EXPLORING ECONOMIC GROWTH

ESSAYS IN MEASUREMENT AND ANALYSIS

A Festschrift for Riitta Hjerppe on her 60th Birthday

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THE TRANSFORMATION OF THE ICELANDIC ECONOMY: INDUSTRIALISATION AND ECONOMIC GROWTH, 1870–1950

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Interpretations of the Icelandic industrialisation

The transformation of Iceland from one of the poorest and technologically most backward societies in Europe to a modern, prosperous industrial society with one of the highest per capita income in the world has been a popular, although not intensively researched, theme in Icelandic economic history. It is tempting from today's perspective to see this transformation as a success story, such is the enormous difference in living standards between the 'traditional' and the 'industrialised' forms of Icelandic society. But when we take a closer look at the historical development of the economy the picture becomes more complicated as pervasive problems and sluggish growth seem to have dogged the economy during a larger part of the period of transition.

Iceland was far from being blessed with earthly riches at the start of her economic modernisation. Some of the more basic parameters set her apart: the extreme smallness and sparsity of the population (70,000 in 1870 increasing to 140,000 in 1950); marginality both in terms of real physical distance and relative neglect by the central power in Copenhagen; the physical geography, dictated by her northerly latitude and vast areas of uninhabitable land. In 1930, it was estimated that at least three-quarters of the land surface was covered by glaciers, lava fields and other wasteland; the remaining quarter were divided between cultivated land (1 per cent), meadows (4 per cent), woodland (3 per cent) and pastures of varying quality (92 per cent).[1] Transport was primitive, roads hardly existed, and harsh weather and huge glacial rivers hampered traffic. The climate prevented any significant cultivation of cereal crops, but the vast pastures made many parts of the country well suited for animal husbandry, especially for raising sheep. The country had, how-

ever, one extremely rich resource: fishing grounds off the coast, with cod as the most valuable species, while haddock, saithe and herring were also caught in large quantities. Apart from fish, Iceland was poorly endowed with natural resources, having virtually no forests and no coal, iron or other mineral deposits. It is true that an abundance of waterfalls had enormous potential for hydro-electrical power but their utilisation did not start until the 1920s, and it was only after 1960 that power-intensive industries began to emerge.

Iceland came closest to the other Nordic countries in economic and social structure. These countries also had a common political and cultural heritage to a certain degree, Iceland being a part of the Danish realm for centuries and only gaining the status of a sovereign state in 1918. But there were important differences as well, if only because Iceland had its own historical experience, culture, laws, and political and social institutions that shaped the course of the economy. Among the most striking social and economic features at the 'starting position' in the late 19th century were the extreme poverty of the bulk of the population, a low level of development in terms of technology and infrastructure, and a very rudimentary division of labour, where the overwhelming majority of the population lived from farming and fishing in rural communities.

How have historians dealt with the economic transformation of Iceland, which we can call for lack of a better term Icelandic industrialisation? The older historical literature was by and large cast in the framework of narrative analysis, using various qualitative source material to describe the major 'events' and the achievements of innovative businessmen (typically trawler-owners rather than tradesmen or industrialists) that shaped the course of the 'Icelandic industrial revolution'.[2] Accounts of sweeping changes in the social and economic conditions of ordinary people were prominent in the early works, elaborating on such themes as migration from country to town, the advent of new industries and technologies, a revolution in transport and communication, improved housing and nutrition, greater chances for the poor to establish a family and lead a life of their own. But many of the accounts also stressed the downside of the new economic order, the squalor and overcrowding in emerging towns, class divisions and industrial unrest, and the hardship of work on the trawlers, in the dockyards and the factories.

There are several notions shared by these diverse accounts. First, the notion of the transformation as a sudden and profound change in the social, economic and political life of the Icelanders was widely accepted. This watershed in historical development was compressed within a relatively short span of time, roughly speaking the first half of the 20th century. What had taken centuries to evolve in the more advanced countries of Europe was confined within the life span of the generation born in Iceland during the last decades of the 19th century. The sense of dramatic change was enhanced by

vast improvements in living standards, at least towards the end of that period, as the reminiscences of the older generations in the post-1945 period could testify, describing the widespread poverty and hardship of their youth. Extremely high infant mortality and pervasive pauperism were frequently cited cases in point.[3]

Second was the notion of technological innovation being seen as a prime mover of economic and social change, counted in the heroic tales like pearls on a string, from the 'Scottish' scythe and the 'Norse' hook, horse-driven agricultural machines, the separator (a dairy centrifuge), the sewing machine – to the steam engine. Of central importance was the mechanisation of the fisheries after 1900, when motorboats and trawlers replaced rowing boats and decked vessels within less than three decades. These important technological advances and their impact on the economy and society have been viewed as the Icelandic equivalent of the industrial revolution in Europe, the 'take-off' that greatly increased production and productivity of the fishing sector, as well as accentuating structural change and urbanisation.[4]

Third, the industrial transformation was believed to be a great leap in human progress that enabled the population to increase its control over the natural environment and greatly improve living standards – at least in the long run. In the age of nationalism, material progress was seen as the economic equivalent to the political awakening of the nation and its advance towards self-determination and ultimately independence. These two forces reinforced each other, or as one historian noted, there was 'a close relationship between economic progress and enterprise in Iceland and increased political self-determination, leading ultimately to full independence'.[5] For most politicians during the struggle for independence, political self-determination was seen as a pre-condition for economic progress.

Research interests, as well as perceptions, of the industrial transformation of Iceland have radically changed in recent decades. As the nationalist interpretation of modern history faded historians attached less importance to Iceland's political status as a dependency (*biland*) of Denmark and its economic policy and turned their attention more to internal sources of growth and stagnation: social institutions (especially bondage of labour and tenure arrangements), powerful domestic interests and receptiveness for technological innovation, and the impact of foreign trade. Some historians couched their accounts within the framework of modernisation theory, focusing on population growth, urbanisation, the rise of the market economy, economic growth – as well as the transformation of different industries.[6] Whereas technology, entrepreneurial skills and social mobilisation of the awakening nation were seen as important movers in the more traditional accounts, later studies have stressed the impact of foreign trade, usually within the theoretical framework of the *staple thesis* and related theories of export-led growth.

Foreign demand is a primary mover according to Sigfús Jónsson, who sees the rapid growth of fish exports as a catalyst of economic change.[7] The lack of a domestic market and the abundance of resources relative to labour and capital gave Iceland a comparative cost advantage in the production of staples to be exported to foreign markets. Increased fish exports encouraged growth and, through linkage and multiplier effects, had great impact on the domestic economy, stimulating associated processing industries, production of consumer goods, infrastructure and the production of inputs.

Although the staple thesis has been the dominant interpretative element in the treatment of the Icelandic industrialisation for the last twenty years, historians have also explored the changing constraints of long-run factors and looked for signs of economic change within the agricultural economy, some by identifying and analysing obstacles to modernisation, lack of capital and primitive transportation,[8] institutional impediments,[9] foreign trade as a Danish enclave,[10] while others have focused more on demographic changes starting long before the technological breakthrough around 1900, such as increased life expectancy and growing population pressures in rural areas with the ensuing migration to America and coastal areas.[11]

Macro-economic studies in economic history using the national accounts approach first appeared in the 1960s but were discontinued until the 1990s.[12] Focusing on the variance and dynamics of economic growth from a historical perspective, this approach offered a new analytical framework for understanding the processes and dynamics of economic growth and development from a long-term perspective. This paper presents new estimates of GDP for Iceland for the period 1870–1945 that are more detailed and rigorously constructed, and covering a longer period, than the previous estimates. The development of GDP and other macro variables are used, first, to analyse the industrialisation process, structural change and the timing, pace and pattern of economic growth. Second, the new evidence enables us to reassess some of the received notions about the nature of Iceland's economic transformation, such as relative income levels, the timing of modern economic growth and its sources, and the contribution of different industries to growth. Third, the national accounts approach enables us to compare the economic performance of Iceland with that of other countries and place its growth story in a European context.

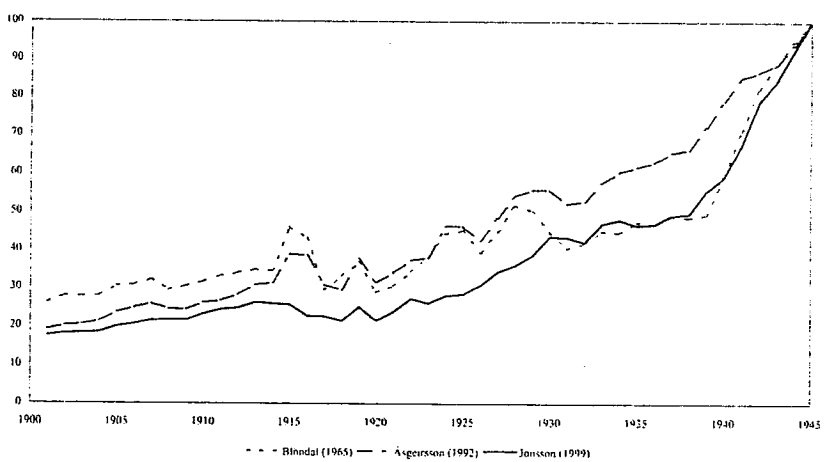
Preliminary results of the study, including details of the methods, estimation techniques and sources used, were published in English in 1999, so here a brief outline of the structure, methods and sources of the research itself will suffice.[13] Instead, I will concentrate on the main statistical findings and what they say about the industrialisation of Iceland, in particular the pattern and sources of 'modern' economic growth and pathways to industrial society.

Estimating Gross Domestic Product

Official national accounting started in Iceland in the 1950s with estimates of nominal and real GDP computed according to the income approach for all years since 1945. These estimates were frequently revised and extended, especially after the adoption of the expenditure approach in 1957. GDP from the output side is, however, only available from 1973 onwards. The first attempt to extend the national accounts backwards was made by an economist, Gísli Blöndal, who used the Statistical Bureau's series of 'national income', starting in 1934, to estimate annual gross output for the period 1901–1945. He divided the economy into three sectors, agriculture, fishing (including fish processing) and 'other industries', where output of the last sector was obtained as a residual.[14]

Blöndal's study did not receive much attention in the economic or historical literature of the following decades. In 1992, the National Economic Institute published a research by Torfi Ásgeirsson which contains more comprehensive and detailed estimates of GDP for the same period.[15] Value added was obtained from the output side and presented in the form of annual time series. Output for agriculture and the fisheries was estimated for each year, whereas output in non-primary sectors was obtained as a residual in 1945 using the gross output from the official national accounts starting in

Figure 1. *Real GDP per capita. Comparison with previous estimates 1945=100*



Sources: Blöndal (1965); *Thjóðhagsreikningar* 1901-1945 (1992); Jónsson (1999b).

that year. Output in non-primary sectors was cast back to 1901 by relating it to non-primary employment data and assuming an increase in productivity of 2 per cent a year over the whole period. Although a great improvement on Blöndal's estimates, Ásgeirssons work has serious shortcomings, particularly the use of the residual method for estimating output of industries outside agriculture and fishing, the selection of gross output as a level of aggregation and the use of a general price deflator for deflating current values.

The GDP estimates presented here differ in many respects from these previous ones.[16] The accounts are cast back to 1870 in order cover the period immediately before Iceland entered a phase of economic modernisation. The production approach is applied where GDP (value added) and its components are obtained by consolidation of production accounts, which have been constructed for eight branches of industry; these are subdivided into 19 two-digit branches and further into 20 three-digit branches according to ISIC 1964 and 1968. Such an approach requires a wide range of detailed primary sources, many of which have not been employed before for this purpose, such as income tax returns, wage data, and business records. The deflation technique has been improved to give more accurate indications of price movements, using double deflation for agriculture and the fisheries, while more general price indices are used for other branches of industry.

The revised series differs substantially from previous estimates of GDP, as Figure 1 shows. The overall growth rate between 1901 and 1945 is, however, remarkably similar to Ásgeirsson's estimates (3.8 per cent as compared to 4.0 per cent) considering the difference in methods of estimation and deflation techniques. However, the pace and pattern of growth differs substantially from Ásgeirsson's estimates, with greatest discrepancy appearing during the two world wars. The new estimate yields average annual growth rates of -2.7 per cent compared to Ásgeirsson's 0.3 per cent for 1913–1920, and 10.4 per cent as compared to 6 per cent for 1938–1945. The depression of the 1930s was, moreover, much shallower according to Ásgeirsson. The older estimates of Blöndal are considerably higher than the new estimates for the first two decades of the century, while they converge after 1930, staying at a similar level until 1945.

The pace and pattern of growth

First, I shall look at the overall statistical picture of Icelandic economic growth between 1870 to 1945 according to the new estimates. Figure 2 conveys the main features of the development of GDP and GDP per capita, characterised up until 1913 by a slow, albeit uneven, growth, which becomes much more volatile after 1913, showing violent upturns and downturns in some years.

Table 1 shows the growth record over the whole period with an annual average growth rate of 3.1 per cent and per capita GDP of 2.2 per cent. The rate of growth was much slower before than after 1913: 1.7 per cent for 1870–1913 compared to 3.1 per cent for 1913–1945.

The pace of growth was very uneven over this long period, which saw an interchange of shorter periods of expansion, stagnation and contraction. In order to identify the different growth phases, as well as economic fluctuations in the economy, Table 1 demonstrates both peak-to-peak and peak-to-trough measurements of growth rates for GDP, population and per capita GDP. In the upper part of the table, showing peak-to peak measurements of growth, the Second World War period clearly stands out with extremely high growth rates. Curiously, the period with the second highest growth rate is the first one, 1870–1881, but it must be born in mind that 1870 is not a peak year but the starting year of the series, and by all indications a time of low levels of activity of the economy.

The high growth during the 1870s was not least due to good fish catches between 1877 and 1880, reminding us of the importance of the highly fluctuating fishing industry for the economy. The slowest growth was, not surprisingly, during the 1930s, at 0.4 per cent per annum, while the three sub-periods between 1881 to 1930, i.e. 1881–1894, 1894–1913 and 1913–1930, show an accelerating growth of 1.1 per cent, 1.6 per cent to 1.8 per cent, respectively.

There is a widely accepted view that instability has been one of the characteristics of the Icelandic economy during the 20th century, which is primarily explained by the narrow resource base of the country, leading to fluctuations both in supply and foreign markets. Low price elasticity of supply in the fisheries has contributed to enormous price fluctuations in foreign markets. Sigfús Jónsson calculated the degree of flutcuations in 'real export income' 1901–1940 and showed that it varied annually by an average of 22.5 per cent from the trend line.[17] A comparison with the other Nordic countries shows that the coefficient of variation of growth rates of real GDP 1870–1913 was highest in Iceland, 0.033, closely followed by Finland. For the period 1913–1945 those two countries had the same score, 0.071, well above the other countries.

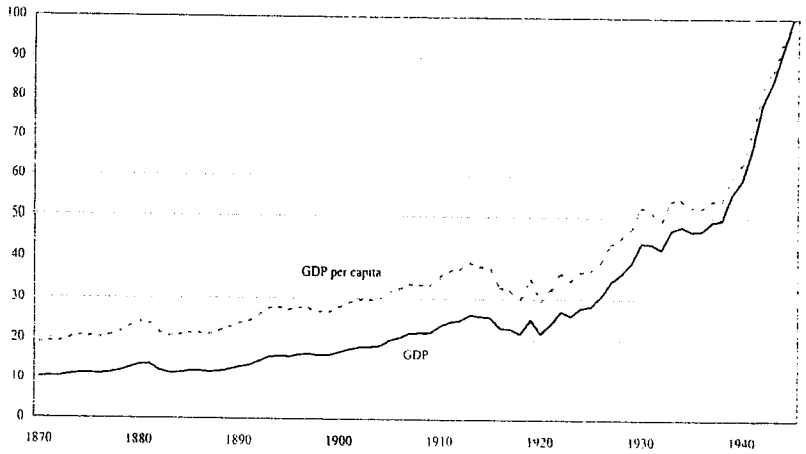
From analysis of major economic fluctuations in the economy, nine phases have been identified by using peak to trough measurements, while also taking into account familiar landmarks in the historical development of the Icelandic and the international economy. These phases are shown in the lower part of Table 1, which in addition to the phases in the upper part of the table also includes periods of contraction.

The 1870s are characterised by brisk growth with GDP per capita rising on average by 2.2 per cent per annum. The findings are at first sight rather

surprising because no fundamental change was taking place within the tradition-bound agricultural economy at that time. A number of factors can explain this growth. First, as already mentioned, the starting date of 1870 was presumably a year of low economic activity and 1881 is a peak year, resulting in the measurement of quite substantial growth for this period. Second, significant structural change was already under way with a decline in agricultural employment. Third, the two principal industries, agriculture and the fisheries, both heavily dependent on the natural environment, were enjoying favourable circumstances. In agriculture, a sheep epidemic (scabies) that had raged over a large part of the country since 1856, killing nearly 40 per cent of the sheep flock, came to an end in the 1870s. The sale of live sheep to England also started at that time, constituting the first significant cash income for peasant farmers. The 1870s also saw the expansion and diversification of the fisheries with the start of herring fishing and whaling at the initiative of Norwegian entrepreneurs. Generally speaking, the evidence of high economic growth during the 1870s supports the view that substantial growth was possible within 'traditional' society, although it tended to be short-lived and connected to fluctuations in the 'natural economy'.

By contrast, the 1880s were a bleak time and marked by a prolonged economic downturn between 1882 and 1887, with on average a negative per capita growth rate of 2.2 per cent per annum. Economic hardship ensued, pauperisation greatly increased and emigration soared from rural areas to America. Two causes seem to be responsible for the poor performance of the

Fig. 2. *GDP and GDP per capita, 1870-1945*
Volume index (1945=100)



economy during those years: on the one hand, colder climate and frequent encroachment of sea ice; and, on the other hand, adverse developments in the export sector, including deteriorating terms of trade.

A more favourable development set in towards the end of the 1880s. On the whole, the 26 years between 1887 and the Great War were characterised by economic expansion with GDP per capita rising by 2.4 per cent per annum. The trend was interrupted only by two short and shallow downturns, the more significant one occurring between 1894 and 1899, when the growth rate was negative by 0.8 per cent. Several sectors such as the fisheries and trade experienced strong growth between 1887 and 1914, but the overall rate of growth, significant though it was, did not reach Rostowian 'take-off' dimensions.

Table 1. *Real GDP: phases of growth, 1870–1945*
Annual average rate of growth (%)

Period	Period length (years)	GDP	Population	GDP per capita
Long phases				
1870–1945	75	3.1	0.8	2.2
1870–1913	43	2.2	0.5	1.7
1913–1945	32	4.3	1.3	3.0
Peak-to-peak measurement				
1870–1881	11	2.6	0.4	2.2
1881–1894	13	1.1	0.0	1.1
1894–1913	19	2.8	1.1	1.6
1913–1930	17	3.1	1.3	1.8
1930–1938	8	1.6	1.2	0.4
1938–1945	7	10.5	1.3	9.2
Peak-to-trough measurement				
1870–1881	11	2.6	0.4	2.2
1881–1887	6	–2.5	–0.3	–2.2
1887–1894	7	4.3	0.3	4.0
1894–1899	5	0.4	1.2	–0.8
1899–1913	14	3.5	0.8	2.7
1913–1920	7	–2.7	1.1	–3.8
1920–1930	10	7.3	1.4	5.9
1930–1938	8	1.6	1.2	0.4
1938–1945	7	10.5	1.3	9.2

Source: Appendix.

Among the factors contributing to higher growth, apart from climatic amelioration, were an acceleration of structural change as agriculture declined and urban economic activity expanded and diversified. Moreover, foreign markets were improving and the adoption of more advanced fishing technology raised productivity and incomes in the fisheries to an unprecedented level. This trend was given a further boost by the rapid mechanisation of the fisheries after the turn of the century, when motorboats and trawlers gradually replaced rowing boats and sailing smacks. The increase in the total fish catch was no less than five-fold between 1900 and 1930, firmly positioning the fisheries as the leading sector of the economy.

Contrary to some of the descriptive historical accounts, my new estimates suggest that the economy was performing poorly during the First World War. The results are most unexpected for 1914 and 1915, which show a contraction of 2.3 per cent and 2 per cent, respectively, even though Iceland's exports were in great demand and fetching high prices in foreign markets. The situation rapidly deteriorated in the latter half of the war years because of trade restrictions, enforced trade agreements with the Allies, rapidly declining terms of trade, and rampant inflation. The immediate post-war years were extremely volatile and growth rates consequently very changeable. Not until 1926 did per capita GDP reach 1913 level, so one can speak of a period of prolonged downturn between 1913 and 1926, in fact a deeper and longer lasting recession than the Depression of the early 1930s. However, there were strong but short upswings in the economy in individual years during the early 1920s (especially 1921 and 1922), and the 1920s as a whole were a period of high growth measured from the depressed year of 1920 to the boom year of 1930, yielding an annual per capita growth rate of 5.9 per cent.

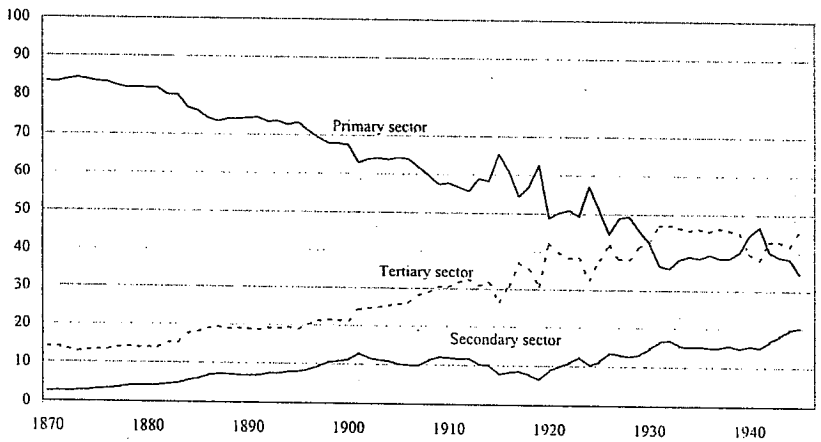
Turning to the 1930s, GDP per capita only grew by 0.4 per cent between 1930 and 1938, the most depressed periods being 1931–1932 and 1935–1936. Iceland's performance was poor compared to the other Nordic countries during the 1930s, the fishing sector was hard hit by the international depression and, not least, by the collapse of its most important salt-fish (baccalao) market with the outbreak of civil war in Spain in 1936. The growth rate is, however, not as low as one would have expected in view of the bleak picture portrayed in the historical literature of the Great Depression, and in fact it was higher than that of most countries on the European continent.

The Second World War so radically altered the fortunes of the Icelandic economy for the better that it needs a special mention. Already in 1939, the increased demand for fresh fish in England substantially improved the operation of the fisheries, turning from heavy losses to high profits and writing off their debts in just two years. With the occupation of Iceland in 1940 by the British army, replaced in 1941 by U.S. troops, the economy entered an entirely new phase. Foreign trade was boosted with favourable trade agreements with Britain and later U.S.A. The occupation forces of between 20 and 30 thousand people totally upset the small labour market and greatly increased demand for a wide range of products and services. The occupation of Iceland, combined with favourable external conditions, yielded an annual growth rate of GDP per capita of 9.2 per cent between 1938 and 1945. This uniquely high growth rate raised the level of GDP by 85 per cent in just seven years, a boom that has not before or since been matched.

Structural change

Changes in the structure of the economy give us important indications of the levels and the pace of Iceland's economic development, as well as the contribution of sectors and industries to economic growth. Figure 3 shows in terms of GDP the relative size of the three main sectors of the economy over the whole period. A note of caution is necessary here because several adjustments have been made to the industrial classification (ISIC), which tend to overestimate the primary sector (agriculture and fishing) at the cost of the

Figure 3. *Sectoral distribution of GDP, 1870-1945*



Notes: GDP at factor cost. – Primary sector includes agriculture, fisheries, fish processing, and meat processing. Secondary sector includes manufacturing, electricity, gas and water supply, and construction. Tertiary sector includes trade, hotels and restaurant, transports, financial institutions, insurance, real estate and business services, personal and household services, and government services.

tertiary sector (services), and even more so for the secondary sector (industry). The most important adjustment is the inclusion of fish processing and fish export trade in the fisheries and hence in the primary sector instead of manufacturing industry and wholesale trade, respectively. As a result, the figures for the secondary sector may be as much as 3 percentage points lower at the start of the period and 6 percentage points lower towards the end of the period.

The national accounts confirm that structural change was already under way in the 1870s, a trend that is also evident in the censuses: the 1870 census shows for the first time a relative decline in agricultural employment compared to the previous census of 1860. Commanding well over 80 per cent of GDP in the 1870s, the share of the primary sector (including the fisheries) had fallen down to two-thirds by 1900 and further to one-third of GDP in 1945, representing the most dramatic change in the structure of the economy of the whole period. The retreat occurred at an accelerating pace up until 1930, when it slowed down and the trend was, interestingly, halted during the early years of both the world wars. The most pronounced periods of contraction were the 1900s and the 1940s.

Industry experienced the most rapid growth of the three sectors, not surprisingly considering its insignificance at the beginning of the period. Its share in GDP was less than 5 per cent in the 1870s, slowly rising to 16 per cent in the 1930s, and further still to about 20 per cent during the Second World War. But more importantly, industry never took the place of the leading sector of the economy during this crucial period of rapid economic modernisation – and did not even make second place! It remained the smallest of the three sectors throughout the period, which must count as one of the peculiarities of the Icelandic economy.

Services were from the very start the second largest sector of the economy, becoming the largest one after 1930. Its share hovered around 15 per cent of GDP until the late 1880s, then gradually rising and entering a phase of rapid acceleration after 1900, so that already in the 1920s it accounted for more than 40 per cent of GDP. In the 1930s services had firmly established themselves as the biggest sector, contributing about 45 per cent to GDP, with only a temporary decline during the first years of the Second World War. Most prominent activities among the services were trade, hotels and restaurants, followed by financial services.

The sectoral development of the Icelandic economy diverges from the general pattern of structural change in Northern Europe in three ways.[18] First, the primary sector, although declining fast, remained bigger in Iceland than in most countries of northern Europe. Even compared to the other Nordic countries, where the primary sector was large by international standards, the Icelandic economy stands out in terms of the predominance of the primary

sector until the mid-20th century. Second, industry was less than half the size of that of most North-European countries. Third, the service sector advanced rapidly, reaching a level after 1920 that most of the more developed economies had already reached by 1900; by 1945 its size was similar to that of the rest of Northern Europe. In one sense, therefore, we can speak of a transition from agricultural economy to a service economy

Table 2. *Distribution of GDP by economic activity*

	1870	1913	1945
A. Percentage shares of GDP (gross factor income)			
Primary sector	83.4	59.8	35.0
Agriculture	65.3	34.9	15.8
Fisheries	18.1	24.9	19.2
Secondary sector	2.5	10.4	20.6
Manufacturing	1.5	6.3	11.4
Electricity, water supply	0.0	0.0	1.6
Construction	1.0	4.0	7.5
Tertiary sector	14.1	31.3	46.0
Trade, restaurants, hotels	5.3	10.6	15.6
Transport, communication	0.8	2.7	9.1
Finance, insurance, etc.	6.3	10.2	9.8
Private services	0.7	5.1	4.6
Public services	1.1	2.7	6.9

	1870–1945	1870–1913	1913–1945
B. Annual rates of growth (%)			
Primary sector	1.8	1.1	2.7
Agriculture	0.4	0.5	0.2
Fisheries	3.5	2.6	4.8
Secondary sector	5.9	6.0	5.9
Manufacturing	5.9	6.1	5.7
Electricity, water supply	-	-	16.9
Construction	5.7	5.8	5.6
Tertiary sector	4.7	4.4	5.1
Trade, restaurants, hotels	4.6	4.2	5.1
Transport, communication	6.5	5.6	7.8
Finance, insurance, etc.	3.7	3.7	3.7
Private services	5.6	7.2	3.5
Public services	5.6	4.7	7.0

The continued prominence of the primary sector was not least due to the expansion of the fisheries, included in the primary sector.

Table 2 demonstrates the rapid decline of agriculture from 65 per cent of factor income in 1870 to 16 per cent in 1945, while the share of the fisheries rose to about one-quarter after the turn of the century, becoming the most important growth sector of the economy. As the economy became increasingly diversified towards the end of the period, the fisheries' share slightly dropped, reaching a proportion similar to, although slightly higher than, that for the 1870s. The share of trade steadily increased throughout the whole period from about 5 per cent to 14–16 per cent after 1920, dropping slightly during the first years of the Second World War. Trade and other services were, after the fisheries, the fastest growing industries at the beginning of the 20th century.

Manufacturing industry grew very fast early on but later at a decelerating rate. Textiles and boat-building were the most prominent industries, but after the First World War, industrial production became more diversified with the growing home market, giving rise to a small scale consumer goods industry (margarine, beverages, shoes and clothing, leather goods). The interwar period also saw the advance of factory production with larger production units than before (textiles, shoes, dairy products, fish processing). Again in the 1930s, manufacturing expanded under strong protective barriers, growing to exceed 10 per cent of GDP. Infrastructural activities and electricity production also expanded rapidly during the interwar period.

The public sector was extremely small, increasing gradually from less than 2 per cent in the 1870s to 7 per cent of GDP in 1945. The reasons are not difficult to comprehend. The state apparatus was undeveloped as Icelanders only began taking the first steps towards self-government at the beginning of the period; it was only in 1918 that Iceland became a sovereign state, assuming the responsibilities and tasks that fitted her status. Most importantly, Iceland did not have a military force and military spending was therefore absent in public expenditure. Insignificant amounts were spent on servicing public debt until the 1930s.[19] The low share of public production in GDP did not, however, mean that the role of the state in the economy was limited. The state apparatus was certainly small but the Icelandic government – local and central – became very active during the first decades of the 20th century, operating a wide range of utilities and infrastructural tasks (water, gas, electricity, roads, bridges, harbours), and spending significant amounts of money on various other economic services. A number of state monopolies were established after 1920 and the government became very prominent in banking, gaining possession of all four major banks by 1930. Most of these varied state activities (transfers, public utilities and businesses owned by the state or municipalities but with independent finances) are not included in public production but in appropriate industrial branches in the private sector.

Turning now to the contribution of individual industries to the growth of the overall economy we can calculate an industry's growth contribution by multiplying its GDP share over a period of time by its average annual growth rate over the same period. The outcome, presented in Table 3, takes account of not only the growth rate of the industry but also its relative weight in the economy. Over the whole period 1870–1945 the fisheries were responsible for the largest part of economic growth, 27.1 per cent, followed and other private services, i.e. financial services and private services (15.3 per cent) by trade, restaurants and hotels (17.3 per cent). Agriculture had the lowest contribution of only 5.5 per cent. The 1870s is the only period in which agriculture's share was the greatest. The table conveys the strong position of the fisheries throughout the period, which contributed more to economic growth after 1880 than agriculture did, despite its much lower share in factor incomes. The 1913–1930 period is the exception, when the fisheries' contribution was very low due to its sluggish performance until after 1920.

The contribution of manufacturing varied from just over 7 per cent in the periods 1870–1881 and 1913–1930 to 19 per cent in the period 1881–1894, while its share was also considerable after 1930. Services had already become an increasingly important contributor to growth during the last two decades of the 19th century. Trade was the biggest single most important branch of

Table 3. *Relative contributions of industries to GDP growth, 1870-1945*
Annual averages, percentage shares

	1870-1945	1870-1913	1913-1945
Total GDP at factor cost	100,0	100.0	100.0
Primary sector	32.6	37.1	29.4
Agriculture	5.5	12.7	1.2
Fisheries	27.1	24.5	28.2
Secondary sector	19.4	20.9	20.4
Manufacturing	12.1	13.5	10.0
Utilities, construction	7.3	7.3	10.4
Tertiary sector	48.0	42.0	50.2
Trade, restaurants, hotels	15.3	14.0	15.7
Transport, communication	8.6	3.7	12.9
Other private services	17.5	19.5	13.7
Public services	6.5	4.8	7.9

Note: The relative contribution of an industry to GDP growth is computed as its average annual growth rate multiplied by its average share in factor incomes.

the service sector from the start and its contribution grew until the 1930s, when it returned negative growth rates. However, other private services were responsible for no less than half of the modest growth between 1930 and 1938.

The Icelandic growth record in European context

Comparing Iceland with the experience of other European countries enables us to assess its relative growth performance in the long run. I employ the familiar procedure of Angus Maddison, who converts GDP for different countries into a common currency by using Geary-Khamis purchasing power parities for conversion into 1990 U.S. dollars and volume indices to cast the figures backwards.[20]

Table 4. *GDP per capita levels and growth rates in Europe, 1870-1950*

	Western Europe [1]	Denmark	Finland	Norway	Sweden	Iceland	Iceland's rank [2]
Western Europe = 100 (Geary Khamis 1990-dollars)							
1870	100	98	56	66	85	51	13
1894	100	100	53	65	85	57	11
1913	100	108	59	65	89	59	12
1930	100	119	60	78	91	64	13
1938	100	118	74	84	101	61	13
1950	100	121	75	90	122	99	6
Annual average rate of growth, %							
1870-1950	1,3	1.6	1.7	1.7	1.8	2.1	
1870-1913	1,3	1.6	1.4	1.3	1.5	1.7	
1913-1950	1,2	1.6	1.9	2.1	2.1	2.7	
1870-1894	1,1	1.2	0.9	1.0	1.1	1.6	
1894-1913	1,6	2.1	2.2	1.7	1.9	1.8	
1913-1930	1,3	1.8	1.4	2.4	1.4	1.8	
1930-1938	1,0	1.0	3.8	2.0	2.3	0.4	
1938-1950	1,4	1.6	1.4	1.9	3.0	5.5	

Notes: 1) Arithmetic mean of 12 West European countries: Austria, Belgium, Britain, Denmark, Finland, France , Germany, Holland, Italy, Norway, Sweden and Switzerland. - 2) Iceland's rank among 13 West European countries.
Source: Maddison (1995), pp. 194-97.

The findings support the widespread notion that Iceland was one of the poorest and least developed countries of Western Europe in the late 19th century. Table 4 shows growth rates and per capita GDP levels of the Nordic countries relative to 'the West European average', which is derived from those of twelve West European countries between 1870 and 1950; the latter year chosen instead of the abnormal year of 1945. The Icelandic 1870–level was only half that of Western Europe and the gap was roughly as wide as between Iceland and Denmark.

The table clearly shows the disparities between the Nordic countries, Denmark having the highest levels, followed by Sweden, which catches up with Denmark after the Second World War. Norway is in the middle of the group, whereas Finland and Iceland are at the bottom.[21] In fact, Iceland's per capita GDP levels were closer to the periphery in southern and south-eastern Europe than to the Scandinavian countries.[22]

Over the long term the Icelandic economy yielded higher per capita growth rates than any of the West European economies, even higher than the fast-growing Nordic economies. The growth rate was 1.7 per cent as compared to the West European average of 1.3 per cent for the period 1870–1913, and 2.7 per cent compared to 1.2 per cent for the period 1913–1950. However, the good performance during the second period (after 1913) is primarily due to the extraordinary expansion of the economy during the Second World War. Comparison for the period 1913–1938 shows that on average the Icelandic economy grew only slightly faster than the West European economies, but considerably slower than the other Nordic economies.

The healthy growth from 1870 to 1894 pushed Iceland temporarily up the league, whereas the growth rates from 1894 to 1913 were closer to the West European average and below those of Denmark and Finland. Table 4 underlines the previously mentioned sluggish growth from the start of the First World War to the Great Depression: Iceland slid again to the bottom place of the Nordic league. The economy was unable to sustain growth on par with most of Western Europe and even more so with Norway, Denmark and Finland. Iceland's relatively low growth rates continued during the 1930s and, although yielding a higher rate of growth than in Western Europe, the economy grew considerably slower than in the other Nordic countries, except Denmark. In 1938 Iceland had the lowest level of GDP of all the Nordic countries.

The phenomenal expansion of the economy during the Second World War clearly stands out in the table, although not as clearly as if 1945 were chosen as the end year for the period. As the fastest growing economy in Europe during the war, Iceland had by 1945 caught up with the rest of Western Europe to attain one of the highest GDP per capita levels in Europe, surpassed only by Britain, Sweden and Switzerland. The upswing did not, however, last

long as the economy was unable to sustain wartime levels based on distorted wartime conditions. Between 1945 and 1950 economic growth was much slower than in most of Europe and it took Iceland decades to gain a similar position as in 1945. Nevertheless, the Icelandic economy did not retreat to its former levels as Icelanders managed to turn a substantial part of their new-found wealth into a more permanent source of growth.

Sources of economic growth

In this chapter I examine the factors influencing the growth performance of the economy and seek to identify the changing sources that raised the productive potential of the Icelandic economy. I will concentrate mainly on proximate sources of growth within the framework of growth accounting, which seeks to 'explain' growth of output and productivity by measuring the contribution of factor inputs, land, capital and labour, in addition to other sources of growth. But I will also comment on the possible conditions or forces that controlled these elements and their changes. Much of what I have to say is of a speculative nature since research has only just begun and data on important economic factors is imperfect.[23]

Looking at the whole period, Iceland's growth performance was very favourable in comparison to Europe, placing it right at the top in the West European growth league. The Icelandic experience fits well with the accepted view developed by Baumol and Abramowitz that there is a pronounced tendency for countries that initially had relatively low income and productivity levels to grow faster than the more developed economies.[24] The Icelandic economy, with its extremely low income and development levels during the late 19th century, had enormous potential in the form of a backlog of unexploited technology from the more advanced countries, together with great opportunities in a curiously undeveloped fishing sector. Among the crucial factors in speeding up the catch-up process – once it was set in motion – were the openness of the economy after 1855 (free trade policy, few restrictions on the movement of foreign capital and labour) but also 'social capabilities' in terms of fairly high standards of education.

As a first step in locating the sources of economic growth, labour productivity (output per person employed) and its variance between periods and industrial sectors is examined. Table 5 shows the growth of labour inputs and productivity and their relative shares in GDP growth, indicating the importance of labour as a source of growth. GDP rose by 3 per cent over the whole period, during which increased growth of labour input accounted for about one-third and productivity for two-thirds of the growth. Interestingly, their

Table 5. *GDP, labour input and labour productivity, 1870-1945*
Annual average growth, %

	GPD	Labour	Labour Producti-vity	Share of labour input, %	Share of producti-vity, %
1870-1945	3.0	1.0	2.0	32.0	67.4
1870-1913	2.0	0.7	1.4	32.8	66.8
1913-1945	4.2	1.3	2.9	31.3	67.8
1870-1894	1.7	0.1	1.6	7.8	92.1
1894-1913	2.5	1.4	1.1	54.4	45.0
1913-1930	2.9	1.6	1.2	56.5	42.8
1930-1945	5.8	1.0	4.8	17.2	82.0

Notes: Excluding ownership of dwellings.
Source: Agnarsson and Jónsson (2003), p. 218.

relative weights hardly changed between the two long periods 1870–1913 and 1913–1945, but huge variations appear during shorter periods.

The low growth of the period 1870–1894 was affected by an almost stagnant population growth – even decline during the 1880s – and the modest growth that occurred can almost entirely be accounted for by productivity increase. For the long period between 1894 and 1930, the share of labour input remained around 55–57 per cent and productivity about 43–45 per cent. Then, a big jump in productivity occurred in the period 1930–1945, which can entirely be attributed to booming wartime circumstances. For the period 1913–1938, labour input is responsible for 82 per cent of the growth, but there is a total reversal during the period 1938–1945, when the share of productivity jumps to 89 per cent.

The table suggests that productivity increased only moderately during most of the period under investigation, with the exception of the the Second World War. The growth rate is higher in the 1870–1894 period than the following decades, which is presumably due primarily to population decline in the 1880s. A modest increase in the rate of productivity between 1894 and 1930 was the result of a combination of factors: market expansion, changes in the structure of the economy, and technical change. The slowest growth of productivity occurred, in fact, during the 1930s, 0.2 per cent per annum, but is masked by the periods reported in the table, where the extraordinary war years raise the productivity rate of the period 1930–1945 to an all time high of 4.8 per cent.

In international perspective, Iceland's performance was just below the average annual labour productivity growth rate of 16 'OECD-countries' 1870–1913, achieving 1.4 per cent compared to their 1.7 per cent; while staying well above the average for the period 1913–1950 at 2.9 per cent compared to their 1.9 per cent, which, in fact, was a higher growth rate than in any of the 16 countries.[25] The other Nordic countries were close to the average for the 1870–1913 period with growth rates ranging between 1.6 and 1.9 per cent, while for the 1913–1950 period rates diverged, with Denmark at the bottom with 1.6 per cent and Sweden sharing top place in the league with Iceland with 2.8 per cent.

When levels of labour productivity are compared, Iceland was near the bottom with a score of 39 (U.S. = 100) in 1870 and 37 in 1913, whereas the other Nordic countries, except Finland, had considerably higher productivity levels. In 1950, however, Iceland's level of productivity had risen to 51, on a par with Sweden but well above the other Nordic countries.[26]

When we look at productivity growth in individual industries, a more complicated picture emerges. Table 6 shows a modest increase in agriculture of 0.8 per cent over the whole period, which is entirely confined to the pre-1913 period, while there is hardly any change in productivity during the period 1913–1945. The fastest growth rates were achieved between 1894 and 1913, when the agricultural labour force was shrinking fast and population pressure in rural areas was alleviated, reducing the number of underemployed. The farming community was adapting to the market economy and using labour more rationally than before. So-called labour bondage, which obliged nearly all landless 'dependents' to hire themselves out as servants, was abolished in 1894 and labour intensive production on the farms, such as woollen knitwear and the milking of ewes, was disappearing fast.[27] Technical innovations were, however, only slowly making an impact, despite advances in animal slaughtering and meat processing and the introduction of horse-drawn hay harvesting machines. The negative productivity growth experienced between 1913 and 1945 is more problematic, but it may be partly explained by the temporary slowdown of the population exodus from rural areas during the interwar period, especially during the depressed 1930s, when agricultural exports almost stopped and labour migration to other sectors dwindled.

Table 6. *Growth of productivity by kind of economic activity annual average growth, %*

	1870-1945	1870-1913	1913-1945
GDP at factor cost [1]	2.00	1.36	2.87
Agriculture	0.83	1.50	-0.06
Fisheries	1.81	0.26	3.92
Manufacturing	1.13	0.62	1.82
Con-struction	1.21	0.53	2.12
Trade, restaurants, hotels	1.20	1.20	1.21
Transport and communication	3.54	3.41	3.71
Financial and private services[1]	3.90	2.72	5.50
Public services	1.76	0.92	2.90

Notes: GDP per person employed. - 1) Excluding ownership of dwellings.
Source: Agnarsson and Jónsson (2003), p. 219.

The most surprising finding in the table is the modest productivity growth in the fisheries, which was below the overall growth rate up until the 1930s and even negative during the crucial period between 1894 and 1930, despite the rapid technological advances made in the sector during the first decades of the 20th century. This startling result may be partly due to imperfect employment data, but one of the reasons is no doubt the inclusion of fish processing in the fisheries sector, a large and growing activity that was dominated by labour-intensive curing of salt-fish up until the mid-thirties.[28]

Manufacturing experienced a modest productivity growth of 1.1 per cent between 1870 and 1945, and considerably faster after 1913. The growth rate is characterised by strong fluctuations between the short periods, which can be partly explained by data deficiencies, but also by substantial changes in the composition of branches and their relative weights, as well as changes in the overall composition of the labour force (self-employed/wage and salary earners, male/female workers).

The service sector had the highest productivity growth rates of all sectors, with transport and communication, and financial and private services in the lead. Rapid technological advances realised in transportation are an obvious source of growth in the former, and in both these branches economies of scale were reaped in the interwar period as firms were getting bigger and commercial banks were replacing the tiny investment banks.

A growth accounting analysis has recently been undertaken by Agnarsson and Jónsson to get a better understanding of the causal influences on economic growth between 1870 and 1945.[29] Table 7 provides a summary analysis of the growth accounts, showing growth of inputs in the top panel and growth accounts in the middle and bottom panels. A moderate increase occurred in labour inputs while there was a strong increase in growth of capital. The growth accounts indicate that 18 per cent of output growth can be attributed to increases in labour inputs, 43 per cent to capital accumulation and 39 per cent to TFP (total factor productivity).

The contribution of land was negligible. One of the most interesting findings is the prominence of TFP for period 1870–1913, accounting for 47 per cent of output growth, while its share falls to 34 per cent for 1913–1945

Table 7. *Sources of economic growth in Iceland, 1870–1945*
Annual averages

	1870–1945	1870–1913	1913–1945
Growth of inputs and outputs, (%)			
Output	3.0	2.1	4.1
Labour	1.0	0.7	1.3
Non-residential capital	3.0	1.7	4.7
Land	1.8	1.6	2.1
Percentage point contribution to growth rate			
GDP at factor cost	3.0	2.1	4.1
Labour	0.5	0.4	0.8
Non-residential capital	1.3	0.8	1.9
Land	0.0	0.0	0.0
TFP	1.1	1.0	1.4
Sectoral change	0.4	0.4	0.3
Unexplained growth	0.8	0.6	1.1
Relative contribution to growth rate, (%)			
Labour	17.6	16.4	19.0
Non-residential capital	43.2	35.6	46.4
Land	0.7	1.3	0.3
TFP	38.5	46.7	34.3
Sectoral change	12.4	18.8	7.9
Unexplained growth	26.0	27.9	26.4

Source: Agnarsson and Jónsson (2003), p. 229.

period. TFP may be seen as composed of not only technical change but also other factors and Agnarsson and Jónsson pay special attention to the effects of structural change, decomposing TFP growth into a structural change effect and a residual. Structural change effect forms a very significant part of TFP, contributing no less than 19 per cent to output growth in the period 1870–1913 and 8 per cent in the period 1913–1945. The fall in the share of TFP between these periods can almost exclusively be attributed to a reduction in the structural change effect, while the residual or unexplained growth accounts for just over one-quarter of output growth in both periods.

To sum up, the growth accounts indicate that the high growth rate of Iceland's GDP can be attributed to an accelerating growth of capital accumulation which accounted for 43 per cent of GDP growth over the whole period 1870–1945. TFP registered a healthy share of output growth, or almost 30 per cent over the whole period, when structural change effects have

been taken into account. However, a rise in TFP growth might have been expected in the course of the period as the impact of technical changes accumulated, but it is very similar between the two major periods. The reasons are not clear but one likely explanation is that the growth of the labour-intensive curing of salt-fish up until the 1930s may have cancelled out the productivity gains of the new fishing technology.

Paths of development and growth

The accepted view in Icelandic historical literature of equating the 'industrial revolution' with the mechanisation of the fisheries during the first years of the 20th century seems to be inadequate both on conceptual and empirical grounds. This view, no doubt influenced by older perceptions about the first industrial nations, is too narrowly focused on technological change and the use of new sources of power, and consequently ignores other features and sources of growth and development. As I have argued above, structural change, division of labour and adaptation to the market economy were key elements in that change.[30] The early influences of European industrialisation on the Icelandic economy were primarily in the form of increased demand for foodstuffs and raw material, with the consequent adaptation of production to foreign markets, allowing key industries to utilise economies of scale to expand and cut costs. Only slowly did changes occur on the supply side of the economy that altered the production possibilities of the economy: the advent of steamships in transportation, increased cultivation in agriculture, advances in fishing technology, the building-up of a modern infrastructure, institutional adaptation to market economy. Thus, the most prominent features of the initial phase of the Icelandic industrialisation were shifts of resources in response to increased foreign demand rather than technological change.

When this broader concept of the industrialisation is applied, the main criteria of industrialisation are not only technological innovation but also sustained economic growth and radical change in the structure of the economy, which entails a shift in production from agriculture to other sectors. Using these criteria to identify the start of the 'industrial breakthrough' or rather the initial phase of industrialisation, it is appropriate to place it around 1890. I will now look at those two crucial indicators, structural change and economic growth.

One of the most obvious outward signs of industrialisation was the rapid change in the structure of the economy and the transformation of certain key industries. The relative decline of agriculture had already begun in the 1870s but during the 1880s the pace of change accelerated. Agriculture's share in

GDP rapidly fell from two-thirds to one-third in just 40 years, between 1870 and 1910, and by 1945 it was down to 18 per cent. Technical advances and larger markets allowed other industries to increase output and productivity. Simultaneously, the prominence of the fisheries rose fast with the advance of the schooner fisheries in the 1880s, followed by the mechanisation of fishing and the emergence of large fish processing industry emerged, creating linkages with producer goods industries, for example the production of fishing gear and shipbuilding and repair. Interestingly, services were the second largest sector of the economy from the start taking the lead after 1930, whereas manufacturing, although yielding substantial growth rates, did not become as prominent as elsewhere in Northern Europe.

Turning now to economic growth, the findings show that after a serious recession in the 1880s the economy entered a phase of accelerating growth from 1888 to the Great War, interrupted only by two short and shallow downturns. In line with much of the international research, a breakthrough in the Rostowian sense can not be verified in the GDP data. Instead we notice a much more gradual GDP per capita growth of 1.6 per cent a year between 1894 and 1913 (2.4 per cent if measured from the 1887 trough to the 1913 peak). The explanation for this more gradual growth of the economy is, as shown elsewhere, that in the early stages of industrialisation only parts of the economy were undergoing rapid transformation, but these were too limited to significantly effect overall output figures.

So, the timing of the 'industrial breakthrough' in Iceland was, broadly defined, similar to that of Sweden and Denmark.[31] The big difference was the very low development level from which Iceland started its modernisation and its pathway was even more narrowly confined to the utilisation of natural resources. The findings of this present study support the view that Iceland was one of the poorest economies of Europe during the second half of the 19th century. The disparities between West European economies were huge and Iceland was at the bottom in terms of GDP per capita with only 50 per cent of the average GDP per capita of 13 prominent West European countries in 1870. Income levels in Denmark, the 'mother country,' were almost twice as high.

Sharing the experience of the 'Scandinavian periphery', the Icelandic economy grew much faster than the advanced economies in Western Europe from 1870 to 1913, and even more so from 1913 to 1950. Looking at the whole period 1870–1950, Icelanders were catching up on the advanced economies in terms of income and living standards, even attaining higher growth rates than those on the fast track among the Nordic countries, i.e. Sweden and Finland. However, Iceland's growth record is not an unmitigated success story for there were huge fluctuations in the economic performance of Iceland with long periods of relative stagnation and even decline. Despite higher

growth than in most West European economies in 1870 to 1913, Iceland's relative position had only slightly improved by 1913. The period 1913–1938 is particularly notable for sluggish growth, maintaining the status quo for the country's relative position, still at the bottom of the West European league in 1938. This poor performance is attributable to two important factors: on the one hand, persistent negative labour productivity in the fisheries, and, on the other hand, the rise of protectionism, which had already begun during the 1920s. The dismal productivity performance prompts the question as to whether the economy was trapped in low-productivity export dependence. The fluctuating rate of productivity indicates, on the other hand, the strong influence of the resource base and external circumstances.

Then came the Second World War, the big catalyst for change in the 20th century economy, which had by 1945 turned Iceland into one of the richest countries of Europe. And although wartime income levels were not sustainable for long, the economy had moved to a higher level of development. Iceland's catching-up on Scandinavia and Western Europe did not occur, therefore, until the very end of the period under investigation.

Moving from events to economic factors in explaining economic growth, I have demonstrated in the previous section that the most influential proximate source of economic growth was capital accumulation, gaining ever greater significance towards the end of the period. Technical change ('unexplained growth' in Table 7) was the second most important source, but its contribution does not seem to have increased with time (except during the Second World War). Structural change as expressed in the rapid shift from the huge agricultural sector to fishing, manufacturing, trade and transport made a very significant contribution to economic growth between 1870 and 1913, but much less so after 1913.

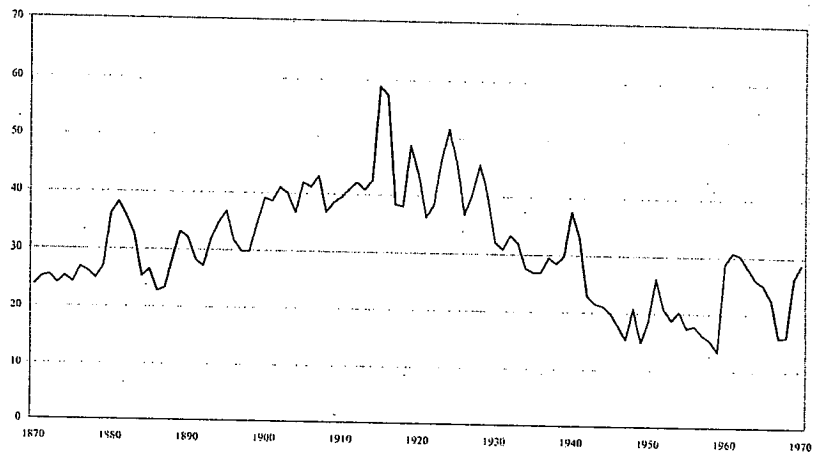
The influence of long-run factors on the performance of the economy have also been mentioned. The advance of the market economy with the growth of foreign trade early on and, later, the expanding domestic market, encouraged work specialisation and opened opportunities for new types of production. The farming community was adapting to the market economy and using labour more rationally than before. The adaptation of age-old institutions to the market economy had a great impact on the allocation of factors of production. Labour bondage, which obliged nearly all landless 'dependents' to hire themselves out as servants, was abolished in 1894 and other occupational restrictions were soon to follow. Competition from other parts of the economy forced the farming community to use labour more rationally and even give up labour intensive production on the farms, for example making woollen knitwear and the milking of ewes.[32]

Turning now to broader historical patterns of growth and development, Iceland's growth strategy lay in the utilisation of its rich fishing stock, which constituted its single most important comparative advantage. The catch-up potential was enormous since Iceland's development level was extremely low at the start, as clearly reflected in the undeveloped infrastructure and the rudimentary fishing techniques, such as hand-line fishing from rowing boats, which imposed severe limitations on the utilisation of the fishing grounds. The development of an export-based economy was intensified with the increased openness of the economy and the growth of international trade. Iceland's development path was characterised by one-sided export specialisation and a fairly passive adjustment to international markets. Growing demand for primary products, spurred by falling transportation costs, encouraged the production and export of fish, wool, hides and mutton, and even, for a short while, the exportation of shark liver oil (ca. 1840–1860) and live sheep (1870–1897), both of which had a significant impact in some regions as a result of the increased cash incomes of producers. The country developed an extensive and, after 1900, a fairly modernised fishing industry geared towards exports. The export ratio (exports as a percentage of GDP) gives a good indication of the growing importance of foreign trade, rising steadily in the last decades of the nineteenth century to peak at more than 40 per cent during the 1910s and 1920s (Figure 4). Exports were dominated by fish products, which accounted for more than 75 per cent of total merchandise exports before the First World War, rising to about 90 per cent in the following decades. Salted fish alone accounted for 55–60 per cent of exports at the height of the production between 1920 and 1936. Other important exports were fresh fish, herring, fish meal and oil, mutton and unprocessed wool, all of which were raw materials and unprocessed or semi-processed primary products.

As a primary producer with an abundant natural resource at the start, Iceland does not easily fit in the Rostowian or Gershcenkronian analytical framework of 'take-off' or 'great spurt', quite apart from the modest growth rate during the initial stage of industrialisation. First, economic growth was initially spurred by foreign trade and re-allocation of production factors through structural change. Second, the leading sector of the economy was not manufacturing but the fisheries, with its intensive use of a natural resource, thus putting it in a similar position to manufacturing industries in many European countries. The industrial sector in Iceland was, in fact, the smallest of its three sectors with only one-quarter of GDP at its peak.

Then the question immediately arises: can we describe the economic transformation of Iceland up to 1950 as a process of industrialisation, given the central importance attached to manufacturing in the historical literature on industrialisation – some writers regarding it almost as a definitional aspect?[33]

Figure 4. *Icelandic exports as a percentage of GDP, 1870-1970*



Source: *Hagskinna* (1997, pp. 560–561).

The answer is affirmative, because the transformation involved systemic change in the economy in which 'output is increased, efficiency raised and new products are being produced, by methods involving new technologies and the enlarged use of capital.'[34] The development of the fishing sector was no simple resource extraction, but entailed the employment of new technology in fishing and fish processing, reorganisation and specialisation of work, and the development of new markets, all of which were prerequisites for intensive utilisation of the fishing grounds. The structure of the economy radically changed with redeployment of the population, leading to a transition from a 'traditional' agricultural economy to a modern 'industrialised' one, although it differed from industry-oriented countries due to the prominence of the fisheries and the smaller role of its manufacturing industry.

The terms '*industrial* revolution' and '*industrial* capitalism' have therefore to be qualified when used in the Icelandic context, because of the prominence of the fisheries in the transformation period. There was nothing unique about this development. Indeed, Iceland shared these characteristics with other primary producers around the world. During the initial stage of industrialisation the comparative advantage of countries with abundant natural resources tended to shift away from industry because the resource cost of earning foreign exchange through exports of primary goods was lower.[35] The rise of modern industrial society was to a large extent characterised by the expansion and transformation of the traditional sectors of the economy rather then the advent of manufacturing and associated industries.

Thus, the economic development of Iceland from the latter half of the 19th century until the middle of the 20th century fits well with the descriptions in the popular literature of how small economies rich in natural resources strive for export specialisation and embrace an outward-oriented trade regime.[36] Like the other Nordic countries, Iceland entered a phase of high economic growth towards the end of the 19th century, spurred by expanding foreign trade, structural change and technological innovation. A liberal foreign trade policy, adopted in the 1850s, was consistently pursued until 1914 and restored in principle after the First World War. The government not only pursued a liberal trade policy but actively promoted export industries by various means, i.e. through investments in infrastructure, provision of loan capital, subsidies on exported butter and quality control of export articles such as salt-fish.

The theory of export-led growth has been criticised lately in the Scandinavian literature. Lenart Schön and others have argued that internal factors have been downplayed in the analyses of economic transformation of Sweden.[37] Schön emphasises the importance of domestic demand and a more active role played by institutions and entrepreneurship in the economic development of Sweden. This criticism directed against the export specialisation thesis is less relevant in the case of Iceland as its development path was narrower and its export ratio one of the highest in Europe before the First World War. But this extreme specialisation posed a most serious development problem for Iceland, as it has for other small, primary-export economies: the pressure of peripheralisation. In the words of Dieter Senghaas, it is the tendency of a less developed country to revert into 'an outpost of the more highly developed one; in extreme cases into a monocultural exclave (!) for food production and the extraction of raw materials.'[38] Although Senghaas believes that a path-dependent mechanism had already been established since the beginning of the early modern period that determined the development path of individual societies well into the nineteenth and twentieth centuries, he nevertheless insists that at critical points individual societies faced policy choices that could determine whether they would achieve 'autocentric' industrial development or regress into peripheralisation.

Iceland showed clear signs of peripheralisation during the first decades of the 20th century as has already been argued. The economy became increasingly dependent on foreign trade and few, if any, European countries relied so heavily on so few export products. Most manufacturing goods, fuel, fishing gear, salt and other important inputs had to be imported. Previously almost self-sufficient in food production and a substantial food exporter for centuries, Iceland now became increasingly dependent on food imports, which have been estimated as constituting more than half of the country's food supply after 1910.[39] In the 'salt fish age' contemporaries were well aware of the

dangers of such acute dependence on one resource, which made the economy extremely vulnerable to fluctuations in the resource supply and foreign markets, causing huge variations in incomes and investment, and putting strain on macro-economic policy. The leading sector was in any case not performing well, not only did low productivity contribute to sluggish economic growth, but the staple character of fish, although not leading to Iceland becoming an enclave, was not particularly suited for creating linkages or inducing industrial production.

Two cycles of transition can be discerned in the Icelandic industrialisation process. The first was between the 1880s and 1930, when Iceland was incorporated into the world economy by the spread of European industrialisation, entering a path of export-oriented industrialisation. It was a dependent industrialisation in terms of extreme dependence on one export article as its main source of growth. Direct foreign economic dominance was, however, limited despite the strong influence of Danish merchants in foreign trade up until 1914 and the growing importance of British capital in the banking system during the interwar period. But economic nationalism after 1918 prevented any significant direct foreign investment or ownership of firms, which was severely limited by law.[40]

The second cycle of industrial transformation started during the 1930s with the intensification of industrial production proper and a significant diversification of the economy. The international economic crises shifted the focus to the development of the home market with the aim of protecting production and employment. Internal factors were also at work with the expansion of the market in fast growing urban areas, an increasing division of labour and rising incomes, which created demand for a broader range of consumer goods. Concerted efforts were made to strengthen and diversify the industrial sector and as a result a sizeable consumer goods industry emerged in the 1930s and 1940s (including clothing, footwear, paint, soap), sheltered by protective tariffs and even further by the war. The collapse of the salt-fish market in Spain in the late thirties forced the fishing sector to reorganise and divert its production away from salt-fish to a more diversified production (herring fishing, fish meal and oil, frozen fish products).

The regime change marked a major shift in Iceland's foreign economic relations, as the country underwent a period of sluggish exports coupled with growing protectionism, which lasted until the 1960s. The export ratio dropped from an annual average of 42 per cent in the 1920s down to 30 per cent in the 1930s and further still to about 20 per cent in the 1950s, its lowest point in the 20th century. This course was only broadly in line with economic developments in Western Europe, as Iceland's contraction of foreign trade was more pronounced and its protectionist policies more entrenched and longer-lasting than for most European economies.

During the second cycle, the industrial sector's contribution rose from about one-fifth to one-third of total employment between 1930 and 1960. Even after the adoption of free trade policies in the 1960s and the joining of EFTA in 1970, on the whole Iceland's industries held up quite well despite greatly increased international competition. Production of inputs for the fisheries, such as fishing gear and ship-building, continued to grow for a while, as did exports of canned marine products, skins and wool articles. But the most innovative change was the build-up of power-intensive industries by foreign capital from the 1960s onwards, primarily aluminium smelters but also a ferro-silicon plant, using the country's abundant geothermal and hydro-power. These developments resulted in the continuing growth of the tertiary sector in the following decades, peaking in the 1970s and early 1980s in terms of employment and accounting for more than one-third of the workforce. As late as 1990, the share of industry was 30 per cent, i.e. slightly above the Scandinavian average and roughly the same as the OECD average.

Thus, for the period I have concentrated on in this article – the 1870s up until the middle of the 20th century – industrialisation certainly transformed the Icelandic economy and society, but not through the manufacturing industry but through the fisheries and associated industries. The development of manufacturing industry was a much slower and harder process as the economy felt the pressure of peripheralisation through its closer integration with the international economy. Only towards the end of the period was there a clear shift away from one-sided export production, which was caused primarily by two external shocks, first the Great Depression that shifted emphasis to the development of the home market and forced the fishing sector to reorganise; then a world war that not only enabled Icelanders to consolidate these new developments, but was responsible, more than any other event, for Iceland's superior growth performance in the first half of the 20th century, bringing living standards to similar levels as in other parts of Western Europe.

Notes

1 National Bank of Iceland (1930, pp. 51–52).

2 cf. Gíslason (1945); Guðmundsson (1944–46). Biographies and memoirs on this theme are, of course, legion.

3 Infant mortality rates fell dramatically in the second half of the century from being one of the highest to one of the lowest in Western Europe; see Garðarsdóttir (2002, p. 19). As for pauperism, an estimated 14 per cent of the population was receiving public financial assistance in 1871, rising to to nearly 20 per cent during the bleakest years of the 1880s; see Jónsson (2001, p. 67).

4 Thorleifsson (1974); Magnússon (1985); Guðnason (1987); Thorsteinsson and Jónsson (1991).

5 Jóhannesson (1937, p. 11).

6 Ólafsson (1993).

7 Jónsson (1981), Jónsson (1986); see also Bjarnason (2001).

8 Magnússon (1985), Jónsson (1991).

9 Gunnarsson (1983); Gunnlaugsson (1988); Jónsson (1991); Eggertsson (1996).

10 Bjarnason (2001).

11 Hálfdanarson (1993); Kjartansson (2003).

12 Blöndal (1965).

13 Jónsson (1999a). The findings were concluded in 1999 and published in Icelandic, see Jónsson (1999b).

14 Blöndal (1965).

15 *Thjóðhagsreikningar 1901–1945* (1992).

16 Jónsson (1999b).

17 Jónsson (1986), p.32.

18 Maddison (1991, pp. 73–74, 248–49).

19 Jónsson (1991, pp. 176–83).

20 Maddison (1995, pp. 162–69).

21 For a more detailed comparison of GDP per capita levels between Denmark, Finland and Sweden, using different PPPs, see Krantz (2001).

22 Maddison (1995, pp. 61–65, 198 and 200).

23 Agnarsson and Jónsson (2003).

24 Baumol (1986), Abramowitz (1986).

25 Maddison (1991, p. 51). Note, however, that the end year of the Icelandic figures is 1945.

26 See Agnarsson and Jónsson (2003). The figures used by Maddison (1991, p. 53) have been converted into Geary-Kharmis 1990 U.S. dollars to make them comparable with the Icelandic data. See also Broadberry (1996, pp. 329–35).

27 Jónsson (1993).

28 Agnarsson and Jónsson (2003, p. 220).

29 Agnarsson and Jónsson (2003).

30 Here we are concentrating on the economics, and not the social and other aspects, of industrialisation.

31 See, for example, Krantz (2001).

32 Jónsson (1993, pp. 107–109).

33 See for example Krantz (2001, pp. 26–31).

34 Pollard (1990, p. 1).

35 Chenery and Taylor (1968, p. 10).

36 Katzenstein (1985). For a survey of the, mainly Scandinavian, literature see Hodne (1994).

37 Schön (2000, pp. 34–37, 150–51).

38 Senghaas (1985, p. 16). See also Krantz (2001, pp. 28–30).

39 Jónsson (1998, p. 36).

40 Jónsson (1995, pp. 89-91).

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APPENDIX

Iceland's GDP and GDP per capita 1870-1945
constant prices (1945=100)

	GDP	GDP per capita	GDP GK 1990 $US
1870	10	19	1.000
1871	10	19	1.018
1872	10	19	1.014
1873	11	20	1.060
1874	11	21	1.092
1875	11	21	1.087
1876	11	20	1.070
1877	11	21	1.092
1878	12	21	1.133
1879	13	23	1.199
1880	13	24	1.271
1881	14	24	1.273
1882	12	21	1.136
1883	11	21	1.093
1884	11	21	1.106
1885	12	21	1.129
1886	12	21	1.133
1887	12	21	1.114
1888	12	22	1.153
1889	12	23	1.202
1890	13	24	1.253
1891	13	24	1.283
1892	14	26	1.365
1893	15	27	1.453
1894	16	28	1.469
1895	16	27	1.437
1896	16	28	1.466
1897	16	27	1.456
1898	16	27	1.412
1899	16	27	1.411
1900	17	28	1.465
1901	18	29	1.530
1902	18	30	1.566
1903	18	30	1.565
1904	18	30	1.574
1905	20	32	1.678
1906	20	32	1.716