been in the mid-nineteenth century. As Irish income was rising in the intervening period it seems probable that home consumption was probably rising, which would indicate that over the period as a whole total output actually increased.⁶¹ Cheese and margarine production was small in Ireland, but after the turn of the century output was probably increasing marginally in response to rising demand on the home market and a small growth in exports.⁶²

IId) TOBACCO

The manufacture of tobacco increased in Ireland during the second half of the nineteenth century. There were 291 tobacco manufacturers in Ireland in 1835 and the industry was to be found in most of the larger towns. At this time the production of roll and twist tobacco was carried out on a small scale, but with mechanisation during the second half of the nineteenth century the industry became more concentrated in a smaller number of large plants, of which there were 17 in 1920. By the turn of the century Belfast dominated the industry, Gallagher's being one of the largest tobacco manufactories in the world. The city accounted for almost two-thirds of Irish tobacco imports. Dublin was the next most important centre of the industry, but there was also factories in Limerick, Dundalk, Cork, Dungarvan, Derry and Waterford. Ireland had become a net exporter of manufactured tobacco by the end of the nineteenth century.⁶³ As less than a quarter of the tobacco consumed in Ireland was imported at this stage, a return of the tobacco duty paid in Ireland during the second half of the nineteenth century is a good indication that output was rising.

⁶⁰ O'Grada, C. 'The Beginnings of the Irish Creamery System 1890-1914', *Economic History Review*, xxx (1977), pp. 284-305.

⁶¹ Solar, P. 'The Irish Butter Trade in the Nineteenth Century', *Studia Hibernica*, xxv (1989-90), pp. 159-160, 154-5.

⁶² Riordan (1920), p. 87.

⁶³ *Second Report of the Railway Commissioners*, BPP 1837-8, xxxv, app. B. no. 14, p. 97.
O'Grada, C. *A New Economic History of Ireland; 1780-1920* (Oxford, forthcoming). O'Riordan (1920), p. 183.

Table 8:15.

**TOBACCO ON WHICH CUSTOMS TARIFFS WERE PAID IN IRELAND
1847-1897 (000 LBS)**

1847	5101
1850	4604
1855	4808
1860	6055
1865	6968
1870	7018
1877	6499
1880	6753
1885	7255
1890	8521
1895	9284

Source: *Customs Tariffs of UK, 1800-1897*, BPP 1898, lxxxv (c. 8669) pp. 197-8.

* * *

From the above survey it seems evident that the Irish food processing and tobacco sector experienced growth during the second half of the nineteenth century. Production in most of the food industries became more centralised in larger production units.

Ile) THE MINING INDUSTRY.

The Irish mining industry remained fairly stagnant during the second half of the nineteenth century. It never became an industry of any great prominence in terms of its contribution to industrial output. The industry never created any forward linkages to other branches of industry since the ore mined was shipped to England and Wales to be smelted and further processed.

Copper mining had been important in the mid-nineteenth century, the largest mine was near Allihies in West Cork. This employed about 1,500 people in 1847, but the market price for copper declined and by 1879 the number employed had fallen to 400. Returns dwindled over the next decades.⁶⁴ The amount of copper ore mined in Ireland fell from 15,063 tons in 1855

⁶⁴ O'Mahony, C. 'Copper Mining at Allihies', *Journal of the Cork Historical and Archaeological Society*, xcii (1987), pp. 71-84.

to only 841 tons in 1882. Prior to this decline Wicklow and Waterford had also been prominent centres of the industry.⁶⁵

Table 8:16.
IRISH MINERAL PRODUCTION* (tons)

	1855	1873	1893	1907
Barium	2,580	3,736	4,934	1,196
Bauxite		8,740		7,537
Copper Ore	15,063	8,793		2,266
Copper Precip		60		
Iron Ore	576	127,132	67,292	89,181
Iron Pyrites		37,738	3,568	2,516
Lead Ore	2,005	1,211	59	
Lignite		1,310		
Ochre etc		793	104	52
Salt	20,000	33,751	41,308	46,666
Zinc Ore		858		
Silver	7,252			
Sulphur Ores	58,000			
Bog Ore				6,290
Coal	145,620	135,730	105,678	99,704

*excludes stone, sand, gravel and clay.

Source; Minerals Statistics, UK BPP 1856, lv (328) pp. 2-5. BPP 1894, xciv (c. 7377) p. 7.
BPP 1908, cxxii (cd. 4343) p. 7. Riordan, J. *Modern Irish Trade and Industry* (London, 1921), p. 150.

Table 8:17.
Irish Mineral Output (current prices)

	1882	1892	1907
Bauxite	5,877	1,860	1,884
Barium	4,810	4,965	761
Bog Ore	1,957	7,681	1,573
Brick Marl	1,165		
Coal	57,417	49,993	46,699
Copper Ore	4,500		2,288
Copper Precipitate	1,118		
Clay, Fire Clay	632	690	4,378
Iron Ore	41,935	11,625	16,153
Iron Pyrites	5,743	2,160	1,252
Lead Ore	25,099	7,246	352
Ochre	758	535	52
Salt, White Salt	12,959	20,643	15,183
Slate, Slabs, Stone	21,360	286,624	118,524
Gravel and Sand		6,913	
TOTAL	167,477	387,128	215,660

Source; *Minerals Statistics UK*, BPP, lxxxv (c. 3869), p. 131.
BPP 1894, xciv (c. 7377) p. 7. BPP 1908, cxxii (cd. 4343) p. 127.

⁶⁵ *Mineral Statistics UK*, BPP 1856, lv (328) pp. 2-5. BPP 1884, lxxxv (c. 3869) p. 131.

Irish coal output contributed a tiny amount of the coal consumed in Ireland. Between 1854 and 1907 output fell steadily from 148,750 tons to 99,000 tons. In the latter year 4,480,777 tons of coal were imported from Britain.⁶⁶

A number of other minerals were mined in Ireland in small quantities. Most of the iron ore raised came from Co. Antrim. Slates and stone became by far the most valuable item by the end of the nineteenth century. Quarries supplied material for building and road making, in addition to limestone crushed for agricultural purposes. The value of the output of quarries was therefore greater in value terms than the minerals raised in Irish mines.

In terms of industrial output, the mining industry in Ireland was never very significant. The figures available for total output (which are not entirely consistent) indicate that mining and quarrying reached peak output in 1890 when the gross value of the industry was £406,512. Output fell back to about half this figure in the following decades.⁶⁷

II) PAPER

Although the number of paper mills in Ireland continued to decline between the 1840s and the 1860s, the output of the industry continued to increase. A smaller number of more highly capitalised and larger mills, displaced many of the smaller mills which had continued to use out-moded technologies.

With mechanisation, the industry became more concentrated in a smaller number of mills around Dublin and east Ulster. The number of mills in County Cork plummeted from 15 in 1837 to only 3 by 1852. The last two Limerick mills also closed down in the early 1860s, and by 1876, only one of the 15 operative mills left in the country was located outside counties Antrim, Dublin and Cork, and this was located in Galway.⁶⁸

⁶⁶ Riordan, J. *Modern Irish Trade and Industry* (London 1920), pp. 145-6. *Imports and Exports, Ireland* BPP 1908, xcix (cd. 4429) pp. 2-69.

⁶⁷ *Mineral Statistics, UK* BPP 1890-1, xcii (c. 6364) p. 7.

⁶⁸ Even the large mill at Dripsey closed in 1864 and thereafter a few Cork mills continued to make only brown paper for the grocery trade. The last of these mills at Gurth closed in 1910 because of competition from Dublin mills using high speed machinery. Bielenberg (1991), p. 80. Mac Lochlainn, A. 'Joseph Sexton, Papermaker', *Old Limerick Journal*, vi, (1981). Shorter, A. *Paper Making in the British Isles* (Newton

Table 8:18.

QUANTITY OF PAPER MADE AND NUMBER OF MILLS IN IRELAND 1845-1860.

	MILLS	PAPER MADE (lbs)
1845	50	5,662,000
1850	39	6,720,000
1855	29	7,443,000
1860	26	9,315,000

Source; *Return of Paper Mills in Ireland* BPP 1861, lviii (256) p. 1. Spicer, A. *The Paper Trade* (London, 1907), p. 246. Cullen, L. *An Economic History of Ireland since 1660* (London, 1972), p. 146.

To justify the installation of new technology, paper manufacturers needed adequate markets. The Dublin manufacturers had an advantage in this respect with the largest market for paper at their doorstep. A number of capable manufacturers established mills on the rivers in the vicinity of the city. The best known were undoubtedly the Mc Donnell's who had been engaged in the industry since the eighteenth century. By the beginning of the nineteenth century they had established the Saggart mills and other members of the family became engaged in operating mills at Templeogue, Tallaght and Clondalkin.⁶⁹

The Mc Donnell's had become the principal paper masters in Dublin by the 1830s, by which time members of the family ran 2 mills at Saggart (employing 200 people), at Old Bawn (employing 50), Killeen (employing almost 200 people) and Drimnagh (employing 25). The Saggart mills (otherwise known as the Swiftbrook Mills) was the most important. In the 1840s, machinery was installed here which enabled the Mc Donnell's to manufacture high quality paper. Saggart had become the best mill in the country. By the 1870s, employment at

Abbot, 1971), pp. 9-12.

⁶⁹ Kennedy, D. MacLochlainn, A. 'The Journals of the Irish House of Commons, An important source for Irish Paper Making History', *Paper Maker*, xxix (1960), pp. 27-36. The Mc Donnell brothers, Derby and Christopher, came from Navan where they had already established a paper mill prior to coming to Dublin in 1775 to set up the Killeen mill. These mills passed on to Edward Mc Donnell and under his auspices they prospered. Edward was also the first chairman of the Great Southern Railway of Ireland and for his extensive involvement in its construction he was knighted. After his death in 1858, the Killeen Mills passed on to his son Richard who was unable to make a success of the business. Mr Edward Nolan (the founder and senior partner in Browne and Nolan) took over after this and invested £15,000 in new machinery including an American turbine to drive the machinery. An important contract which the mill fulfilled for many years was the manufacture of all the Bank of Ireland bank notes. But this contract did not last long after the death of Mr Nolan in 1882 and the bank of Ireland thereafter had all its notes made in England (like all the other Irish banks). The business soon failed and the Killeen mills became derelict. *The World Paper Trade Review*, 25 August, 1911. National Library; Ms 15,614, Notes on History of Dublin Paper Makers.

the two mills there had risen to 400.⁷⁰ The Mc Donnell's sold the mills for £30,000 in 1880 (very much below their value) to a Dublin company which continued to operate them with success.⁷¹ At this stage, another large and successful company had been set up in Ballyclare, Co. Antrim.

The Ballyclare Mills was taken over by a group of Lancashire businessmen in 1875 who began to trade as the Northern Ireland Paper Making Company. The company imported most of its raw materials, which included esparto grass, wood pulp, chemicals and coal. It made paper for newspapers in Dublin, Belfast, Liverpool and Manchester. Because the company was highly capitalised (expending £170,000 on capital account between 1876 and 1883) it could install the new technology which was revolutionising the British paper making industry during these decades. It could compete with British mills because of the cheapness of labour in Ireland, while it could compete with its Irish rivals because it was highly capitalised and used superior technologies. Output rose from 60 tons a week in 1879 to about 120 by 1888.⁷²

But many other Irish mills went out of business and the industry as a whole seems to have gone into a decline from about 1860. By 1907, there were only 7 mills left in Ireland with a combined output of only £175,000. 5 were located in Co. Dublin and 2 in Co. Antrim. Most Irish mills did not invest sufficient capital in new technologies. By the turn of the century the capital required to set up the best paper making machinery was extremely expensive; most Irish manufacturers were unwilling or incapable of raising this to install new technology and re-

⁷⁰ *The World Paper Trade Review*, 25 August 1911. Saggart was established in 1795 by John McDonnell in a building previously used for flour milling. The opening of a second mill close-by in 1806 indicates that the first concern was a success. A large waterwheel (50ft in diameter) made by J and R Mallet was installed in 1848 to drive this machinery, and the dams and mill ponds were built around this time to increase the available power. But even this was insufficient to provide enough power, so in the early 1870s a Corliss steam engine was installed in the upper mill at a cost of £5,000. In the 1840s, machinery was installed here which enabled the Mc Donnell's to manufacture high quality paper. Saggart had become the best mill in the country. Each morning a string of carts brought the paper to the company stores and offices at Lower Ormond Quay. The same carts returned to Saggart with linen rags and esparto grass which were the principal raw materials used.

⁷¹ *Ibid.* After the death of John Mc Donnell in 1859, the Saggart mills were left in trust to his nephew on condition he acquired a full knowledge of paper making. He failed to fulfill this stipulation and his younger brother was also unwilling to commit himself to the industry as he joined the Jesuit order after his schooling at Clongowes in 1877. The mills were therefore sold.

⁷² Todd, N. *A Social and Economic Study of South Antrim During the Second Half of the Nineteenth century* (Unpublished MA, QUB, 1975), pp. 123-4.

organise which was the only way to survive. If they failed to take this course of action they could not compete with paper imported from England, Germany and America.⁷³

IIg) THE GLASS INDUSTRY

The manufacture of flint glass in Ireland suffered serious setbacks during the 1840s and most of the flint glass works went out of business. Even Gatchell's of Waterford, the most prestigious of the flint glass works in the country, closed down in 1851.⁷⁴ The Irish flint glass industry was almost wiped out with this closure. Some of the Waterford workers found employment in Belfast where flint glass production survived until the late 1860s.⁷⁵ The Dublin industry lasted somewhat longer owing to the ability of the Pugh brothers, who first entered a glass making partnership in Liffey St. in 1854. Nine years later they took over the larger glassworks in Potter's Alley. But even the Pugh's works seems to have been based more on skilled craftsmanship rather than on mass produced goods. The firm made wine glasses, jugs, decanters, in addition to railway lamps, glass for lighthouses and ships. The importation of much cheaper glassware from the continent (notably Belgium), ultimately led to the demise of Pugh's works in 1893, as they were unable to match the significant technical improvements which had raised the productivity of the continental glass houses. Pugh's wine glasses for example in 1884 sold for 5s and 6d a dozen compared 7d a dozen for similar wine glasses imported from Belgium.⁷⁶

Apart from competition from Belgian and French glass manufacturers, a witness for the Commission on Irish Industry in 1884 blamed the collapse of the Irish flint glass industry on

⁷³ Todd (1975), p. 120. Riordan (1920), pp. 169-70. At the Edmondstown, Newbrook and the Kynoch mills (all in Co. Dublin), brown paper was made, while common paper was produced in Clondalkin on two 72 inch machines. At the remaining Dublin mill, Swift Brook, fine and superfine writings, banks, typewritings, and account book papers were made on a 72 inch machine. The North of Ireland Paper Mills Company at Ballyclare was the largest in the country producing fine news, printings, writings and browns on five machines from 84 to 116 inches in width. The company's other mill at Larne made mostly common papers on two machines of 90 and 108.

⁷⁴ The company had made financial losses in 1849. In the following year the owner regreted that although the works were still doing a reasonable trade, despite a recession, he had insufficient capital to enable the business to reach its potential. He was unable to secure a partner and the Bank of Ireland was unwilling to advance him more credit. Following a strike, the fires were finally put out. National Museum. Waterford Glassworks Letterbook, Number 154-1956, 6 August 1850.

⁷⁵ Westropp (1978), pp. 113-4.

⁷⁶ Boydell, M. 'Some Dublin Glass Makers', *Dublin Historical Record*, xxvii, (1972), pp. 44-8.

the combined efforts of English and Scotch manufacturers, as they covered carriage, breakage, and packaging in Ireland; these concessions were not given to English traders. In addition, he blamed the lack of commercial enterprise among the Irish manufacturers and a lack of patronage from the Irish public. It seems evident that the key factor was that the Irish manufacturers failed to keep pace with the technology used in England and the continent which meant much lower levels of productivity. The importation of all the raw materials may also have raised costs.

With the closure of Pugh's works in 1893, the only type of glass production which survived in Ireland was the manufacture of glass bottles. Dublin was the main centre of this industry, followed by Belfast.⁷⁷

III) TANNING AND FOOTWEAR

The Irish tanning industry was in decline by the mid-nineteenth century. The growth in exports of live cattle from the 1820s, with the improvement in sea communication, resulted in a contraction in the supply of Irish hides and a corresponding increase in the supply of hides to English tanners. The use of imported English leather therefore increased. Most Irish tanyards failed to keep up with the pace of technological change within the English industry, where mechanisation and the use of chemicals increased productivity and reduced the time and costs required to carry out the process. Irish demand for leather was therefore increasingly supplied from tanneries based in the West of England.⁷⁸

The quality of the work done by many Irish tanners had also declined by the 1880s; hides were badly flayed and scarred making them unfit for high class leather work. However a few larger firms like the Dunns and Murphys in Cork, who amalgamated in the 1830s managed to reorganise successfully and survive. They subsequently became the largest tanners in the country, adopting new technology for rolling, scrapping, beating and smoothening the leather. The size of their operation enabled them to reap economies of scale as they could import whole

⁷⁷ Westropp (1978), p. 67, 114.

⁷⁸ Dwyer, P. 'The Leather Industries of the Irish Republic', *Irish Geography*, iv (1961), pp. 175-180.

cargoes of bark and valonia at cheap rates. There were 2 other tanning firms in Cork in 1902 and 18 in the whole country. Limerick at this stage had displaced Cork as the leading centre of the industry with 2 firms which processed over 30,000 hides per annum for sole and harness leather. Other sole leather tanneries were located in New Ross, Londonderry and Ballitore. In Dublin one firm specialised in saddlery, harness leather and book binding. Centres of upper and harness leather included Belfast, Newry, Coleraine, Drogheda, Dunmanway, Bantry, Clonmel, Mountmellick and Richhill. These surviving firms tended to be larger and more highly capitalised than the typical tanyard of the mid-nineteenth century and they could compete with English imports.⁷⁹

The footwear industry also experienced contraction during the second half of the nineteenth century. By mid-century British penetration of the Irish market had become more pronounced with the importation of prepared uppers and cheap sole leather from Northampton and London. British manufacturers increased their productivity significantly by applying new technology which enabled them to reduce the prices of their shoes and boots. Apart from being cheaper, their products were more fashionable and they offered Irish shop keepers large discounts to attract more custom. The length of production runs was an important determinant in the efficiency of footwear factories so British manufacturers had an advantage in this respect as their home market was much larger. The concentration of the industry in Northampton, Leeds, Stafford and Leicester tended to reduce overheads and transport costs and enabled manufacturers located there to enjoy external economies; these included a skilled workforce and specialised machine makers who serviced the industry in these towns. Irish centres of the industry increasingly tended to depend on this region for supplies of tacks, rivets, tools and leather.⁸⁰

The surviving Irish firms tended to specialise in agricultural footwear which required less skill. There was a ready market for this type of footwear in Ireland and it was one of the few areas where Irish manufacturers could gain economies of specialisation. The Lee Boot manufacturing Company in Cork for example started large scale production around 1880, updating plant

⁷⁹ Ibid., pp. 175-180. Bielenberg (1991), p. 83.

⁸⁰ Press, J. *The Footwear Industry in Ireland 1856-1922* (Dublin, 1989), pp. 17-26.

periodically and keeping abreast of organisational changes within the industry. Other firms subsequently emerged in Belfast and Clonmel. Hilliard of Killarney (established 1870) similarly made heavy boots. The oldest and largest firm, Winstanley's of Dublin, produced a more sophisticated range of footwear. From small beginnings in the early-1850s the firm produced about 4,800 pairs of shoes by 1888 employing about 400 people. But this firm was an exception to the rule as British producers supplied the bulk of Irish demand by the end of the nineteenth century. According to Winstanley, Irish manufacturers only supplied 25% of Irish demand by 1885. Matters had improved by the turn of the century; new factories were established in Waterford, Carlow and Dundalk. The durability of Irish footwear and growing nationalist sentiments won more custom. By 1907 the industry employed over 2,000 people. But because of lower levels of mechanisation, productivity in Ireland was still much lower than in England.⁸¹

III) SOME OTHER INDUSTRIES.

The printing industry, experienced growth all over Ireland during the second half of the nineteenth century in contrast to the paper industry. The largest centre of the industry was in Dublin where a host of newspapers, journals and books were published and printed, but the industry also did well in Belfast, Cork and many smaller provincial centres across the country. Rising levels of literacy and improved communications was an important factor in the growth of printing and publishing.

The chemical and manure industry experienced expansion during the second half of the nineteenth century; the number of plants rising from 4 in 1870 to 20 by 1920. W. and H. Goulding was the best known and most successful establishing a plant first in Cork in 1858 and subsequently in Dublin. By the 1880s it produced about half of Irish artificial manure output and also built up a large export trade. Another Dublin-based chemical and manure company was Boileau and Boyd which also mixed paint and made up drugs and medicines, in addition to producing bleach. It was taken over by United Alkali in 1890. The largest of a

⁸¹ Ibid., pp. 17-26.

number of soap factories in Dublin was Barrington's which was taken over by Unilever in 1910. Maguire and Paterson's match factory was another prominent firm in Dublin in this sector.⁸²

Around Belfast, the chemical industry was closely associated with the production of bleaching agents for the linen industry. The Boyds again were a prominent family in the business, establishing a chemical works in Carrickfergus in 1865 and also running another in Lagan Village. The Becks were another important family in chemicals, manufacturing bleaching powder, caustic soda, alkali, American resin, acid in their works in Belfast at Short Strand and Dillon St. The firm produced up to 3,000 tons of bleaching powders per annum towards the end of the nineteenth century in addition to the other chemicals. In 1899, they also acquired an adjoining soap works. Members of the family subsequently became engaged in the production of copperas, glycerine, oil and greese, bitumen solution and felt varnish, in the vicinity of Belfast.⁸³

Another small Dublin industry which made a minor recovery during the second half of the nineteenth century was the silk industry which employed 193 looms by 1910. These looms were operated in the homes of the weavers, with a few firms (often Quaker owned) carrying out the preparation of the yarn and the finishing and marketing of the cloth which had a limited luxury market.⁸⁴ The Quakers were also well represented in Ireland's small jute industry. The premier firm was Goodbody's of Clara established in 1865. Goodbody's staple trade was in grain and manure sacks. After becoming a limited liability company in 1888 with a capital of £48,000 all owned by the family, the business made steady progress down to the First World War diversifying into the production of twill sacks and bags for flour, grain and coal. The English trade was vital for the business as about four-fifths of Clara's output was sold there. The company could vie with the best in England as the management constantly adopted any

⁸² Daly, M. *Dublin, The Deposed Capital 1860-1914* (Cork, 1985), pp. 39-40.

⁸³ PRONI, D. 2498/2, History of J.A. Beck Ltd.

⁸⁴ Daly (1985), p. 41. Webb, J. *Industrial Dublin since 1698 and the Silk Industry in Dublin* (Dublin, 1913), pp. 125-206.

technical improvements which were introduced. The factory employed 600 people at the turn of the century and had the advantage of cheaper wages than its major competitors in Dundee.⁸⁵

A more domestically oriented industry was the manufacture of portland cement which commenced in Ireland at Drinagh quarries and lime works in Co. Wexford in 1881. In addition to manufacturing for the domestic market these works also quickly built up an export trade to England. At peak production in the 1890s the works employed 150 men.⁸⁶ There were also a number of brick works in Ireland (70 in 1920) but many of these only opened when demand was very high and the industry suffered from competition from British imports. However works located close to ports could do a good trade with towns on the seaboard. The demand for cement and bricks depended on the state of the building industry. The fortunes of the construction industry fluctuated during the second half of the nineteenth century, but experienced a period of growth after the turn of the century, reflecting the more pronounced growth in the economy as a whole.⁸⁷

II) CONCLUSION.

Many small Irish firms which only serviced local markets found it difficult to survive against competition from imported manufactures. It seems apparent that scale economies had become an important factor and if production runs were limited, then costs tended to be higher. Industries which depended too much on craft skills rather than introducing new techniques to increase productivity and reduce costs often failed to compete. This accounts for the decline of the Irish flint glass industry. A few firms like those engaged in silk production, or pipe manufacture in Dublin or pottery in Belleek built up a specialist niche involving high levels of skill and craftsmanship which was still sought after. However, in most ranges of consumer goods low cost was the most significant factor, and manufacturers which clung to old fashioned technologies were always in danger of extinction; this included many of those

⁸⁵ Stewart, M. *Goodbody's of Clara* (Dublin, 1965), pp 3-22.

⁸⁶ Murphy, H. 'The Drinagh Cement Works', *Old Wexford Society*, vi, (1976-7), pp. 38-44.

⁸⁷ Riordan (1920), pp. 151-3.

engaged in paper, tanning and footwear. But industrialists who built larger and more highly capitalised plants using new technologies in a diverse range of industries did well. As in the other industries covered in the preceding chapters, there was a tendency for industries to become more concentrated in a smaller number of larger and more highly capitalised plants.

CONCLUSION

I

Conflicting opinions on growth and decline trends between 1790 and 1845, which have emerged within the historiography will now be re-assessed in the light of the evidence presented in the preceding chapters. Some consideration will be given to the major inputs into the industrial sector, providing some new angles to a debate which has to date focused predominantly on labour inputs. To sharpen the discussion, an estimate of net industrial output in 1840-45 will be presented. This can be used in conjunction with the import and export figures of the Railway Commissioners for 1835 to provide some tentative clues to the nature and extent of demand for domestically produced and imported industrial goods in Ireland. This will help to clarify the impact of British industrialisation on Ireland in the pre-Famine era. Finally, some consideration will be given to regional variations in the pattern of industrial development in Ireland. In particular, an economic explanation for the more dynamic nature of industrial development in the north-east will be made.

* * *

Available raw materials played a significant role in shaping the character of the industrial sector in different regions in the British Isles. A comparison between Ireland and Scotland during the Industrial Revolution is illuminating in this respect. The absence of substantial coal and iron ore deposits excluded Ireland from following the path of industrial development pursued by Scotland. The abundance of these natural resources in Scotland, facilitated the transformation of its industrial sector between 1750 and 1850; an extensive iron industry emerged as new technology enabled it to convert its rich indigenous geological resources into pig iron, using its own coal reserves which developed as an industry in its own right.¹ Johnson and Kennedy point out that all the first generation of industrial countries (Britain, Belgium, Germany and the US) was well endowed with mineral resources which provided income, exports and cheap fuel for other industries; natural resources gave these countries significant advantages over countries like Ireland which lacked them.²

¹ Campbell, R. *The Rise and Fall of Scottish Industry*, (Edinburgh, 1980), p. 19.

² Johnson, D. Kennedy, L. 'Nationalist Historiography and the Decline of the Irish Economy', S. Hutton,

With limited mineral based natural resources, Ireland's industrial sector evolved quite differently to the rest of the British Isles. Ireland's very slow industrial development between 1790 and 1845 depended on more organically based industries, notably those engaged in processing raw materials produced by the agricultural sector. The one advantage Irish industrialists had over their British rivals was the lower cost of unskilled labour.³ Since agricultural labour in Ireland was cheap relative to the rest of the British Isles, Ireland could provide raw materials derived from agriculture at lower costs to its industrial sector. These included flax for the linen industry and corn for the brewing, distilling, milling and baking industries.⁴ Food processing (notably bacon and butter) also depended on raw materials from agriculture. Most of these industries expanded between 1790 and 1845 to meet the demand provided by a growing domestic population without suffering from British competition; linen was the only major export oriented industry. But a small and growing export trade in foodstuffs and drink gave some indication that demand from the expanding British industrial cities would become an important outlet for the agro-based industries during the second half of the nineteenth century when the transport revolution would integrate Ireland more fully into the rest of the UK economy.

Natural resource endowments (or lack of them) also influenced the energy inputs into the Irish industrial sector. All material production requires a certain expenditure of energy, either in the form of heat or mechanical work. When human and animal muscle alone were used productivity levels remain low. Though Ireland had limited deposits of coal, the topography and high rainfall gave Ireland significant potential for exploiting water power. The application of water power to industrial work significantly increased the energy inputs into the Irish industrial sector between the 1790s and the mid-nineteenth century.⁵

Stewart, P. *Ireland's Histories* (London, 1991), p. 26.

³ Kane, R. *The Industrial Resources of Ireland* (Dublin, 1845), pp. 397-402. Bowley, A. *Wages During the Nineteenth century* (London, 1900), pp. 44-53.

⁴ A Comparison of the prices of wheat and oats between 1840-45 in England and Wales and Belfast and Dublin shows that corn prices in Ireland were cheaper. While British demand had an influence on UK prices, on the supply side, Irish labour was cheaper. For prices of corn in Britain see Mitchell, B. *British Historical Statistics* (Cambridge, 1988), pp. 756-7. and the Belfast News-letter for Irish prices. I would like to thank Liam Kennedy for the latter.

⁵ For a general overview of the use of power in Ireland's most industrial province during this period see Gribbon, H. *The History of Water Power in Ulster* (Newton Abbot, 1969).

The use of steam-power also slowly increased between 1790 and 1845. Steam engines enabled heat to be converted into energy, thereby removing the geographical and seasonal constraints which waterpower imposed on manufacturers. Around 1740, the first steam engine was set up in Ireland at Doonane Colliery in Queen's County (now Co. Laois). Engines were installed in a number of Irish mines thereafter, but they only began to be used for other industrial purposes during the 1790s.⁶ Steam engines were predominantly driven by imported coal by the mid-nineteenth century. Irish coal only accounted for between 5 and 10% of the amount actually consumed in the country during the first half of the nineteenth century.⁷

Wrigley identifies increased coal consumption as the dominant vehicle of growth in the British economy from the early nineteenth century. In Ireland, it certainly played an important role in the mechanisation of flax spinning where falling labour inputs were more than offset by a rise in energy and capital inputs. It also facilitated the concentration of a range of other industries in the major centres of demand where there were limitations on the availability of water power, notably in Belfast, Dublin and Cork. The incentive to use coal in more inland locations diminished as the distance from the coast got greater. According to Wrigley the cost of transporting coal overland in Britain doubled the pithead price in 10 miles;⁸ in Ireland, with the additional cost of shipping coal from Britain, it was all the more important to keep down transport costs. Industries heavily dependent on coal were therefore largely clustered in the major ports on the eastern coastline running from Derry around to Cork, all of which had access to supplies from British coalfields at reasonable costs. These larger ports were suitable locations for manufacturing many industrial goods because they were also the main centres of demand in Ireland.

The growing use of steam as a source of energy led to a rise in coal imports from 738,453 tons in 1825 to 1,001,378 tons in 1835.⁹ By 1837, there were 151 stationary steam engines in

⁶ Bowie, G. 'Early Stationary Steam Engines in Ireland', *Industrial Archaeology Review*, ii (1978), pp. 168-174.

⁷ O'Grada, C. 'Industry and Communications 1801-45', in Vaughan W. (ed) *New History of Ireland*, v. (Oxford, 1989), p. 142.

⁸ Wrigley, A. *Continuity Chance and Change; The Character of the Industrial Revolution in England* (Cambridge, 1988) pp. 17, 56. For a list of steam engines used in Ireland in 1837 see Report of Railway Commissioners (P.P., 1837-8, vol. xxxv). Additional engines installed between 1837 and 1843 are listed in Smith, G. *Ireland Historical and Statistical* (London, 1849), vol iii, pp. 307-310.

⁹ *Exports and Imports, Ireland*, BPP 1823, xvi (472) pp. 4-7 (318) pp. 4-7.

Ireland; about one third of these engines was in the vicinity of Belfast. Steam power used in the greater Belfast area (Antrim and Down) in the linen industry alone rose from 788 horse power in 1839 to 1850 horse power in 1850. Expansion is also evident in the application of steam in a range of industries in other parts of the country; at Cork, Dublin, Derry, and Clonmel there had been 67 engines recorded in the 1837 return; by 1843 an additional 38 engines had been added in these towns.¹⁰

Other energy sources tapped by the industrial sector included turf and wind power. The latter was never very important in Ireland. The two main areas where wind was exploited were the arable farming regions of counties Down and Wexford. There were over 100 windmills recorded by the Ordnance Survey (1834) in co. Down, which was probably close to the peak, as the number used declined during the second half of the nineteenth century. The employment of turf as a source of heat for industry was expanding in Ireland according to Kane writing in the mid-1840s; turf was undoubtedly the most important source of fuel used for domestic purposes and up to 16 million tons worth about 2.8 million pounds in value per annum may have been consumed.¹¹ There seems to be little doubt that energy inputs into the Irish industrial sector increased significantly between 1790 and 1845.

From the preceding chapters it seems evident that capital inputs into the industrial sector also increased significantly in most industries. The shift between 1790 and 1845, from large numbers of small scale producers, to a lesser number of larger production units recurs in a number of industries. This growth in the capitalisation and scale of individual production units was generally accompanied by the adoption of more sophisticated technologies and rising productivity. The application of new technologies led to changes in the nature of labour inputs. The mechanisation of the spinning process in the linen industry for example, led to a significant fall in the employment of hand-spinners.

¹⁰ *Factory Returns, UK*, BPP 1839, xlii (41) pp. 322-345. BPP 1850, vol. xlii (745), pp. 1-30. *Report of The Railway Commissioners*, BPP 1837-8, xxxv, app. B. 17, p. 112. Smith, G. *Ireland, Historical and Statistical* (London, 1849) III, pp. 306-310.

¹¹ McCutcheon, A. *Wheel and Spindle* (Belfast, 1977), pp. 5-9. Kane, R. *The Industrial Resources of Ireland* (Dublin 1845), p. 41. Assuming half of Ireland's inhabitants consumed turf, each consuming 4 tons per annum worth 3s shillings 6 pence a ton (see *Report of Railway Commissioners*, BPP 1837-8, xxxv, app. no. 3, pp. 44-5).

Interpretations of the changing employment patterns in industrial occupations recorded in the census returns between 1821 and 1841 vary considerably. Cullen uses the census data to argue that industry was experiencing growth, while Mokyr uses the census data to argue that there was widespread industrial decline. By comparing occupational data between the 1831 and 1841 census years, Cullen concluded that male employment was rising in most industries, which led him to the conclusion that the industrial sector was growing, with the notable exception of textiles.¹² Mokyr subsequently argued that Cullen's position was untenable as the occupational data for 1831 and 1841 were incompatible. Since the classification procedures were different in the two censuses, Mokyr points out that the proportion of individuals employed in 'other pursuits' fell from 18% to only 10%, and much of the balance he argues was registered in the manufacturing sector in 1841, thus accounting for the increase which Cullen mistakenly identified as an indication of growth. Instead Mokyr applied an alternative procedure by comparing the combined industrial and commercial occupations of 1821 with those for 1841; this registered a fall from 41.2% of total occupied persons to 31.8%. From these figures he argued that there was widespread industrial decline.¹³

But the census data between 1821 and 1841 were also not strictly compatible, but even assuming that they were for the sake of argument, the diminishing numbers employed in domestic industry is still not necessarily an indication of industrial decline. In Antrim, for example, the percentage employed in industrial and commercial occupations fell from 57.2% to 48.2%.¹⁴ Are we to conclude from this (as Mokyr does for the whole country) that industrial and commercial activity was declining? This seems highly improbable as Antrim was the county in Ireland which experienced industrialisation most intensely.

The major factor leading to the decline of domestic hand spinning was the mechanisation of flax spinning. Linen was far more important than woollens or cotton in terms of the numbers of hand spinners employed in 1821 and 1841. It seems evident from Solar's figures for linen exports (which accounted for the bulk of output) that the total output of the linen industry actually experienced growth; linen exports rose from under 44 million yards to over 56 million

¹² Cullen, L. *An Economic History of Ireland since 1660* (London, 1972), p. 124.

¹³ Mokyr, J. *Why Ireland Starved* (London, 1985), pp. 12-4.

¹⁴ O'Grada, C. *Ireland before and After the Famine* (Manchester, 1988), p. 36.

between 1821 and 1841.¹⁵ The decline in the number of part time domestic linen hand spinners between 1821 and 1841 was not therefore a consequence of industrial decline, it simply demonstrated that hand spinning was being replaced by machine spinning. This was not de-industrialisation; it was de-*proto*-industrialisation.

Because of the extremely low level of productivity of domestic hand spinners relative to factory workers (and the fact that many were often unemployed and most only worked part-time) their importance should not be overestimated as a consequence of their impressive presence in the census. O'Malley, makes the mistake of assuming that the large numbers employed in domestic industry was evidence of significant industrial development in Ireland in the early nineteenth century.¹⁶ Even in 1841, about 700,000 people in Ireland were returned as being engaged in some branch of textile manufacture. If employment is taken as an index of industrial development, Ireland was only marginally behind Great Britain where 883,000 people were engaged in textiles.¹⁷ Far from demonstrating Ireland's industrial development, these figures merely indicate that Ireland had large numbers of part-time domestic producers, and a textile industry with extremely low levels of productivity per capita, relative to Britain.

The first phase of industrialisation within the Irish linen industry during the second quarter of the nineteenth century may have offset the decline of the cotton industry. In the north-east, the main centre of the cotton spinning sector, many cotton mills were converted for linen spinning. Geary points out that much of the fixed capital investment in the north-east's cotton industry was not lost; it merely switched into flax spinning, so overall there was continuity and expansion in the textile industry in this region.¹⁸ Much of the human capital which had been built up in cotton transferred across into linen, including a knowledge of production and marketing. This contributed to the pool of human capital in the north east. The concentration of commercial and technical skills around Belfast, and a factory workforce working for lower

¹⁵ Solar, P. 'The Irish Linen Trade, 1820-1852', *Textile History* xxi (1990), pp. 57-85.

¹⁶ O'Malley, E. *Industry and Economic Development* (Dublin, 1989), p. 39.

¹⁷ O'Malley, E. 'The Decline of Irish Industry during the Nineteenth Century', *The Economic and Social Review* xiii (1981), pp. 21-42. Crouzet, F. *The Victorian Economy* (London, 1982), p. 189.

¹⁸ Geary, F. 'The Rise and Fall of the Belfast Cotton Industry' *Irish Social and Economic History*, viii (1981), pp. 30-49.

wages than other linen producing regions in Britain gave the region's linen manufacturers advantages over other linen producers in terms of both quality and cost.

Throughout the eighteenth century, linen exports from Ulster had grown with the assistance of privileged access to the British market and that of her colonies. By the mid-nineteenth century sectoral specialisation and the scale of linen production in the greater Belfast region, created the critical mass in linen production which was so vital to the whole process of industrialisation. The external economies which manufacturers located in this region enjoyed included commercial and technical skills, credit facilities, a workforce experienced in linen production and farmers experienced in the cultivation of flax. The quantity of linen produced facilitated the development of a textile machine industry which began to supply linen manufacturers elsewhere in Britain and Europe. This build up of human capital distinguished north-east Ulster from other parts of Ireland, while the low cost of labour distinguished the region from other parts of Britain. Ulster gradually became the principal linen manufacturing region in the world. In a UK context, the regional concentration and sectoral specialisation of Ulster in linen production was similar to Lancashire's dominance in cotton and Yorkshire's leadership in the production of woollens.

The cotton and woollen industries declined during the second quarter of the nineteenth century, although the mechanised woollen industry experienced revival and growth during the second half of the century. It is difficult to gauge to what extent the growth of the linen industry may have offset some of the decline in other textiles. Despite the decline of the horse-power used in the woollen and cotton industries, the total horse-power employed in the mechanised textile industry as a whole rose from 3,650 to 4,535 between 1839 and 1850.¹⁹ In terms of output therefore the rise of the linen industry should not be underestimated. Nor should the importance of the woollen industry be overestimated. The fixed capital investment in the whole of the factory based woollen industry in 1821 (when it was near its peak for the first half of the nineteenth century), was only just over £300,000 (current prices) according to a contemporary estimate. This does not compare remotely with the linen industry which by the early 1840s had

¹⁹ *Factory Returns, UK*, BPP 1839, vol. xlii (41) pp. 322-345. BPP 1850, vol. xlii (745) pp. 1-30.

at least £5,000,000 (current prices) invested in it, according to Kane.²⁰ The decline of the domestic woollen industry was more significant.

In a regional context, the north-east entered the first phase of industrialisation during this period, but in the south in contrast the textile industry experienced widespread decline from the 1820s onwards. This resulted in a shift in income from widely dispersed rural domestic cottage producers to factory owners, rural weavers and the working class located predominantly in the north-east. In terms of national income for Ireland as a whole, the loss of labour inputs into the linen industry as a result of what could be termed de-*proto*-industrialization, was more than offset by an increase in capital and energy inputs. In addition, the quantity and value of the industry increased, judging by the rise in the amount exported and the shift away from the exportation of cheap coarser linens. New technology facilitated a dramatic increase in productivity in a more regionally concentrated industry. The decline of the domestic cottage industry within linen was therefore a regional problem rather than a national problem. This type of regional specialisation and concentration at the expense of other regions was typical of the textile industry all over the UK.

Ireland lost out in the production of cottons and woollens to Lancashire and Yorkshire. The dynamics of concentration and sectoral specialisation were most apparent in these two regions where the gradual centralisation and mechanisation of textile production was accompanied by major changes in the organisation of credit and financial services; this led to the emergence, for example, of traders with a specialist knowledge of marketing cottons and woollens in domestic, European and transatlantic markets. Manufacturers located in these regions also had a good transport and service infrastructure, close contacts with suppliers and markets, which created external economies and a critical mass, which militated against producers in other regions of the UK,²¹ including Ireland.

But by the mid-nineteenth century, Britain's dominance over Irish industrial producers was still largely confined to cottons, woollens, silks, leather and glass, and none of the latter three

²⁰ Kane (1845), p. 336. *Fourth Report of Revenue Arising in Ireland*, BPP 1822, vol. xiii, app. no 21-23. pp. 167-187.

²¹ Hudson, P. *The Industrial Revolution* (New York, 1991), pp. 114-7.

industries were highly significant in terms of total industrial output in Ireland. There was no widespread or 'rapid industrial decay' following the removal of the last of the union duties in 1824 as Greene suggests.²² A number of industries continued to re-organise successfully, and it is evident that some continued expanding, and it is probable that these collectively more than offset the losses sustained within the declining industries.

Greene and Mokyr both exaggerate the impact of the decline of the provisions trade after the Napoleonic war.²³ The contraction of beef and pork exports from Ireland in the decades after the war, were offset by the rise in exports of butter, bacon and hams to Britain. Judging by the significant degree of capital formation in the milling industry it seems probable that the consumption of bread increased in Ireland between 1800 and 1845.²⁴ Exports of oatmeal and flour also expanded between 1800 and 1845. Flour milling was concentrated more in Leinster and Munster, while oatmeal production was largely located in the north and west of the country. Overall, it seems probable that the absolute size of the food processing sector increased during this period.

The brewing and distilling industries experienced a process of consolidation into a smaller number of more highly capitalised production units by the mid-1840s. Ireland was beginning to build up an export trade in beer to Britain at this stage, a good indication of the industry's ability to compete. Both industries became more industrialised between 1800 and 1845. Dublin remained the major centre of both industries. The tobacco industry probably held its own. The food, drink and tobacco sector taken as a whole experienced expansion during this period.

The paper industry became increasingly concentrated in the vicinity of Dublin. It experienced a growth in output during the 1830s and 1840s, despite the fact that the number of mills began to fall. Engineering and iron founding also experienced growth during these decades, particularly in Dublin, Belfast and Cork, but also in some smaller towns like Derry and Drogheda. There

²² Greene, R. 'Industrial Decline in the Nineteenth Century' in Cullen L. (ed) *The Formation of the Irish Economy* (Cork, 1969), p. 94.

²³ *Ibid.*, p. 89-100.

²⁴ Solar, P. *Growth and Distribution in Irish Agriculture Before the Famine* (unpublished Phd, Stanford, 1987), p. 151.

was little growth in shipbuilding, but the industry became more concentrated in larger yards in Cork and Belfast.

As yet we do not have any estimates of industrial output at the end of the eighteenth century, so it is impossible at this stage to get any idea of growth trends in the industrial sector for this period between 1790 and 1845. However it is possible to make some speculative inferences from the extensive amount of quantitative work which has been done on the British industrial sector during this period. Recent work on British industrial output suggests that growth rates were extremely slow during this period, with the exception of the fast growing cotton industry.²⁵ Since cotton was much less significant in Ireland, we can assume that growth was much slower than in the rest of the UK. The Irish population rose rapidly during this period from about 4.4 million in 1791 to 8,4 million in 1841,²⁶ It seems probable that there was a very slow growth in industrial output during this period in absolute terms to meet the growth in demand generated by rising population. Mokyr and O'Grada have assumed that overall average Irish income grew during the half century before the famine, despite the poverty of the bottom half of the population.²⁷ Assuming average income per capita grew between 1790 and 1845, and industrial output experienced growth in absolute terms (but not in per capita terms), this would indicate that per capita income growth was generated predominantly in the agricultural and service sectors. This is consistent with the development of greater regional specialisation within the UK with Ireland specialising more in agriculture, and less in the production of cotton and woollen goods. Falling employment in textiles does not necessarily mean that there was widespread industrial decline. Rising productivity in the linen industry and rising output occurred simultaneously with falling employment in domestic hand spinning as the spinning sector became mechanised. Overall, it seems probable that industrial output was increasing marginally in absolute terms, as slow growth in linen, engineering, food and drink, paper more than offset decline in woollen, cotton, tanning and glass.

²⁵ Crafts, N. *British Economic Growth During the Industrial Revolution* (Oxford, 1985)

²⁶ Mokyr, J. C. O'Grada, C. 'New Developments in Irish Population History, 1700-1850', *Economic History Review*, xxxvii, (1984) p. 475.

²⁷ Mokyr, J. O'Grada, C. 'Poor and getting Poorer? Living Standards in Ireland before the Famine', *Economic History Review*, xxxxi (1988) pp. 220-231.

From a regional perspective, this picture of very slow growth of industrial output in absolute terms, over time seems consistent with the first phase of industrialisation in the north-east which more than offset the decline of the rurally based domestic industry in other parts of the country and the urban cotton and woollen industry. Although research on a regional basis is still thin on the ground, what has been done on Cork and Derry, indicates that overall, a process of slow growth and consolidation was taking place in the industrial sector in these cities between 1790 and 1845, despite the declining importance of textile production.²⁸ This places a question mark over Green's perception of widespread and rapid industrial decay after the mid 1820s outside the north-east.²⁹ The popular perception is that Dublin's industrial base declined catastrophically between the Union and the Famine. Undoubtedly the city's cotton, woollen and silk industries declined, but the city was certainly not devoid of industry by the mid-nineteenth century with food processing, clothing, brewing, distilling, engineering and iron founding all strongly represented.

Overall, the evidence presented in the thesis suggests that the period between 1790 and 1845 was one of very slow and uneven growth in the Irish industrial sector. In conclusion therefore, it would seem that Cullen's impressions of pre-famine industrial performance were slightly over optimistic, but he was closer to the truth than Mokyr, whose impressions were too pessimistic. Mokyr's conclusion that the occupational census data and a large amount of other evidence, most of it admittedly indirect and circumstantial, seems to support the view that deindustrialisation was widespread, and not confined to textiles other than linen', seems misplaced. This conclusion is heavily dependent on the decline of hand spinning which has been discussed above.³⁰ Textiles remained an important industry as can be seen from the industrial output figures for 1840-45 (see table 9.1).

The most striking feature about industrial output by 1840-45, was the size of the contribution of textiles and clothing which accounted for about 43% of total output. Food processing and

²⁸ Bielenberg, A. *Cork's Industrial Revolution* (Cork, 1991). Hume, J. *Social and Economic Aspects of the Growth of Derry 1825-1850* (Unpublished MA thesis, Maynooth, 1964) For an introduction and bibliography to industrial development in Ulster see Ollerenshaw, P. 'Industry 1820-1914' in Kennedy L. and Ollerenshaw P. (eds) *An Economic History of Ulster* (Manchester, 1985).

²⁹ Green (1969), pp. 89-100.

³⁰ Cullen (1972), pp. 124-5. Mokyr (1985), p. 13.

£38,000,000, which indicates that the bulk of industrial output was produced for the domestic market. Imports in 1835 of manufactures, semi-processed goods, (including coal, iron, metals, hides and skins, stone, tallow, ashes barilla, British refined sugar etc but excluding foreign sugar, tobacco, wine) amounted to under £7,500,000.³¹ Roughly £2,500,000 of these imports were either raw materials or semi-processed inputs for Irish industries. These figures indicate that the bulk of the industrial goods consumed in Ireland were still made in Ireland in the mid-1830s. So the impact of competition from British manufactures imported into Ireland prior to the Famine has probably been overestimated. British penetration of the Irish market for industrial goods became much more significant in the second half of the nineteenth century when the railway network had been built.

The high costs of transport prior to the completion of the rail network still provided sufficient protection for many industries. It took between 4 and 5 days to move goods traffic between Dublin and Galway; by 1845 there was still not even 70 miles of railway in operation in Ireland.³² In many areas therefore local manufacturers still held their own. Despite the introduction of free trade between Britain and Ireland, the full force of British competition was only to become apparent during the second half of the nineteenth century. British competition prior to the famine only had a significant impact in woollen and cotton industries. Glass, tanning and silk were also affected, but they were too small to have an impact on the industrial sector as a whole. Transport costs were too high to facilitate competition in heavy and less valuable goods, and in the food processing and drink sectors, Irish producers could comfortably compete with their British rivals in the British market.

³¹ *Report of the Railway Commissioners BPP 1837-8*, xxxv, app. b. no. 10, p. 92.

³² *Ibid.*, p. 150. Lee, J. 'The Railways in the Irish Economy', in Cullen L. (ed) *The Formation of the Irish Economy* (Cork, 1968), p. 87.

II

Before taking full account of developments within the Irish industrial sector during the second half of the nineteenth century it is first necessary to look at developments within the economy as a whole. The major changes which took place within the Irish economy during the second half of the nineteenth century were brought about to a large extent by the transport revolution which integrated Ireland further into the rest of the UK economy. British demand became the main engine of the slow growth of the Irish economy during this period. By 1908, about half of Irish agricultural output and roughly 40% of the gross value of industrial output was exported (mostly to Britain).³³ By any standards, Ireland was an extremely open economy. If contemporary statistical data on trade can be trusted, Ireland was trading more per head of population than the rest of the UK; trade per head was more than double that of Norway, Sweden, Germany or France. This led one advocate of free trade, Charles Oldham, to comment with mild exaggeration that 'what we produce we do not consume, and what we consume we do not produce.'³⁴

Lee's comment that since 1850, Ireland had been an underdeveloped economy with a highly developed transport system is somewhat off the mark. The growth of the transport network was a vital factor in Ireland's economic development during the second half of the nineteenth century since the economy was so dependent on trade. After the introduction of steam navigation in the mid-1820s, Dublin was five times nearer to Liverpool than to Galway in terms of journey time. It significantly improved the speed and efficiency of trade across the Irish Sea, locking the major Irish ports closer into the British market. But it was the railways which brought the transport revolution into the interior of the country, expanding from 65 miles of track in 1845 to 2,000 by 1872, and 3,500 by 1914.³⁵

³³ Butler, T. *The Agricultural Output of Ireland* (HMSO, 1912). Gross industrial output calculated from estimate in appendix 2. *Imports and Exports, Ireland*, BPP 1908, xcix (cd. 4429), pp. 1-69.

³⁴ Oldham, C. 'The Economics of Industrial Revival', *Statistical and Social Inquiry Society of Ireland*, xii, (1908), p. 183.

³⁵ Lee, J. *The Modernisation of Irish Society* (Dublin, 1973), p. 13. Lee, J. 'Railways in the Irish Economy' in Cullen, L. (ed) *The Formation of the Irish Economy*, (Cork, 1968), p. 87. J. Lee, 'The Provision of Capital for Early Irish Railways, 1830-53' *Irish Historical Studies*, xvi (1968), p. 43.

Rail increased the speed, continuity and volume of trade in Ireland. Cheaper freight rates were critical in realising this growth. The average cost of road haulage was approximately 5d per ton mile in the mid-1830s. Average freight rates on the railways worked out at about 2d per ton mile. Rail reduced journey time across Ireland (between Dublin and Galway) from four or five days to ten hours. This was enormously beneficial for the exportation of perishable agricultural produce and livestock. Agricultural exports tripled in value between 1840 and 1914, and during this period the railways provided the means to supply rural Ireland with both Irish and British made industrial goods. Exports of all goods increased from 11.5 million pounds in 1835 to 51 million in 1907, while imports during the same period increased from 10.9 million to 54.1 million (current prices).³⁶

Apart from reducing costs, the railways in Ireland assisted the major extension of retailing throughout the country, breaking down the pockets where the economy had retained a relatively self-sufficient character. Rail supplied producers with transport which was safer and less susceptible to seasonal and geographic obstructions. It widened markets and stimulated competition and promoted economies of scale, reinforcing tendencies towards regional specialisation. Rail provided the different parts of the country with the opportunity to produce products for which they had comparative advantage. Kennedy found that regional specialisation increased during the second half of the nineteenth century in wheat, flax and cattle production in agriculture.³⁷ The increase in the volume of agricultural exports to Britain which the railways facilitated also had an important influence on the Irish industrial sector, firstly because the growing commercialisation of the agricultural sector and the increased disposable income of those engaged in agriculture provided much of the demand for Irish industrial goods. Secondly, much of the Irish industrial sector was engaged in processing raw materials from agriculture. The first tentative attempts to establish national income in Ireland during this era, suggest that per capita income rose from roughly £10 per head in 1841 to about £34 per head in 1911.³⁸ GNP growth during this period from roughly 80 million pounds to

³⁶ Lee (1968), p. 78. Mc Cutcheon, A. *The Industrial Archaeology of Northern Ireland*, (New Jersey, 1984), p. 23. O'Grada, C. 'Industry and Communications 1800-1850' in Vaughan, W. (ed), *The New History of Ireland 1800-1870* (Oxford, 1989). *Imports and Exports, Ireland*, BPP 1908, xcix (cd. 4429) pp. 2-69.

³⁷ O'Brien, P. 'Transport and Economic Growth in Western Europe 1830-1914', *Journal of European Economic History* xi (1982). Kennedy, L. 'Specialization, The Railways and Irish Agriculture', in Goldstrom, M. and Clarkson, L. (eds), *Irish Population, Economy and Society*, (Oxford, 1982), p. 193.

³⁸ Kennedy K. et al, *The Irish Economy in the Twentieth Century* (London, 1988), pp. 20-1.

150 million was not spectacular, however the fall in population from 8.2 million to 4.4 million meant that the per capita share of the cake was significantly larger by 1911. In per capita terms, Ireland consequently began to catch up with the rest of the UK. Sluggish growth in both the agricultural and industrial sectors in Ireland was complemented by more impressive growth in the service sector, which reflected improvements in transport, banking, retailing, education and state administration.

As disposable income increased during the second half of the nineteenth century, there was an increase in the demand for processed food, beer, and tobacco in addition to a range of industrial consumer goods. A number of industries like flour milling (by the turn of the century), baking or railway engineering for example were entirely based on home demand. The British market, and its colonies, provided much of the demand for the growth of linen and shipbuilding, in addition to processed food, drink and tobacco. A host of smaller industries which were collectively quite significant further boosted exports.

Figure 9.2.
EXPORTS OF INDUSTRIAL GOODS FROM IRELAND 1835-1907

	1835	1907
Linen goods+	£3,698,774	£11,387,215
Woollens, drapery	£40,128	*£794,293
Cotton goods	£148,133	£1,651,505
Hides and skins	£45,831	£591,606
Beer	£138,981	£1,954,858
Spirits	£75,505	£2,304,874
Tobacco	£6,814	£1,151,521
Flour, oatmeal	£1,127,000	£161,870
Bacon and hams+	£828,158	£2,996,951
Beef and pork+	£723,935	£107,738
Ships	-	£2,400,000
Other food and drinks^	£182,013	£2,080,014
Other manufactures and ore	£570,422	£4,434,071
TOTAL	£7,290,602	£32,016,516

*includes haberdashery. ^excludes butter.

Source; *Report of the Railway Commissioners* BPP 1837-8, xxxv, app. b. no. 10, p. 92. *Imports and Exports, Ireland*, BPP 1908, xcix (cd. 4429) pp. 2-69. +revisions taken from Solar, P. 'The Agricultural Trade Statistics in the Irish Railway Commissioners Report', *Irish Economic and Social History* vi (1979), pp. 24-40. Solar, P. 'The Irish Linen Trade 1820-1852', *Textile History* xxi (1990). Price of linen (1s 6d per yard) taken from Solar, P. Durie, A. 'The Scottish and Irish Linen Industries Compared' in Mitchison, R. and Roebuck, P. *Economy and Society in Scotland and Ireland 1500-1939* (Edinburgh, 1988), p. 216.

Between 1840 and 1907 the relative importance of textile production declined within the Irish economy, despite further concentration of linen and cotton production in the north east and the much smaller woollen industry in Cork. The growth of the clothing sector notably in Derry, east-Ulster and to a lesser extent in Dublin was the most dramatic change with more textiles being manufactured into finished clothing, thus creating more added value in the clothing and textile sector as a whole. The food processing, drink and tobacco sector became relatively more important within the economy, much of it being exported to Britain; whiskey and tobacco from Belfast, beer and biscuits from Dublin and bacon and butter from Waterford, Cork and Limerick.

Outside railway engineering in Dublin, textile machinery in Belfast and the manufacture of agricultural machinery in Wexford and Belfast, engineering remained a relatively underdeveloped industry. Shipbuilding, which became concentrated almost entirely in Belfast, was the most spectacular growth industry. By the 1870s, tanning, glass and paper were also in various stages of decline and mining remained fairly low key, but these industries were all in the third and fourth division of the Irish industrial sector. More significant was the decline of the broadly based milling industry from the late 1870s. But a diverse range of smaller industries, like rope making, jute bagging, fertiliser, and cement were gradually improving. The building industry experienced growth after the turn of the century,³⁹ reflecting a general acceleration of growth in the economy as a whole.

The best way of measuring changes in industrial activity over time is by using national income accounting techniques to generate figures for output retrospectively. Figures for industrial output have been calculated here for 1840-5 (see appendix I). These can be compared with an adjusted version of the 1907 Census of Production (see appendix II). This table provides strong evidence for slow industrial growth during the period in question. Even when these estimates have been adjusted to take account of price changes, it is evident that industrial output more than doubled between 1840-5 and 1907 (see appendix III).

³⁹ Riordan, E. *Modern Irish Trade and Industry* (London, 1920), p. 151.

NET OUTPUT IN THE IRISH INDUSTRIAL SECTOR; 1840-1907. (CURRENT PRICES) AND % SHARE OF NET OUTPUT OF EACH SECTOR				
	1840-5	%	1907	%
Textiles	£5,453,000	32.3	£5,435,000	18
Food Processing	£600,000	3.5	£2,042,000	6.8
Clothing and Millinery	£1,810,000	10.7	£4,057,000	13.5
Brewing	£339,000	2	£3,528,000	11.7
Distilling	£992,000	5.9	£1,139,000	3.8
Grain Milling	£1,494,000	8.8	£700,000	2.3
Tobacco	£167,000	1	£1,130,000	3.8
Construction	£2,043,000	12	£4,359,000	14.5
Shipbuilding	£5,000	.1	£1,062,000	3.5
Tanning and leather goods	£310,000	1.8	£212,000	7
Paper Printing and Stationary	£502,000	3	£1,087,000	3.6
Mines and Quarries	£272,000	1.6	£197,000	7
Engineering, Timber, Chemicals, Glass and all other Trades	£2,924,000	17.3	£5,150,000	17.1
TOTAL	£16,911,000	100%	£30,098,000	100%

Table 9.3. Source, see appendices 1 and 2.

The growth of industrial output in Ireland during the second half of the nineteenth century was achieved against a background of falling employment in the industrial sector. But the lion's share of this fall was in textiles and clothing sector where the numbers engaged fell from 819,119 in 1841 to 200,717 in 1911. Historians often point to this as evidence of industrial decline, but this is not necessarily the case. Industry became more highly capitalised with greater machine inputs which increased productivity. The fall in employment in textile production can therefore be misleading as an index of industrial decline. Factory production and employment in the linen, woollen industries actually increased during this period. The growth of the clothing sector, notably the making up trade in the north-east and the Derry shirt industry increased added value in the industrial sector; Ireland no longer simply exported cloth. The fall in textile prices as a consequence of mechanisation accounts for the lack of growth in the value of textile output. The relative share of textiles also fell from about one third of industrial output to under a fifth between 1845 and 1907. There was a corresponding growth in the importance of food processing, drink and tobacco which collectively accounted for 12.4% of industrial output in 1840-45 rising to 26.1% in 1907.

When textiles and clothing are excluded from the census material, it is evident that employment in industrial occupations actually rose from 301,010 in 1841 to 412,680 in 1911. This provides more strong evidence for industrial growth, as rising employment was probably accompanied by rising productivity. Employment in the food, drink and tobacco sector increased. There was also an increase in printing and publishing, and in trades associated with machinery and the production of instruments. Shipbuilding and chemicals also registered an increase in employment, as did precious metals and jewellery, carriage building, furniture and fittings. Industries which registered a decline apart from textiles included those in the iron related industries, mining, timber trades, cane and rush trades, tanning, grease and gut related trades, arms and ordnance.

COMPARISON OF OCCUPATIONS 1841 AND 1911 CENSUS (USING 1911 CLASSIFICATION)		
	1841	1911
BOOKS (INCLUDES PRINTS AND MAPS)	3,221	8,163
MACHINES	2,292	11,159
TOOLS AND IMPLEMENTS	781	198
WATCHES INSTRUMENTS (INCLUDES SURGICAL)	933	3,114
ARMS AND ORDINANCE	362	57
MUSICAL INSTRUMENTS	105	246
TYPE, DIES ,MEDALS, COINS	49	73
TACKLE FOR SPORTS AND GAMES	70	104
HOUSES	67,618	52,417
FURNITURE AND FITTINGS DECORATIONS	3,748	5,527
CARRIAGES	4,157	4,588
HARNESS	3,335	2,737
HULL MASTS RIGGING ETC	1,857	7,954
DRUGS AND OTHER CHEMICAL COMPOUNDS*	1,164	2,552
TOBACCO AND PIPES	1,338	2,276
BOARD AND LODGING	10,545	11,368
SPIRITUOUS DRINKS	890	4,293
FOOD	38,575	46,086
WOOL AND WORSTED	81,357	4,767
SILK	968	322
COTTON AND FLAX	142,726	74,837
HEMP AND OTHER FIBROUS MATERIALS	2,681	2,127
MIXED OR UNSPECIFIED TEXTILES	367,404	22,610
DRESS	223,983	96,054
GREASE GUT BONE HORN IVORY WHALEBONE	1,717	424
SKINS	2,687	556
HAIR AND FEATHERS	858	592
CANE RUSH AND STRAW OILS GUMS RESINS	3,084	792
WOOD AND BARK	14,873	5,205
PAPER	1,209	3,664
MINERS	3,096	1,217
COAL GAS ETC	448	3,857
STONE CLAY ROAD MAKING (INCLUDING SALT)	6,013	10,579
EARTHENWARE AND GLASS	759	932
PRECIOUS METALS AND JEWELLERY	431	768
IRON AND STEEL	34,074	19,452
COPPER	929	239
TIN AND ZINC	2,117	1,124
OTHER METALS (INCLUDING LEAD)	535	1,470
MAKERS AND DEALERS (GENERAL)	44,685	28,921
MECHANICS AND LABOURERS (GENERAL) @	42,455	169,799
TOTAL	1,120,129	613,397

Table 9.4. *includes explosives,colouring matters @ includes refuse matter water

There was a small fall in construction related industries but a large number of builders labourers were obviously listed as general labourers in the 1911 census so construction may also have increased in terms of employment. When one considers that population fell from 8.2 million to 4.4 million between 1841 and 1911, it can be seen that the relative importance of industry as a source of employment had not declined; those with industrial jobs in 1911 were significantly better off in terms of average income than those employed in the industrial sector in 1841 (many of whom were part-time domestic hand producers earning exceedingly low levels of remuneration for their work).

Finland provides an interesting contrast to Ireland during this period as it also experienced industrial output growth between 1860 and 1913, but within a protectionist environment rather than within a free trade environment. Finland's growth was achieved by an increase in the labour force rather than by an increase in productivity.⁴⁰ The increase in Ireland's labour productivity during this period was partly a consequence of the free trade environment within which Ireland's industrialists had to operate. Open competition with their British industrial rivals meant that mechanisation was the only means of survival. Close economic, political, social and cultural links and geographical proximity to Britain, and a common language, made the diffusion of new technologies into Ireland relatively unproblematic.

The evidence presented in the preceding chapters, combined with the estimates of industrial output, rising industrial exports and the growth of employment in the industrial sector outside textiles, all support the conclusion that the Irish industrial sector experienced growth between 1845 and 1907.

⁴⁰ Heikkinen, S. Hjerpe, R. 'The Growth of Finnish Industry in 1860-1913', *Journal of Economic History*, xvi (1987), pp. 231, 244.

III

The principal objective of the thesis has been to identify the major growth trends in the Irish industrial sector between 1790 and 1907. The other objectives were to get some idea of the changing geographical location and scale of Irish industry, and to isolate the major economic factors which led to the industrialisation of the north-east of Ireland.

During the nineteenth century, the greater Belfast region became industrialised. It effectively became part of the great industrial network of northern Britain, drawing upon its coal and processed iron resources which could be transported at low costs on the short sea journey across to Belfast. Shipbuilding in particular emerged as a new industry in the city. The linen and engineering sectors expanded, while a host of new industries like distilling, tobacco, rope making and food processing emerged which deepened the diversity and scale of the region's industrial sector. By 1907, two thirds of industrial exports from Ireland originated in Belfast. Royle has noted the link between urbanisation and industrialisation; the population of the city rose from 75,308 in 1841 to 386,947 in 1911, by which time its population exceeded that of Dublin. Belfast was Ireland's only major Victorian industrial city.⁴¹

Increased regional concentration like this occurred in the industrial sector all over Europe.⁴² By 1911, the six counties which subsequently became Northern Ireland accounted for about two thirds of Irish industrial output. The bulk of industrial activity in this region was concentrated in east-Ulster, where linen and shipbuilding were the major industries, in addition to engineering, distilling, food processing, tobacco and rope making. Industrial development occurred elsewhere in Ulster; a number of industrial villages were built between 1820 and 1870, including Annsborough and Dunbarton in Co. Down, Sion Mills in Co. Tyrone, Bessbrook in Co. Armagh, while earlier ones like Hilden near Lisburn (established in 1784) were considerably extended. In West Ulster the shirt making industry emerged in Derry from the 1840s; by the 1870s up to 5,000 workers were employed in 12 factories in the city which put

⁴¹ Royle, S. 'Industrialisation, Urbanisation and Urban Society, c. 1850-1921' Graham, B. Proudfoot, L. (eds), *An Historical Geography of Ireland* (London, 1993), p. 260, 271.

⁴² Pollard, S. *Peaceful Conquest; The Industrialization of Europe 1760-1970* (Oxford, 1986), pp. 3-12.

out work to an additional 15,000 rural outworkers. By 1902 the number of factories had risen to 38, and employment had risen to 80,000.⁴³

Table 9.5.

**NET INDUSTRIAL OUTPUT IN THE 32 COUNTIES IN 1907 AND
THE 26 COUNTIES IN 1911. (in current prices)**

	1907 32 Counties	1911 26 Counties
linen (a)	£4,856,000	£66,000
brewing, malting	£3,528,000	£3,903,000
clothing, millinery	£1,818,000	£325,000
bread, biscuits, cocoa etc (b)	£1,057,000	£531,000
shipbuilding (c)	£939,000	-
printing, publishing, engraving	£887,000	£545,000
grain milling	£700,000	£533,000
distilling	£513,000	£177,000
engineering, implements	£510,000	£109,000
tobacco	£441,000	£89,000
timber trades	£389,000	£183,000
butter, cheese, margarine	£356,000	£305,000
chemicals, drugs, fertilisers (d)	£262,000	£285,000
woollen and worsted	£248,000	£262,000
bacon curing (e)	£217,000	£299,000
mines and quarries	£197,000	£118,000
paper, stationary, cardboard	£140,000	£51,000
vehicles (f)	£123,000	£106,000
boots and shoes	£116,000	£57,000
metals (g)	£97,000	£75,000
bricks, masonry, fireclay	£87,000	£64,000
soap and candles	£86,000	£46,000
all other	£3,317,000	£563,000
TOTAL	£20,884,000	£8,692,000

NOTES; a) 1907 includes hemp, 1912 includes lace and canvas. b) Includes flour confectionery, sweet confectionery, fruit preserving. c) small shipbuilding industry in south (1912) included in all other. d) Includes sheep dip, insecticides, paints, oils, seed crushing, tallow, fireworks, match and firelighter trade. e) 1912 includes sausage making. f) includes carriages, carts etc, cycles, motors, blacksmiths g) Includes iron and steel.

Source; *UK Census of Production 1907*, BPP 1912-13, cix (cd. 6320). *Census of Production, Irish Free State, 1926* (Stationary Office, 1932).

Over the course of the nineteenth century regional specialisation had intensified, and the larger urban centres had become more significant as locations for industry. Dublin was the main centre of industrial production in the south which in 1911 accounted for well over half of the

⁴³ Royle (1993), pp. 276-7.

industrial output of the 26 counties (which subsequently became the Free State).⁴⁴ Brewing, railway engineering, distilling, biscuit making and clothing were well represented and there was also a host of smaller industries. The textile industry in Dublin had declined significantly since the 1820s, as it had in most of the southern cities. Cork, however had become the main centre for the mechanised woollen industry, also retaining its position as a centre for brewing and distilling.⁴⁵ Cork, Waterford and Limerick were all important centres for food processing; notably bacon curing, milling and processing butter.

But the agro-based industries which had emerged in the south were capital intensive, rather than labour intensive. They also yielded extremely low added value. The net benefits of these industries to the economies of the southern cities were therefore much less intense than linen production in Ulster which was labour intensive and yielded a relatively higher added value. Shipbuilding and engineering also yielded high added value, further intensifying the dynamics of industrialisation in the north-east.

From an industrial perspective, it is unrealistic to separate the north-east from the rest of Ireland, as regional concentration was common in industry all over Europe during the nineteenth century. It was the subsequent creation of the border between the Free State and Northern Ireland which separated the two regions economically and politically. There is little evidence during the nineteenth century that they would be divided, so to separate them prior to this is writing history backwards. Most of the work which has been published on the Irish industrial sector has tended to take a regional perspective, concentrating on Ulster alone. This approach is one of the consequences of partition. But for analytic purposes, Ireland's industrial and economic history can be better understood by treating the whole island as a region within the UK, as within the available UK statistical data for this period, the island of Ireland was usually differentiated from Great Britain.⁴⁶

⁴⁴ This assumption is based on an assessment of industrial output in the 26 counties in 1911 (see table 9.5). Industries like brewing, distilling, biscuits, tobacco, engineering, printing and publishing, paper, clothing millinery were heavily concentrated in Dublin.

⁴⁵ For a general overview of Cork's industrial history between 1780 and 1880 see Bielenberg, A. *Cork's Industrial Revolution* (Cork, 1991).

⁴⁶ For a list of published work on Ulster industry see McCutcheon, W. *The Industrial Archaeology of Northern Ireland* (New Jersey, 1984). Ollerenshaw, P. 'Industry, 1820-1914' in Ollerenshaw, P. Kennedy, L. (eds) *An Economic History of Ulster* (Manchester, 1985).

Political and ideological perceptions loom large in Ireland's industrial history. The traditional nationalist view was that Ireland had a substantial industrial sector by the end of Grattan's parliament (1800), which was subsequently destroyed during the nineteenth century by the Act of Union and Free Trade which removed protection for Irish industry. This view seems to have been widely held by Irish nationalists at the end of the nineteenth century; they viewed the lack of industrial development in Ireland as a problem which had been brought about by political factors rather than by economic factors. Protectionist and nationalist sentiments became particularly strong in the 1880s recession, which coincided with the centenary of Grattan's parliament, which many nationalists believed conferred major economic benefits to Ireland. Subsequently, the views of Arthur Griffith, who advocated a policy of protection for Irish industry, found a receptive audience which doubted the benefits of Free Trade for Ireland.⁴⁷ But it is extremely unlikely that the growth of the Irish economy during the nineteenth century could have taken place within a protectionist environment since the main engine of growth was trade with Britain.

In contrast to O'Malley, who argues that Irish industry declined in the nineteenth century under classic laissez-faire free market policies, this thesis argues that both the industrial sector and the economy as a whole did better in this period under Free Trade than it would have done in a more protectionist environment because of the small size of its domestic market. Protectionist policies would only have been successful in an economy with a large domestic market, not in a small open economy. The high level of industrial exports relative to industrial output indicates that a large part of the Irish industrial sector was competing successfully on international markets.

Irish industrial companies tended to become larger and more highly capitalised during this period which enabled them to reap economies of scale. Because of this, in many industries, a smaller number of large companies replaced a larger number of smaller companies. Industries became concentrated in the larger towns so many smaller towns experienced industrial decline; this was a regional rather than a countrywide problem which was more than offset by

⁴⁷ O'Malley, E. 'The Decline of Irish Industry in the Nineteenth Century', *Economic and Social Review*, xiii, (1981), p. 23. Lee, J. 'The Railways in the Irish Economy', in Cullen, L. (ed), *The Formation of the Irish Economy* (Cork, 1968), p. 77.

developments in the regions of industrial growth. The geographic concentration of industry in particular regions at the expense of others occurred all over Europe and Britain during this period, so Ireland's experience in this regard was not unusual.

Although industrial output in Ireland declined relative to the rest of the UK during the nineteenth century, this thesis has demonstrated that this period was not one of major industrial decline in Ireland in absolute and per capita terms. Although the cotton and woollen industries went into decline from the 1820s, and in the following decades the glass and tanning trades experienced reversals. The growth of the paper industry was also reversed during the 1860s. More significant was the decline of the rural milling industry from the late 1870s. But decline in these sectors was more than offset over the period by growth in other sectors. Total employment in the Irish industrial sector outside textiles and clothing increased in absolute terms between 1841 and 1911, and within textiles factory employment also increased with the growth of mechanised linen and woollen manufacture. Industrial exports also rose over this period, which facilitated an expansion of output in the face of general population decline within Ireland. The qualitative and quantitative evidence presented in this thesis indicates that contrary to popular opinion, the Irish industrial sector experienced limited growth during the nineteenth century. Growth in the industrial sector was extremely limited between 1790 and 1845. But during the period between 1845 and 1907 a higher level of growth is evident, industrial output rising from about 17 million pounds to 30 million (current prices) (see table 9.3). Although this was hardly spectacular, it was much more impressive than growth in the agricultural sector when output increased from 43 million to only 46 million (current prices) during the same period.⁴⁸

When compared to Britain (the leading industrial society in the world for most of the nineteenth century), Irish industrial performance does not look impressive. But Johnson points out that Britain may not be the most appropriate comparison. When pre-partition Ireland is viewed from

⁴⁸ O'Grada, C. *The Irish Economy Before and After the Famine* (Manchester, 1988), pp. 48, 68, 129.

a broader European perspective, he notes that its industrial sector was by no means backward; 'in 1911, 23 per cent of the economically active population was involved either in manufacturing industry or construction. This placed it very much in the middle rank of industrial countries, along with Portugal, the Scandinavian countries, Italy and the Netherlands, all of which were in the band from 22 to 25 per cent. Ireland had a more industrialised economy than Austria, Spain, Hungary or any of the nations of Eastern Europe'.⁴⁹ To those with traditional perceptions of industrial decline in nineteenth century Ireland, this might seem strange. But when the main conclusion of this thesis is taken into account (a prolonged period of slow growth in the Irish industrial sector during the nineteenth century), then Johnson's observation hardly seems surprising.

⁴⁹ Johnson, D. *The Inter-War Economy in Ireland* (Dublin, 1989), p. 20.

Appendix 1

AN ESTIMATE OF IRISH INDUSTRIAL OUTPUT IN 1840-45.

TEXTILES

LINEN

Conrad Gill has made estimates for the output of the Irish linen industry during in the early nineteenth century. In his opinion, total output was about 70,000,000 yards in 1802, rising to 89,500,000 yards in 1821. In the latter year he estimated that home consumption of linens in Ireland was about 40,000,000 yards; this was a little less than 6 yards per person. To get total output he added this figure to total exports (49,500,000 yards in 1821). Gill pointed out that per capita consumption was probably declining during this period because of the growing use of cottons, which were cheaper.¹

In order to make an estimate for 1840-5 it will be assumed that consumption in Ireland continued falling as Gill suggested, to a level of about 4 yards per person. Assuming the population of Ireland had reached 8,500,000, home consumption would have been in the region of 34,000,000 yards. Solar's pioneering work on the trade statistics relating to linen conveniently provides us with figures for the export trade from Ireland. According to Solar, average exports between 1840-5 were about 57,112,000 yards.² By adding exports to the above estimate of home consumption a figure of 91,112,000 yards is arrived at which will be taken as the total output per annum of linen cloth between 1840-45.

To estimate the value of linen output it will be assumed that the average price of the cloth equalled 1s 6d per yard.³ On this basis the gross value of the output of linen cloth in 1845

1 Gill, C. *The Rise of the Irish Linen Industry* (Oxford, 1925), p. 277.

2 Solar, P. 'The Irish Linen Trade 1820-1852', *Textile History*, xxi (1990), p. 69.

3 Durie, A. Solar, P. 'The Scottish and Irish Linen Industries Compared, 1780-1860'. Mitchison, R. Roebuck, P. *Economy and Society in Scotland and Ireland 1500-1939*. (Edinburgh, 1988), p. 216. Linen cloth prices were falling between the 1830s and the 1840s, but it has been assumed that this fall was offset by the improvements in the average quality of Irish linen during this period which kept average prices up.

would have been £6,833,400. Assuming net output was 60% of gross output, as Deane and Cole did for estimating the net output of the UK linen industry in 1845,⁴ we arrive at a figure for net output of £4,100,000.

The value of the linen yarn trade also needs to be taken into account; in 1840 it was worth £1,500,000.⁵ Between 1865 and 1869 coal and flax accounted for about 69% of the gross value of linen yarn. Given that the price of both coal and flax had risen since the 1840s we will assume that these raw materials accounted for about 63% of gross value.⁶ If this is deducted we get a net figure for the yarn trade of £555,000. If this is added to the value of linen cloth, we arrive at a figure of £4,655,000 for the total net output of the Irish linen industry.

It is more difficult to estimate the output of the woollen industry, which was experiencing considerable decline in the decades prior to the Famine. Employment in the factory industry fell from 1,641 in 1835 to only 1066 in 1847.⁷ Willan's, one of the large Dublin manufacturers estimated that in 1838, not more than £1,400,000 of factory made woollens were sold in Ireland per annum. So consumption of factory made woollen cloth in Ireland worked out at approximately 3 shillings 3 pence per head compared to 20 shillings per head in England. Of this, Willan's estimated that not more than £220,000 (or 16% of the total) was manufactured in Dublin and the other manufacturing centres in the south of Ireland, the rest was imported from Britain.⁸

We now have a figure of £220,000 for the factory industry. But Willan's estimate does not take into account the woollens made within the domestic industry. According to Houghton, one of the big Dublin manufacturers interviewed by the Revenue Commissioners in 1822, up to half of the Irish population was clothed in domestically manufactured cloth. Although the domestic industry was experiencing a decline over the next decades it was still important prior to the

⁴ Deane P. and Cole, W. *British Economic Growth 1688-1959* (Cambridge, 1964), p. 204.

⁵ PRONI. D. 20863\1, The Linen Trade Circular, 6 August 1852. *Thom's Directory*, 1847.

⁶ Boyle, E. *An Economic History of the Irish Linen Industry* (unpublished PHD, QUB, 1977), p. 195. Smyth, F.W. *Irish Linen Trade Handbook* (Belfast, 1876), p. 3.

⁷ *Persons employed in Mills and Factories UK*, BPP 1836, xlv (138) p. 3. BPP 1847, xlvi (294) p. 12.

⁸ *Second Report of the Railway Commissioners*, BPP 1837-8, xxxv, app. B, no. 30, p. 92.

Famine. The 1841 census lists over 81,000 people who were occupied in some branch of the woollen industry. Most of these (over 71,000) were domestic hand spinners. The domestic industry made a minor recovery in the late 1830s; according to the Handloom Weavers' Report of 1839 the domestic manufacture; 'has received considerable extension' since the wool produced in Ireland was only suitable for the coarser clothes and friezes made within the domestic industry.⁹ Given this evidence it does not seem unreasonable to assume that per capita consumption of domestically manufactured cloth was at least 1 shilling per annum. We have already noted Willan's estimate of 3 shillings 3 pence per annum for the consumption of factory made cloth (produced in Ireland and Britain), which would have accounted for over three-quarters of the cloth consumed if the above estimate for domestically manufactured cloth is plausible. Making this assumption the domestic industry was worth £425,000 (assuming the population was 8.5 million). By adding this to the figure for the factory industry we arrive at a total of £645,000 gross. Using the same conversion rate from gross to net as Deane and Cole for 1840-44,¹⁰ we arrive at a net figure for total output of £410,220 (say £410,000).

For the cotton industry we can only make a rough estimate. According to Lecky its output was worth £600,000 per annum (gross) in 1800, which would have been about £291,600 (net).¹¹ The industry grew to a peak in the 1820s and declined thereafter except in a small number of mills which were mostly located around Belfast. It is possible to make a rough estimate for Ireland from the UK, where the total net output of the industry was roughly £24,300,000 in 1845, and there were 273,000 factory hands employed.¹² This would imply that for each factory hand employed, about £89 worth of cotton was produced (net) per annum. It will be assumed that productivity in Ireland was a little lower than in Britain, each worker producing on average £80 worth of cotton (net) per annum. This assumption seems justified since the surviving cotton mills in Ireland at this stage were those which were reasonably competitive with British imports. There were about 4,200 factory hands working in the Irish cotton

⁹ *Fourth Report on Revenue*, BPP 1822, xiii, app. no. 23, pp. 180-7. *Report on Handloom Weavers*, BPP 1840, xxiii (43) pp. 591-676. 1841 Census, Ireland.

¹⁰ Deane and Cole (1964), p. 196.

¹¹ Lecky, W. *Ireland in the Eighteenth Century* (London, 1892), v, p. 399.

¹² Deane and Cole (1964), p. 212. Mitchell, B. *British Historical Statistics* (Cambridge, 1988), p. 376.

industry at this time.¹³ Making these assumptions the net output of the Irish industry would have been about £336,000 per annum.

The silk trade in Ireland which was centred largely in Dublin had been in decline for a number of years. There were only 342 employed weavers in the Dublin in 1839. There were still 193 looms working in the city in 1911. The census of 1841 lists 968 people who worked within the industry in Ireland, the 1911 census lists only 322. The net value of the industry was given as £29,000 in 1907. Output was probably greater therefore in the early 1840s. Deane and Cole estimated that in 1847 the net output of the UK industry was 6.5 million and 100,000 people were employed.¹⁴ Assuming 1,000 people were employed in the Irish industry in 1840-45, and net output per worker was 20% less than in Britain, the net output of the industry would have been £52,000.

The total net figure for textile manufacture therefore comes to £5,453,000.

TANNING AND THE MANUFACTURE OF LEATHER GOODS

There are hardly any clues on the output of the tanning industry in the 1840s. However we know from duties paid on tanned leather between 1825 and 1827 that on average over 7,000,000 lbs of leather was being tanned in Ireland at this time. In Cork, which was one of the important centres of the tanning trade, the industry experienced some growth up to the end of the 1820s, Thereafter, a slow decline set in. With this information, it seems reasonable to assume that output had fallen back to about 7,000,000 lbs of leather per annum by the first half of the 1840s. Mc Culloch in his estimate of the British industry at this time gives the price of finished leather as 1s 6d per lb. The gross value of leather tanned in Ireland would therefore have been worth £525,000. About £50,000 of this was exported judging by the estimates of exports made by the Railway Commissioners for 1835. We remove the value of exports from the value of tanned leather produced, which leaves £475,000. From information on all the

¹³ O'Brien, G. *Economic History of Ireland from the Union to the Famine* (London, 1921), p. 313.

¹⁴ Webb, J. *Industrial Dublin since 1698 and the Silk industry in Dublin* (Dublin, 1913), pp. 167, 180. Deane and Cole (1964), p. 210. 1841 census, 1911 census.

tanpits operating in Derry at this time it is evident that hides and bark accounted for about 79% of the gross value of the leather produced. The net value of the tanning industry in Ireland would therefore have been in the region of £99,750. To reach a figure for the value of the leather industries (saddlery and leather goods trades) Mc Culloch multiplies the value of the tanned leather by three.¹⁵ If we take this approach for the Irish tanning industry net output works out at about £299,250 to which we must add back in the value of exports of tanned leather (£50,000 gross, or £10,500 net), giving us a net total of £309,750 for the Irish tanning and leather industries, (say £310,000).

THE PAPER INDUSTRY

From the duty paid on paper we know that the average output of the paper industry was 4,183,000 lbs between 1840 and 1845. To allow for paper which did not have duty paid on it this figure will be raised to 4,500,000 lbs. Over four-fifths of the paper made in Ireland in 1836-7 was first-class paper. This would have been worth 1 shilling a lb. It will be assumed that four-fifths of the paper made in 1840-45 was of this variety and had a value therefore of £189,000. The remaining fifth will be valued at 4d per lb and would therefore have been worth £15,000. On this basis, the total gross value of paper produced would have been £204,000. After deducting 34.4% to allow for the cost of raw materials,¹⁶ the net value of the Irish paper industry would have been £134,000.

The value of the books, newspapers and other goods produced from paper can be estimated from a rough estimate made by Mulhall. According to Mulhall, in 1884-5 £16.2 million worth of books etc was produced from 220,000,000 lbs of paper in the UK.¹⁷ As the price of paper was falling in the interim period, it will be assumed that in 1840-5 the same quantity of paper would have produced £30 million worth of books. The 4,500,000 lbs of paper produced in Ireland between 1840-5, in this scenario would produce books, newspapers, writing paper etc

¹⁵ *Return of Duty Paid on Tanned Leather*, BPP 1828, xxii (134) p. 1. *Second Report of the Railway Commissioners*, BPP 1837-8, xxxv, app. B, no. 10, p. 92. Mc Culloch's, *Account of the British Empire* (London) p. 738.

¹⁶ Spicer, A. *The Paper Trade* (London, 1907), p. 244. The estimates of price and the gross to net ratio comes from a Scottish paper mill in 1843; Thompson, A. *The Paper Trade in Scotland. 1590-1861* (Edinburgh, 1974), p. 173.

¹⁷ Mulhall, M. *History of Prices* (London, 1885), p. 69.

to the value of £614,000 gross. Assuming that the net value of the industry was 60% of gross then the net value of printing and publishing would have been £368,000. The total net value of paper, printing and publishing would have been £502,000.

GRAIN MILLING

The corn used for grain milling can be estimated from the harvest yields with deductions for exports of grain, consumption by horses, brewing, distilling and seed. It will be assumed that the remainder was milled for human consumption. Solar has made estimates for these items for the 1840-45 period. In addition, he has ascertained the average price of flour and oatmeal. His estimates have therefore been used throughout this section.¹⁸ The conversion ratios from wheat to flour and oats to oatmeal have been taken from Bourke's work on the Irish grain trade.¹⁹

According to Solar about 292,000 tons of wheat were used for human consumption on average between 1840-5, which had a value of £3,045,560. If this is converted into flour using Bourke's conversion ratios it works out at 4,672,477 cwt. To this must be added exports of flour which averaged 661,167 cwt between 1840-45 according to Solar. This amounts to 5,333,644 cwt. Taking 17 shillings per cwt as the average value of Irish flour, gross value comes to £4,533,597. When the value of wheat used is deducted, (including wheat used for milling flour exports which was 41,319 tons, or £430,957 if Bourke's method is used to turn flour back into the wheat equivalent), the net value of flour milling would have been £1,057,000.

About 494,000 tons of oats were used for human consumption according to Solar, which had a value of £2,395,000. This works out at 5,534,073 cwt of oatmeal. To this must be added exports which averaged 1,304,500 cwt between 1840-45 according to Solar. This amounts to 6,838,573 cwt. Assuming oatmeal had an average value of 12 shillings a cwt, the gross value of oatmeal produced would have been £4,103,144. If the value of oats used, £2,960,000,

¹⁸ Solar, P. *Growth and Distribution in Irish Agriculture before the Famine*. (unpublished PhD, Stanford, 1987), pp. 212, 364, 227, 230, 340-1.

¹⁹ Bourke, A. *The Irish Grain Trade, 1839-48*, *Irish Historical Studies*, xx (1966), p. 158.

(which includes oats used in milling exported oatmeal which was 116,446 tons or £564,783) is deducted then the net value of oatmeal produced was £1,143,000.

An allowance of £50,000 net has been added to allow for other grains which were milled. The total net output of the milling industry was therefore £2,250,000.

THE DISTILLING INDUSTRY

From the records kept by the excise we know that the output of the distilling industry between 1840-5 averaged 6,630,342 gallons per annum.¹⁹ Between 1840-5 about 25% of the whiskey produced was made in patent stills; this will be valued at 4s per gallon (including duty). Pot still whiskey will be valued at 5s 6d per gallon (including duty).²⁰ Patent still whiskey would have been worth £331,517 and pot still whiskey £1,367,508. 30% will be added on to the figure for pot still whiskey to account for the illicit industry which is taken to have been worth £410,252. The total gross output of the industry would have been worth £2,109,277.

Assuming 8,122,169 gallons (including the illicit industry) of spirits were made in total, and materials cost 2.75 shillings per gallon,²¹ then the total cost of materials for the distilling industry would have been £1,116,798. When this is deducted, we are left with a net value for distilling of about £992,000.

THE BREWING INDUSTRY

The output of the brewing industry can be calculated from the tax on malt. The amount of bushels of malt on which duty was paid averaged 1,114,294 between 1840-5.²²

Lee assumes that approximately 2 bushels of malt were required to produce 1 barrel of beer.²³

Using this conversion, the average output of beer during these years would have been 557,147

¹⁹ *Return of Gallons Distilled in UK*, BPP, 1856, lv (384) p. 2.

²⁰ Maguire, E.B. *Irish Whiskey* (Dublin, 1973) p. 262. Weir, R. 'The Patent Still Distillers'. Cullen, L. and Smout T. (eds) *Scottish and Irish Economic and Social History* (Edinburgh, 1977), p. 138.

²¹ Nettleton, J. *The Manufacture of Spirits* (London, 1893), p. 9.

²² *Return of Licensed Brewers*, BPP, 1846, xlv (254) p. 13. annually to BPP 1846, xlv (136) p. 12.

²³ Lee, J. 'Money and Beer in Ireland 1790-1875', *Economic History Review*, xix (1966), p. 185.

barrels. If 20% is added to allow for the evasion of malt duties and private brewers, then the output rises to 668,576 barrels. Taking the average price of a barrel at £1 10s between 1842 and 1846, the gross value of the brewing industry would have been £1,002,864. Assuming materials accounted for 66.2% of gross value,²⁴ the net output of brewing would have been £339,000.

THE FOOD PROCESSING INDUSTRIES

The estimates of the meat processing trades used here will depend almost entirely on Solar's work on agricultural exports since the industry was very export oriented. Solar estimated that between 1840-45, bacon and ham exports averaged 679,700 cwt and salted pork averaged 185,300 cwt. He also assumed that all the pigmeat consumed in Ireland did not exceed 613,000 cwt. If half of this was bacon and ham the output of this industry would have been roughly 1,172,000 cwt. Assuming the average price of bacon was 42 s per cwt,²⁵ the gross value of the industry would have been £2,461,000.

Solar estimated that salt beef exports averaged 72,000 cwt per annum during this period. Very little would have been produced for domestic consumption; it will be assumed here that 3,000 cwt would account for the home trade, raising output to 75,000 cwt. Assuming salt beef was worth 51 shillings per cwt,²⁶ the gross output of the industry would have been roughly £191,000.

The total gross value of the meat processing industry would have been £2,652,000. We will assume the net figure would have been about 10% of the gross figure leaving a net output for the meat processing industry of £265,000.

²⁴ Lynch P. and Vaizey, J. *Guinness Brewery in the Irish Economy* (Cambridge, 1960), pp. 99, 207.

²⁵ Solar (1987), pp. 61-2, 67-70, 146-151.

²⁶ *Ibid.*

The fishing industry was bigger in 1840 than it was in 1907. It will therefore be assumed that fish curing was worth more than the figure of £13,000 given for this trade in the 1907 census; £20,000 net will be attributed to this trade in 1840-5.

Bottling would have been smaller than in 1907. £70,000 net will be attributed to this trade.

For the remaining sectors of the food industry we must turn to the 1841 census and make a rough income estimate for winecoopers, cidermakers, bakers, confectioners, cooks, soda watermakers, cordialmakers, salters, salt manufacturers, vinegarmakers and mustard makers. There were 7119 adult males in these categories; assuming they earned 14 shillings a week and worked 45 weeks in the year their income would have come to £224,249. Bakers accounted for the majority (6359) so this estimate seems plausible; bakers in Dublin earned £1 a week in 1834.²⁷ Assuming that the 1319 women and children working in these categories earned 3 shillings a week on average and worked 45 weeks in the year, their income would have been £8,903. These gives a total of £233,152 for this category. Assuming income accounted for 95% of the total and the remaining 5% for profits etc the final value of these categories would have been £245,000.

The total net output of the food processing industries (excluding milling) would have been £600,000.

TOBACCO

A rough idea of the tobacco processed in Ireland, can be deduced from the amount of tobacco consumed in Ireland on which duty was paid. Since most of the tobacco consumed in Ireland was processed in Ireland, we will assume that 95% of consumption=production. Exports were negligible. Average consumption between 1840-45 was 5,431,401 lbs,²⁸ so 5,159,831 lbs will be taken as the raw tobacco used by the industry. Using the value attributed to tobacco exports in the Railway Commissioners' report in 1835, this tobacco would have had a gross

²⁷ Royal Irish Academy, Dublin, The Haliday Collection, 4. B. 31.

²⁸ *Customs UK, 1800-1897*, BPP 1898, lxxxv (c. 8669) pp. 197-8.

value of £666,510 when processed. Assuming net was 25% of gross then the net value of the tobacco industry would have been £167,000.

THE MINING INDUSTRY

Robert Kane's book on "The Industrial Resources of Ireland" gives much information on the main mining regions in Ireland in the 1840s. This can be supplemented by Thom's Directory of 1846. By making a rough estimate of the mining output (excluding coal) of each county from these sources the following figures were arrived at:

Wicklow	£80,000
Waterford	£60,000
Cork	£40,000
Tipperary	£35,000
Kerry	£20,000
Dublin	£10,000
Wexford	£5,000
Others	£10,000
TOTAL	£260,000

To this figure we need to add the value of the output of coal mining. It is possible to get a rough estimate of the output of most Irish coal fields in the early 1840s from Kane.²⁹ About 120,000 tons were produced in Leinster, 3,000 in Connaught, and roughly 60,000 in the coalfields in Munster. According to McCutcheon the Tyrone collieries produced roughly 25,000 during this period, and another 10,000 can be added to account for the other Ulster collieries. This leaves a total output of 218,000 tons. Kane estimated that coal in Ireland was worth on average 8s per ton at the pit mouth.³⁰ Coal output was therefore worth £87,200. The total gross value of all mining activities would have been roughly £347,000. Assuming the net value of mining was about 85% of the gross value, the total net value of the Irish mining industry in 1840-5 would have been £295,000.

²⁹ Kane, R. *The Industrial Resources of Ireland*, (London, 1847), p. 53.

³⁰ *Ibid.*, pp. 11-12, 22, 53. McCutcheon, W. *The Industrial Archaeology of Northern Ireland* (New Jersey, 1984), p. 337.

GLASS INDUSTRY

The output of the glass industry can be calculated from excise on glass. The average amount of flint glass on which duty was paid between 1841 and 1845 was 616,269 lbs. Assuming the average price of flint glass produced was 1s 3d per lb, then the gross value of flint glass produced would have been £38,517. Deducting 20% for raw materials, the net value of the flint glass industry would have been about £31,000.³¹

The average amount of bottles on which duty was paid between 1841 and 1845 was 7494 cwt (excluding 1844).³² If this is converted to lbs (assuming 112 lbs=1 cwt) then the output of bottles would have been 839,328 lbs. Assuming bottles were worth 3d per lb, then the gross value would have been about £10,492. By deducting 40% for raw materials the net value of the bottle trade would have been about £6,000.

To allow for excise evasion, 15% is added to the combined figure for flint glass and bottles. The total net value of the glass industry therefore adds to a total of £43,000.

SHIPBUILDING

Between 1842 and 1845 the average tonnage built in Ireland was only 706 tons. The value was not more than £14 a ton.³³ The gross value of the shipbuilding industry was therefore about £10,000. Deducting 50% for the cost of materials the net value of the industry would have been £5,000.

³¹ Glass duty taken from *Duty charged on Glass in UK*, BPP 1846, xlv (214) pp. 4-5. O'Brien, G. *Ireland from the Union to the Famine* (London, 1921), p. 364. According to Ross the average value of Irish flint glass was low relative to Britain. One Cork manufacturer mentioned an export consignment worth 11d per lb in 1830. This manufacturer produced glass which was lower than average in quality and price. Ross, C. 'The Excise Tax and Cut Glass in Ireland 1800-1830'. *Journal of Glass*, xxiv (1982), p. 239., mentions a figure of 1s 3d per lb for flint glass.

³² O'Brien (1921), p. 364.

³³ Riordan, J. *Modern Irish Trade and Industry* (London, 1920), p. 101. O'Mahony, C. 'Shipbuilding and Repairing in Nineteenth Century Cork', *Journal of Cork Historical and Archaeological Society*, xciv (1989), p. 77.

CLOTHING AND MILLINERY

For information on all of the remaining industries we must turn to the 1841 census in conjunction with information on wages. Most of the workers in this sector were women and children (under 15) working for very low levels of remuneration. We will assume that the 129,871 women and children who worked in this sector earned on average only 3 shillings a week and worked 36 weeks in the year. On this assumption their income would amount to £701,303. There were 37,718 adult males in this sector who it will be assumed earned on average of 15s shillings per week and worked 36 weeks in the year. On this basis the income of men (of 15 years and older) in this sector amounted to £1,018,386. So income in the clothing and millinery sector came to £1,719,689. To make an allowance for profits etc we will assume income accounted for 95% of the final figure and the remaining 5% was profit. The final figure for clothing and millinery would come to £1,810,199, (say £1,810,000).

This figure seems reasonably plausible. The vast majority of the adult males in this sector were tailors (34,944). The tailors mentioned in the Poor Inquiry of 1836 in Belfast and Londonderry earned between 14 shillings and 17 shillings 6 pence per week. Many of the women in this sector earned more than 3 shillings per week; female glovers in Dublin for example earned six shillings per week.³⁴ The sewed muslin trade alone which would be included in this sector was said to be worth £1,400,000 (gross) in the mid-1840s.³⁵

IRON, ENGINEERING, TIMBER, CHEMICAL AND OTHER TRADES.

All the miscellaneous trades which fall within the industrial sector but are not included in the sectors which have already been counted will be included in this section. So this estimate will cover a very broad range of industries which are otherwise impossible to capture. The list is drawn from the summary of occupations in the 1841 census. It includes all occupations in "Lodging, Furniture and Machinery" from the beginning down to Bellowsmakers (excluding undertakers, miners and those engaged in shipbuilding trades, paper, printing and books and

³⁴ *Poor Inquiry, Ireland*, BPP 1836, xxx, app. C, Pt 1, p. 61. Swift, J. *History of the Dublin Bakers* (Dublin, 1948), pp. 366-7.

³⁵ *Thom's Directory*, 1846.

all those engaged in construction trades). It also includes miscellaneous manufacturers, tradesmen and apprentices (unspecified). An allowance will also be made for labourers.

The number of male artisans (15 years old and upwards) engaged in these occupations comes to 78,083. Assuming they earned 15 shillings a week on average and worked 45 weeks in the year then income for this group would amount to £2,635,301. An average wage of 15 shillings a week seems reasonable; data on wages in these sectors suggest that most of the artisans in these sectors earned more than this. In the Poor Inquiry of 1836 a person interviewed in Derry thought that 15 shillings a week was the lowest wages on which a mechanic could live decently.³⁶ From the same sources an average wage for labourers of 8 shillings and women and children at 3 shillings seems reasonable. There were 8037 women and children employed in these trades and assuming they worked 45 weeks in the year their income would have been £54,250. There were 31,252 labourers and porters enumerated in the census. It will be assumed that half of these worked in the service sector and half in industry. It will be assumed that 8,000 of them worked in construction (see below); 5,000 labourers worked in industries which have already been accounted for in this estimate, so they will be excluded; the remaining 2626 will be included within this section. If they earned on average 8 shillings a week and worked 45 weeks in the year, this would amount to £47,268. Adding the income from artisans, labourers, women and children in these industries and trades we get a figure of £2,736,819. Assuming 95% of income in this group comes from wages and a further 5% comes from profit the value of these industries and trades would have amounted to £2,881,000.

THE CONSTRUCTION INDUSTRY

The income method will be used to estimate this sector. The same data and wage rates will be used as in the preceding section (ie Artisans 15 shillings a week, women and children 3

³⁶ *Poor Inquiry, Ireland* BPP 1836, xxx, app. C, Pt. 1, p. 62. Royal Irish Academy, Dublin, Holiday Collection, 4. B 31. Swift (1949), p. 366-7.

shillings and labourers 8 shillings) and it will be assumed that a working year consisted on average of 36 weeks to allow for unemployment, sickness, retirement etc.

EMPLOYMENT IN CONSTRUCTION		
	Skilled Males	Women and Children
architects	292	1
builders	790	2
stonecutters	3752	59
bricklayers	1326	5
stonemasons	16450	55
slaters	3254	31
thatchers	1016	2
plasterers	1413	12
paviors	157	
carpenters	38672	219
road contractors and makers	406	6
TOTAL	67,528	392

The total wages of the artisans and other skilled males working in construction would amount to £1,823,256; the total wages of children and women amounts to only £2117 (to the nearest pound). Assuming 8,000 labourers worked in construction their wages would have amounted to £115,200. Wages in construction add to a total of £1,940,473 and assuming this accounted for 95% of the income made from the industry and the remaining 5% for profit the net figure for construction would have been £2,042,603, (say £2,043,000).

By adding all the sectors given above it is possible to get a figure for industrial output in the period in question.

NET OUTPUT IN THE IRISH INDUSTRIAL SECTOR; 1840-5.	
Textiles	£5,453,000
Food Processing (excluding milling)	£600,000
Clothing and Millinery	£1,810,000
Brewing	£339,000
Distilling	£992,000
Grain Milling	£1,494,000
Tobacco	£167,000
Construction	£2,043,000
Shipbuilding	£5,000
Tanning and leather goods	£310,000
Paper Printing Stationary etc	£502,000
Mines and Quarries	£ 272,000
Glass	£43,000
Engineering, Timber, Chemicals- and all other Trades	£2,881,000
TOTAL	£16,911,000

APPENDIX II

A revision of the 1907 Census of Production to establish Irish industrial output.

The 1907 Census of Production was the first official attempt to establish industrial output in the UK. This census provides the earliest figure available for Irish industrial output. Undoubtedly, the figure of 22.7 million which the census records as Ireland's net industrial output is an underestimate, as the census failed to incorporate a large part of the industrial sector. There were only 291,304 industrial workers employed in all of the industrial plants which the census covered in Ireland. This deficiency is evident from the 1911 Census of Population which lists 613,397 people in the industrial class. The latter figure includes a number of occupations which should be in the service sector, so various adjustments need to be made which will be detailed below.

When data provided by the 1907 Census of Production is used in conjunction with 1911 Census of Population, it is possible to adjust the different sectors in the 1907 Census of Production and gain a more realistic figure for industrial output in Ireland in that year. The import and export figures for 1907 can also be used to check the veracity of some of the figures, and a rough indication of output can be had in cases where figures for Irish consumption are available (ie tobacco). For some industries (notably shipbuilding) the value of output can be arrived at by other means. The details of such variations in method will be recorded in the notes below.

The margin of error in this exercise will be reduced by working through the 1907 Census on a sector by sector basis. Where adjustment has been necessary in a given sector, all the occupations within it, which are given in the 1911 census of Population are added together. But dealers, traders, merchants, drapers, etc (a number of which are included in the industrial class in the 1911 census) have been removed. In occupations where dealers or other traders are included together with other industrial manufacturers or workers (ie salt-maker, dealer) then

half of that occupational category is assumed to have been dealers etc and thereby half has been excluded. By using this procedure, new employment figures can be generated for a number of sectors where the 1907 Census of Production is deficient. An idea of per capita output can be derived directly from 1907 Census of Production, but some adjustment has usually been deemed necessary (these are outlined in the footnotes that follow the estimate). In cases where more people are listed in a sector in the 1907 Census of Production than in the 1911 Census of Population, then this figure is taken as the total for that industry. So mining, linen, printing, chemicals, food and brewing have all been taken directly from the 1907 estimate.

Two other problems arise from using the 1911 Population census to generate new employment figures for the 1907 Census of Production. Firstly, the population census overstates the number of people employed in a given trade as those who have retired, the sick and the unemployed all tend to describe themselves as belonging to a trade for the purposes of the census. The 1907 census recommended a deduction of up to three-quarters of a million people from the population census in the UK industrial sector to allow for this. Assuming the Irish industrial sector accounted for about 3.2% of UK industrial output in 1907, then a deduction of 24,000 people from the Irish industrial sector seems reasonable. Since these will be deducted from the labourer and mechanic category which would have had a lower than average output per capita, 35,000 people will be deducted to allow for this. This leads to the second problem.

After all the industrial occupations in the 1911 census have been rearranged to fit the format of the 1907 Census of Production, there are still 169,022 mechanics and labourers which have to be accounted for, and 1377 people from the makers and dealers category. The 1911 census does not indicate what industrial category these people worked in, so they need to be allocated to particular sectors. According to the 1907 Census of Production, the majority of people who were unaccounted for in that census worked in clothing, boots and shoes, laundry and the building trades. The majority of these would have been poorly paid with intermittent work. The 170,000 people unaccounted for in the 1911 census have therefore been accounted for as follows: 35,000 have been deducted to allow for over-estimation (see last paragraph). 15,000 have been deducted to bring the 1911 census of population figures for textiles, mines, chemicals, paper and food and drink into line with the higher figures given in the 1907 Census

of Production, in addition to 3,000 for the domestic woollen industry. 20,000 have been accounted for in iron, shipbuilding and engineering sector, where the figure estimated here exceeds those recorded in the 1911 census in this sector by about 20,000 (excluding blacksmiths). 35,000 have been allocated to the clothing sector and it has been assumed that they earned only £25 per annum, as many were part-time workers. 35,000 have been allocated to the building trade and it has been assumed that they earned £35 per annum. The remaining 27,000 have been allocated to the 'other' category. After all these adjustments have been made the following estimates have been arrived at which added together give a total figure for Irish industrial output:

A REVISION OF THE 1907 CENSUS OF PRODUCTION			
	EMPLOYMENT	OUTPUT PER WORKER	NET OUTPUT
Mines/Quarries*	3,763	£52.4	£197,000
Iron and Steel*	578	£69.2	£40,000
Shipbuilding	17,65	£62.6	£1,062,000
Marine Eng*	540	£55.6	£30,000
Railways*	11,963	£52.2	£624,000
Blacksmiths	11,715	£59.7	£699,000
Engineering*	6,730	£74.2	£540,000
Tools/Imp*	147	£68	£10,000
Cycle/motor*	404	£61.9	£25,000
Others	8,073	£74.2	£599,000
Metal trades	5,511	£73	£402,000
Woollen*	4,461	£55.6	
<i>domestic woollens</i>	<i>3,000</i>	<i>£13.3</i>	<i>£288,000</i>
Linen*	82,356	£59	£4,856,000
Others*	5,538	£52.5	£291,000
Paper*	599	£200.3	£120,000
Printing etc*	12,000	£80.6	£967,000
Chemicals*	2,586	£134.6	£348,000
Brewing*	6,595	£534.9	£3,528,000
Distilling	2,423	£470.1	£1,139,000
Milling*	4,675	£149.7	£700,000
Bacon curing*	2,100	£103.3	£217,000
Other Food *	19,790	£92.2	£1,825,000
Timber	12,309	£60.9	£750,000
Leather	3,196	£66.2	£212,000
Building	56,661	£58.4	
<i>other building</i>	<i>35,000</i>	<i>£30</i>	<i>£4,359,000</i>
Tobacco	7,290	£155	£1,130,000
Clothing	89,121	£35.7	
<i>other clothing</i>	<i>35,000</i>	<i>£25</i>	<i>£4,057,000</i>
Others	2,501	£55	
<i>additional others</i>	<i>27,000</i>	<i>£35</i>	<i>£1,083,000</i>
Total	481,276	£62.5	£30,098,000

*straight from *First UK Census of Production (1907)*, BPP 1912-13, cix (cd. 6320).

FOOTNOTES

Engineering, Shipbuilding, Iron and Steel

Irish shipbuilding tonnage from Oldham, C. 'The Belfast Shipbuilding Industry', *Statistical Society of Ireland*, xii (1910), p. 431. Value taken from Irish exports of steamers, *Imports and Exports of Ireland*, BPP 1908, xcix (cd. 4429) pp. 2-69. Gross to net taken from UK figure for shipbuilding in 1907 Census of Production. Employment figures calculated from Harland and Wolff, 1907. Moss, M. Hume, J. *Shipbuilders to the World; Harland and Wolff*, (Belfast, 1986), p. 133. It has been assumed that the manning levels per ton launched by this yard was similar to the remainder of the industry. Blacksmiths taken from 1911 census, output per worker from 1907 census. Average output per blacksmith for whole country assumed to be 25% less than in figure given in 1907 census. Rest taken from 1907 census. Others calculated assuming gross value shipbuilding £2,436,000. This and the remaining categories in the iron and engineering sector (as given in the 1907 Census) amount to £4,769,000. The balance of £1,045,000 which brings the total gross figure for the sector up to £5,814,000 is assumed to have been equal to gross figure for others. Net in this category is assumed to have been 57.3% of gross (as in engineering). If per capita output was the same as in engineering then employment would have been 8073.

Metal Trades

Metal trades taken from 1911 census, includes precious metals and jewellery, copper, tin and zinc, lead, mixed or unspecified metals, watches and philosophical instruments. Output per worker calculated from all metal trades in 1907 census.

Woollens

To allow for the domestic woollen industry, (notably in Donegal, Conemara, Mayo) which would not have been registered in the 1907 Census of Production, £40,000 net has been added. It has been assumed 3,000 worked in the industry on a part time basis. On the eve of the First World War no more than 2,000 were employed in this industry in Donegal, the main centre of the industry, C. O'Grada, *A New Economic History of Ireland 1790-1920* (Oxford, forthcoming).

Distilling.

Spirits distilled in Ireland in 1907 amounted to 11,653,513 proof gallons. *Abstrat of Labour Statistics* , BPP 1908, xcvi (cd. 4413) p. 30. . Value calculated from exports. *Imports and Exports, Ireland*, BPP 1908, xcix (cd. 4429) pp. 2-69.

Timber

From 1911 census, output per worker taken from all timber trades in 1907.

Leather

From 1911 census, output per worker taken from all leather trades in 1907. Average output assumed to be 70% of figure given for all leather trades in 1907.

Building

From 1911 census, output per worker taken from 1907 census, average output per worker in Ireland assumed to be 85% of average output for all building trades in 1907.

Tobacco

Ireland accounted for 11.8% of UK tobacco consumption in 1907. *Committee on Irish Finance* BPP 1913, xxx (cd. 6799) p. 204. UK consumption was £32,800,000 in 1907,

Prest, C. *Consumer Expenditure in the UK, 1900-1919*. (Cambridge 1954), p.89. So Irish consumption 3,870,400. Deduct manufactured imports (£390,105) and add manufactured exports (£1,151,521) gives gross output of £4,631,816. Net was 24.4% of gross in the UK tobacco industry, so net output was £1,130,000. Employment estimated by assuming output per worker same as in UK (ie £155 per annum). Gallagher's alone in Belfast employed 3,000 people in 1907. Ollerenshaw, P. 'Industry 1820-1914', in Kennedy L. and Ollerenshaw P. (eds), *An Economic History of Ulster* (Manchester, 1985), p. 87.

Clothing

From 1911 census, output per worker taken from 1907 census. Average output per worker for Ireland assumed to be 70% of output per worker in 1907 census, to allow for lower output of large numbers of outworkers.

Other

From 1911 Census.

APPENDIX 3

INDUSTRIAL OUTPUT FOR 1840-45 IN 1907 PRICES AND INDUSTRIAL OUTPUT IN 1907 IN 1840-45 PRICES.

	1840-45 (1840-5 PRICES)	1907 (1840-5 PRICES)
TEXTILES (1)	£5,453,000	£20,381,000
FOOD PROCESSING (2)	£600,000	£2,997,000
BREWING (3)	£339,000	£3,528,000
DISTILLING (4)	£992,000	£3,554,000
GRAIN MILLING (5)	£1,494,000	£854,000
SHIPBUILDING (6)	£5,000	£1,062,000
MINERALS (7)	£272,000	£170,000
OTHERS (8)	£7,756,000	£15,841,000
Total	£16,911,000	£48,387,000.
	1840-45 (1907 PRICES)	1907 (1907 PRICES)
TEXTILES (1)	£1,454,000	£5,435,000
FOOD PROCESSING (2)	£516,000	£2,042,000
BREWING (3)	£339,000	£3,528,000
DISTILLING (4)	£318,000	£1,139,000
GRAIN MILLING (5)	£1,225,000	£700,000
SHIPBUILDING (6)	£4,000	£1,062,000
MINERALS (7)	£316,000	£197,000
OTHERS (8)	£7,831,000	£15,995,000
TOTAL	£12,003,000	£30,098,000

Using 1840-5 prices, industrial output rose from £16.9 million to £49.2 million. Using 1907 prices, industrial output increased from £12.1 million to £30.1 million.

Notes;

- (1) Price of linen in 1907 census and in 1840-5 estimate used as deflator.
- (2) Sauerbeck Statist Index for vegetable and animal products.
Mitchell, B. *British Historical Statistics* (Cambridge, 1988), p. 725.
- (3) Price of beer in 1907 census and in 1840-5 estimate used as deflator.
- (4) Price of spirits in 1907 census and 1840-45 estimate used as deflator.
- (5) Price of flour in 1907 census and 1840-5 estimate used as deflator.
- (6) Price of ships in 1907 census and 1840-45 estimate used as deflator.
- (7) Saurbeck Statist Index for Minerals used. Mitchell, p. 725.
- (8) Mitchell, p. 722. includes clothing and millinery, construction, tanning and leather, paper and stationary etc, tobacco, engineering and all others.
Rousseaux Price Index for principal industrial goods used.

APPENDIX 3

BREWING

IMPORTS AND EXPORTS OF BEER FROM IRELAND 1800-1828 (BARRELS)

	EXPORTS	IMPORTS
1800	444	19,709
1801	363	17,972
1802	2,108	10,495
1803	5,782	9,884
1804	6,775	3,209
1805	9,707	3,143
1806	5,797	2,160
1807	4,510	2,449
1808	4,630	2,188
1809	5,713	1,708
1810	4,098	1,101
1811	5,393	1,378
1812	8,727	528
1813	6,266	338
1814	6,814	215
1815	8,022	173
1816	8,556	220
1817	5,480	163
1818	1,153	194
1819	679	162
1820	4,128	317
1821	3,185	235
1822	5,483	
1823	6,096	
1824	8,564	
1825	10,034	
1826	9,962	
1827	10,821	
1828	11,263	

SOURCE; O'Brien, G. *The Economic History of Ireland between the Union and the Famine* (London, 1921), p. 345. *Beer Exported from Ireland*, BPP 1828, xviii (440) p. 2.

**THE QUANTITY OF MALT USED BY BREWERS
IN IRELAND (BUSHELS)
(year ending 5th Jan)**

	malt taxed	brewers
1820	1,321,040	
1821	1,205,120	
1822	1,395,728	
1823	1,498,144	
1824	1,365,560	
1825	1,336,992	
1826	1,410,797	
1827	1,512,612	
1828	1,402,654	
1829	1,343,240	
1830	1,131,212	
1831	1,493,392	215
1832	1,543,265	216
1833	1,683,285	231
1834	2,055,326	240
1835	1,829,587	245
1836	2,032,856	251
1837	1,800,669	248
1838	1,933,990	243
1839	1,813,783	231
1840	1,279,466	191
1841	1,030,415	166
1842	993,114	145
1843	1,010,054	138
1844	1,095,298	122
1845	1,277,416	115
1846	1,464,573	118

Source; *Return of Licensed Brewers* BPP 1830, xxii (223) p. 2. BPP 1831, xvii (58) p. 2. BPP 1847, lix (154) p. 12. (1821-1825 converted from quarters, 8 bushels =1 qtr)

**Malt used for Brewing in Ireland 1845-1901 (bushels)
and the Number of Brewers**

	malt used	brewers
1845	1277416	115
1846	1464573	118
1847	1233350	109
1848	1279695	101
1849	1204875	96
1850	1164702	95
1851	1268314	97
1852	1266344	98
1853	1307867	97
1854	1315139	101
1855	1376148	104
1856	1542333	107
1857	2083934	104
1858	1918257	102
1859	2372911	109
1860	2279973	109
1861	4119546	93
1862	2436471	108
1863	2365489	104
1864	2535797	95
1865	2748772	90
1866	3001121	91
1867	3004875	87
1868	2872443	81
1869	3000722	80
1870	3403240	80
1871	3127210	79
1872	3050625	78
1873	3519790	74
1874	3558651	68
1875	3815872	65
1876	3934896	62
1877	4108032	61
1878	3985323	59
1879	3662200	56
1880	3965887	53
1881	3778884	52
1882	4206875	54
1883	5157536	48
1884	4298909	43
1885	4290735	42
1886	4187016	43
1887	4410591	42
1888	4477004	42
1889	4732157	40
1890	4696109	40
1891	4904976	41
1892	4903861	39

1893	5077663	36
1894	4916515	36
1895	5070712	37
1896	5258399	37
1897	5113784	38
1898	5442730	40
1899	5552443	39
1900	5640974	38
1901	5978136	38

Source; *Return of Malt used by Brewers*, BPP 1846, xliv (136) p. 12. annually to BPP 1901, lxix (101) p. 12. Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1907), p. 470.

SPIRITS

The Production and Consumption of Irish Spirits (,000 Proof Gallons in year ending 31st March

Year	Production	Consumption
1857	8911	6807
1858	9857	6783
1859	7671	5418
1860	7406	5950
1861	4801	4192
1862	4404	4190
1863	4138	3892
1864	4502	3934
1865	5483	4157
1866	5747	4518
1867	5487	5103
1868	5852	4677
1869	6011	4842
1870		5025
1871	8874	5213
1872		5750
1873		6091
1874		6177
1875	9674	6094
1876		6697
1877		6381
1878		6115
1879		6008
1880		5075
1881	9721	5185
1882		5132
1883		5377
1884		5304
1885		5069
1886		4755
1887	10630	4927
1888	11064	4954
1889	11357	4224
1890	11818	4711
1891	12989	4821
1892	14408	4405
1893		4280
1894		4265
1895		4040
1896		4222
1897	14283	4207
1898	14548	4157

1899	14755	4110
1900	14481	4713
1901	14222	4238
1902	12781	3807
1903	12441	4009
1904	13011	3936
1905	11798	3738
1906	12651	3636
1907	12053	3633

Source: Nettleton, J. *The Manufacture of Spirits* (London, 1893), p. 406. Coyne, W. *Ireland, Industrial and Agricultural* (Dublin, 1907), p. 499. *Account of Spirits Distilled in UK*, BPP 1870, xx (c. 82) p. 3. *Whiskey Commission UK*, BPP 1908-9, lviii (421) cd. 4181. Mitchell, B. *British Historical Statistics* (Cambridge, 1988), pp. 408-9.

COTTON

Cotton Wool and Yarn Imports into Ireland 1790-1822 (Cwt)

	Wool	Yarn
1790	14649	1835
1791	10233	2664
1792	20513	2902
1793	7533	1551
1794	14206	2803
1795	13167	5244
1796	14151	6083
1797	6687	1703
1798	12130	4536
1799	14853	8718
1800	12632	4099
1801	10716	3354
1802	18378	9874
1803	13891	7231
1804	18183	10259
1805	16734	16606
1806	18429	9467
1807	32851	5092
1808	22620	13276
1809	49788	9954
1810	53133	2807
1811	47122	7950
1812	26109	14359
1813	30162	15443
1814	20551	8490
1815	24371	5588
1816	19974	4852
1817	22076	7267
1818	30609	11568
1819	27312	15517
1820	33527	10690
1821	35422	20754
1822	34162	16065

Source; *Account of Imports and Exports, Ireland*, BPP 1823, xv (472) pp. 4-7.
(318) pp. 4-7.

LINEN

IRISH LINEN EXPORTS 1780-1845 (YARDS)

1780	18,746,902	1816	43,383,732
1781	14,947,265	1817	45,617,854
1782	24,970,303	1818	55,770,639
1783	16,039,705	1819	50,805,586
1784	24,961,898	1820	37,464,279
1785	26,677,647	1821	43,507,928
1786	28,168,666		
1787	30,728,728	1824	49,516,000
1788	35,487,691	1825	55,523,000
1789	29,344,633	1826	42,371,000
1790	37,322,125	1827	46,181,000
1791	39,718,706	1828	40,322,000
1792	45,581,667	1829	38,934,000
1793	43,312,057	1830	40,174,000
1794	43,257,764	1831	37,417,000
1795	42,780,840	1832	38,605,000
1796	46,705,319	1833	44,709,000
1797	36,559,746	1834	48,234,000
1798	33,497,171	1835	49,317,000
1799	38,466,289	1836	69,531,000
1800	35,676,908	1837	44,329,000
1801	25,041,516	1838	58,035,000
1802	37,767,077	1839	55,327,000
1803	35,491,131	1840	63,449,000
1804	37,432,365	1841	56,289,000
1805	42,988,621	1842	51,059,000
1806	43,534,971	1843	54,656,000
1807	30,049,727	1844	57,669,000
1808	40,901,442	1845	59,549,000
1809	43,904,382		
1810	37,061,859		
1811	36,846,971		
1812	31,392,845		
1813	35,787,671		
1814	38,994,381		
1815	42,964,064		

Source; Gill, C. *The Rise of the Irish Linen Industry* (Oxford, 1925).
 Solar. P. 'The Irish Linen Trade, 1820-1852,' *Textile History*, xxi (1990).

**THE DISTRIBUTION OF ADULT MALE TEXTILE WEAVERS IN
IRELAND IN 1831 AND 1841**

	1831	1841
CLARE	2.4%	1.0%
CORK	6.9%	3.4%
KERRY	2.3%	1.3%
LIMERICK	2.7%	1.4%
TIPPERARY	2.4%	1.0%
WATFORD	0.7%	0.6%
MUNSTER	17.4%	8.8%
GALWAY	4.1%	2.0%
LEITRIM	0.9%	0.9%
MAYO	3.4%	3.1%
ROSCOMON	2.5%	1.2%
SLIGO	2.2%	1.0%
CONNAUGHT	13%	8.3%
ANTRIM	3.8%	14.9%
ARMAGH	11.7%	12.5%
DOWN	14.0%	16.8%
TYRONE	6.7%	9.8%
DERRY	5.0%	7.4%
FERMANA'	2.2%	1.6%
CAVAN	2.8%	2.8%
DONEGAL	4.8%	3.1%
MONAN	0.7%	3.0%
TYRONE	6.7%	9.8%
ULSTER	51.9%	71.8%
CARLOW	0.4%	0.2%
DUBLIN	2.6%	1.4%
KILDARE	0.8%	0.3%
KILKENNY	1.3%	0.7%
KINGS	1.4%	0.7%
LONGFORD	1.1%	0.9%
LOUTH	1.9%	2.7%
MEATH	2.3%	1.3%
QUEENS	2.6%	1.2%
WMEATH	1.5%	0.9%
WEXFORD	1.1%	0.7%
WICKLOW	0.7%	0.2%
LEINSTER	17.6%	11.1%
IRELAND	100%	100%

Note; cities and towns included in county totals, (Belfast in Antrim)
SOURCE; Census 1831, 1841.

Belfast Linen Exports 1859-1907

Linen exports (packages)		Linen exports (tons)	
1859	65406	1884	25734
1860	65613	1885	25273
1861	57678	1886	26834
1862	65086	1887	28942
1863	78475	1888	30259
1864	81622	1889	31248
1865	98944	1890	34506
1866	102517	1891	33699
1867	95268	1892	35766
1868	99658	1893	34189
1869	102723	1894	34515
1870	112253	1895	43765
1871	122425	1896	44634
1872	120409	1897	43006
1873	120409	1898	40079
1874	120461	1899	42266
1875	128239	1900	38148
1876	109255	1901	40609
1877	119028	1902	50886
1878	117543	1903	50386
1879	117390	1904	47914
1880	119767	1905	50186
1881	124810	1906	54784
		1907	51656

Source; National Library, Ir. 387 b. 2. Belfast Harbour Commissioners, Imports and Exports.

ENGINEERING

Belfast Machine Exports 1859-1907 (tons)

1859	622
1860	764
1861	891
1862	1213
1863	1483
1864	1774
1865	2132
1866	2710
1867	1770
1868	1077
1869	818
1870	1756
1871	1657
1872	2005
1873	2472
1874	2126
1875	2404
1876	2002
1877	1633
1878	1595
1879	
1880	
1881	
1882	
1883	
1884	3552
1885	3384
1886	3562
1887	3672
1888	3445
1889	3610
1890	4906
1891	4654
1892	3929
1893	3828
1894	4088
1895	4277
1896	5212
1897	5662
1898	6435
1899	6735
1900	6963
1901	6078
1902	6809
1903	7267
1904	7316
1905	9897
1906	10235
1907	10224

Source; National Library, Ir 387 b. 2. Belfast Harbour Commissioners, Imports and Exports.

IMPORTS OF UNWROUGHT IRON INTO IRELAND (CWT)

1780	139,191	1802	149,083
1781	170,395	1803	245,208
1782	189,605	1804	250,783
1783	164,187	1805	191,529
1784	158,985	1806	302,798
1785	178,535	1807	234,237
1786	-	1808	348,914
1787	181,943	1809	328,012
1788	200,060	1810	282,983
1789	206,957	1811	256,117
1790	193,430	1812	288,544
1791	200,068	1813	414,351
1792	204,022	1814	464,619
1793	228,830	1815	297,762
1794	180,673	1816	256,231
1795	265,633	1817	180,183
1796	177,407	1818	249,149
1797	226,259	1819	280,350
1798	172,507	1820	292,506
1799	218,427	1821	217,323
1800	231,214	1822	266,651
1801	149,913	1823	277,755
		1825	358,040
		1835	386,600

Note-1825 and 1835 covered from tons assuming 1 ton=20 cwt

SOURCE; *Imports and Exports Ireland*, BPP 1823, xvi (472) pp. 4-7. (318) pp. 4-7.
Railway Commissioners, BPP 1837-8, xxxv, app. b. no. 10, p. 92.

GLASS

IRISH BOTTLE PRODUCTION AND EXPORTS (IN DOZENS)		
	PRODUCTION	EXPORTS
1801		6,020
1802		19,661
1803		42,894
1804		19,442
1805		14,447
1806		22,665
1807		15,421
1808		8,006
1809		9,676
1810		15,236
1811		16,774
1812		8,319
1813		11,534
1814	64,080	4,549
1815	43,920	6,215
1816	33,440	8,683
1817	29,969	4,386
1818	15,736	8,596
1819	33,419	4,317
1820	35,069	5,373
1821	35,930	4,490
1822	30,791	6,644
1823	33,580	5,118
1824	46,139	
1825	29,258	
1826	22,806	
1827	19,480	
1828	62,516	

Source; Murray, A. *Commercial Relations between England and Ireland* (London, 1903)
pp. 443-4. *Duty Charged on Glass in Ireland*, BPP 1839, vol. xlvi (370) p. 8.

QUANTITIES OF GLASS ON WHICH DUTY WAS PAID IN IRELAND.

	FLINT GLASS (LBS)	BOTTLES (CWT)
1826*	471,546	
1827	765,847	
1828	752,613	
1829	944,494	8,724
1830	842,173	8,499
1831	600,091	15,002
1832	627,447	6,660
1833	738,487	11,250
1834	622,609	5,964
1835	596,788	11,585
1836	535,460	9,578
1837	887,189	11,870
1838	808,398	10,405
1839	832,190	6,980
1840		
1841	702,016	10,712
1842	623,840	9,375
1843	599,760	7,417
1844	455,840	-
1845	699,888	2,471

*only a half year.

Source; *Duty charged on glass in Ireland*, BPP 1839, xlv (370) p. 8. BPP 1846, xlv (214) pp. 4-5.
 O'Brien, G. *Ireland from the Union to the Famine* (London, 1921), p. 364.

SHIPBUILDING

Tonnage Launched in Ireland 1850-1880.

1850	1092
1851	1840
1852	386
1853	2748
1854	4558
1855	5444
1856	4315
1857	7452
1858	2793
1859	3935
1860	7592
1861	7549
1862	8195
1863	9976
1864	17140
1865	9190
1866	9408
1867	13183
1868	7575
1869	7155
1870	9160
1871	16073
1872	14642
1873	1878
1874	16238
1875	7780
1876	9608
1877	6677
1878	14755
1879	14549
1880	13842

Source; Oldham, C. 'The History of Belfast Shipbuilding,' *Statistical Society of Ireland*, xii (1911), p. 430.

Tonnage Built in Ireland 1881-1907 .

	Harland	Workman	Others	Irish Total
1881	16975	1800	5270	24045
1882	19640	6000	2482	28122
1883	31151	8900	2497	42548
1884	19407	9800	1479	30686
1885	26663	7000	648	34311
1886	20912	8000	0	
1887	31234	3300	9157	43691
1888	21069	10800	8457	40326
1889	56792	18100	12776	87668
1890	48633	15631	13112	77376
1891	64962	24922	13582	103466
1892	68614	19215	11998	99827
1893	65660	16635	4961	87256
1894	65448	32453	0	97901
1895	58093	43723	251	102067
1896	81316	38440	0	119756
1897	84240	24743	294	109277
1898	67905	53475	0	121380
1899	82634	45018	4071	131723
1900	72897	56201	2333	131431
1901	92316	58459	1627	152402
1902	79497	75932	4334	159763
1903	110463	44378	3701	158542
1904	31842	44272	1886	78000
1905	85287	58190	1023	144500
1906	83238	65478	1024	149740
1907	75015	63245	1182	139442

Source; Oldham, C. 'The History of Belfast Shipbuilding', *Statistical Society of Ireland*, xii (1911), p. 431. Moss, M. Hume, J. *Shipbuilders to the World, 125 years of Harland and Wolff* (Belfast, 1986), pp. 510-3. Workman and Clarke, *Shipbuilding in Belfast, 1800-1933* (Belfast, 1928).

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