

Background Report

Detailed Assessment of Ireland's Productivity Performance 1980-2005

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Table of Contents

1. Introduction	3
1.1 Productivity and Competitiveness	3
1.2 Methodology & Scope of the Data.....	6
2. Overview of Ireland’s Productivity Performance since 1980	7
2.1 Ireland’s Long-run Performance in Productivity.....	7
2.2 Broad Sectors in the Irish Economy	10
3. Agriculture and Food Processing.....	12
3.1 Overview	12
3.2 Agriculture.....	12
3.3 Food, Drink and Tobacco	12
4. Construction	14
4.1 Overview	14
<i>Box 1. Physical Measures of Productivity in Construction</i>	14
5. Manufacturing.....	15
5.1 Overview	15
5.2 “Modern” versus “Traditional” Manufacturing	16
5.3 The “Modern” Manufacturing Sector	17
5.4 The “Traditional” Manufacturing Sector	18
5.5 Alternative Estimates of Productivity in Modern Manufacturing.....	21
6. Services	22
6.1 Overview	22
6.2 “Tradable” versus “Non-tradable” Services.....	23
6.3 “Tradable” Services	24
6.4 “Non-tradable” Services.....	26
<i>Box 2. Measuring Productivity in Public Services</i>	29
7. Summarising Ireland’s Productivity Performance Since 1980	32
7.1 Where has Ireland’s Productivity Growth come from?	32
7.2 Ireland’s Overall Performance.....	33
7.3 The Base of Ireland’s Productivity and Ireland’s Productivity Growth	34

1. Introduction

Competitiveness refers to the ability of firms to succeed in markets. National competitiveness refers to the ability of firms based in a particular country to compete on international markets. It is concerned with the business environment, the physical infrastructure and the knowledge infrastructure within which firms in a country operate. National competitiveness is an important determinant of firms' overall competitiveness.

National competitiveness helps determine firms' operating environment.

National competitiveness and the productivity performance of an economy are closely related, particularly for small open economies. Productivity drives most economic growth and improvements in living standards in the OECD. For small economies to achieve continuing productivity growth, it is necessary to compete on international markets because of issues of scale. In particular, the primary focus for policymakers is on labour productivity. This is primarily because labour productivity determines wages - and therefore contributes to standards of living.

Productivity and national competitiveness are closely related, particularly in small open economies.

After briefly outlining the relationship between competitiveness and productivity, this paper describes Ireland's national productivity performance over the past 25 years. For consistency, the same dataset (Groningen Growth and Development Centre), time period (1980-latest available) and comparator economies (the EU-15, the USA, the UK, Norway, Korea and the new EU member states where possible) are used throughout. Northern Ireland is also included in the analysis (where possible), although it does not form part of the Groningen database. The analysis also breaks down the economy into its main sectors and assesses evolving trends in each.

This paper outlines Ireland's overall productivity performance and by sector, since 1980.

1.1 Productivity and Competitiveness

In its most basic terms, productivity refers to the amount of output generated by an input. Labour productivity, then, is the quantity of output produced per unit of labour worked. The unit chosen throughout this paper is per-hour labour productivity.¹

For this paper, productivity is defined as output per hour worked. It is both an indicator and a driver of competitiveness.

Productivity is both an indicator and a driver of competitiveness. It is an indicator of competitiveness, because in market economies (particularly small open economies such as Ireland), regardless of the method of measurement, goods will only be produced - and hence labour will only be productive - when there is demand for the goods to be produced.

Productivity is also a driver of competitiveness, because for Irish firms to be competitive in international markets, they need to be cost effective. Cost effectiveness can mean that a firm sets a target level of output and tries to achieve this with the minimum cost of inputs. Alternatively, a firm can try to maximise its output for a given set of inputs. For countries such as Ireland, which have high average wage costs, this

For living standards to rise, economies must foster productivity growth.

¹ Productivity so defined is equivalent to *economic efficiency*, the relationship between inputs and outputs, but is also closely related, particularly in the public sector, to *effectiveness*, how well outputs match outcomes.

latter approach is more applicable. For Ireland to stay competitive in the international economy while continuing to raise the standard of living here, productivity levels must grow.

Economic growth has two components, labour utilisation ('working harder', i.e. more people working or people working longer hours) and labour productivity ('working smarter'). Figure 1 breaks down economic growth since 1980 into both components. Ireland's economic growth in recent years was driven by a combination of working harder and working smarter. During the 1990s, Ireland's productivity growth was exceptionally strong relative to its economic peer group. Not only were there significantly more people employed in Ireland in 2000 than in 1990, but also for each hour they worked, they produced more output.

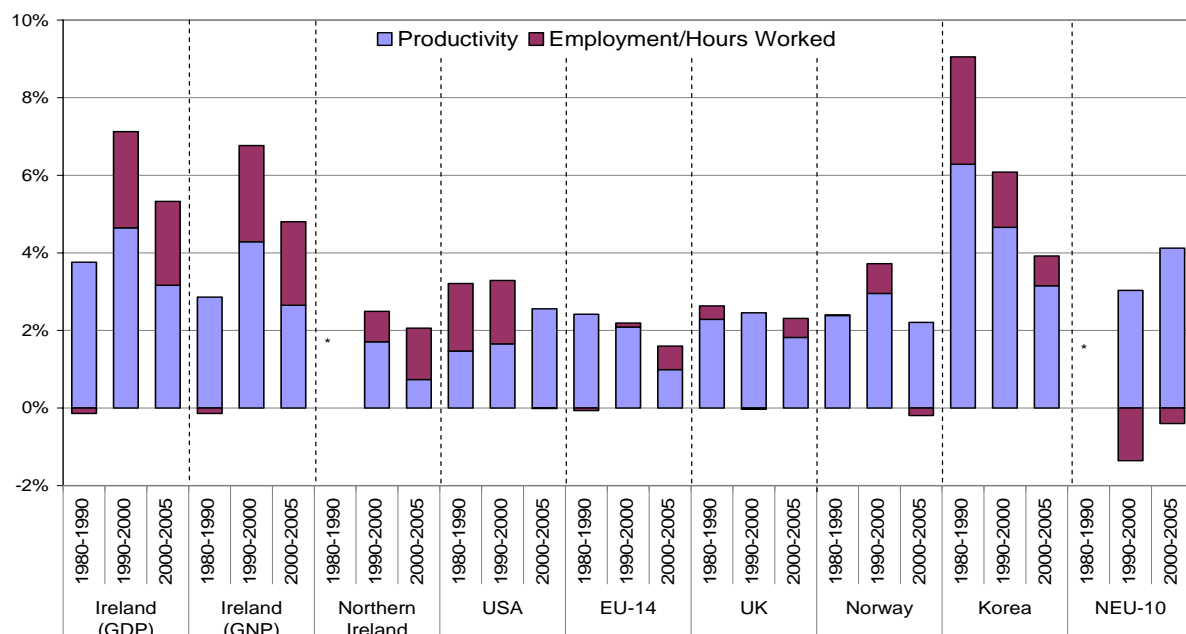
Economic growth has two components: labour utilisation (employment) and labour productivity.

For most of the economies shown, productivity has been the main - or sole - driver of economic growth. In the EU, productivity growth averaged about 2% per annum between 1980 and 2000, while employment growth was negligible. Productivity growth has been the driver of economic growth in the US since 2000. The exception is Northern Ireland, where productivity growth has slowed considerably in recent years and employment gains are driving economic growth.

Employment has played a large role in Ireland's recent catch-up, but productivity has been the primary driver of recent economic growth in the OECD and will be so for Ireland in the future.

In the new EU member states, productivity has also been the driver behind recent growth. Elsewhere, though, including Ireland, productivity growth has slowed since 2000. With employment rates in Ireland now above the EU average, Ireland's ability to catch up with the living standards of the world's richest regions will depend less on increasing the numbers employed and more on increasing the productivity of those at work.

Figure 1: Growth and Productivity performance in selected economies, 1980-2005 (average annual rates)



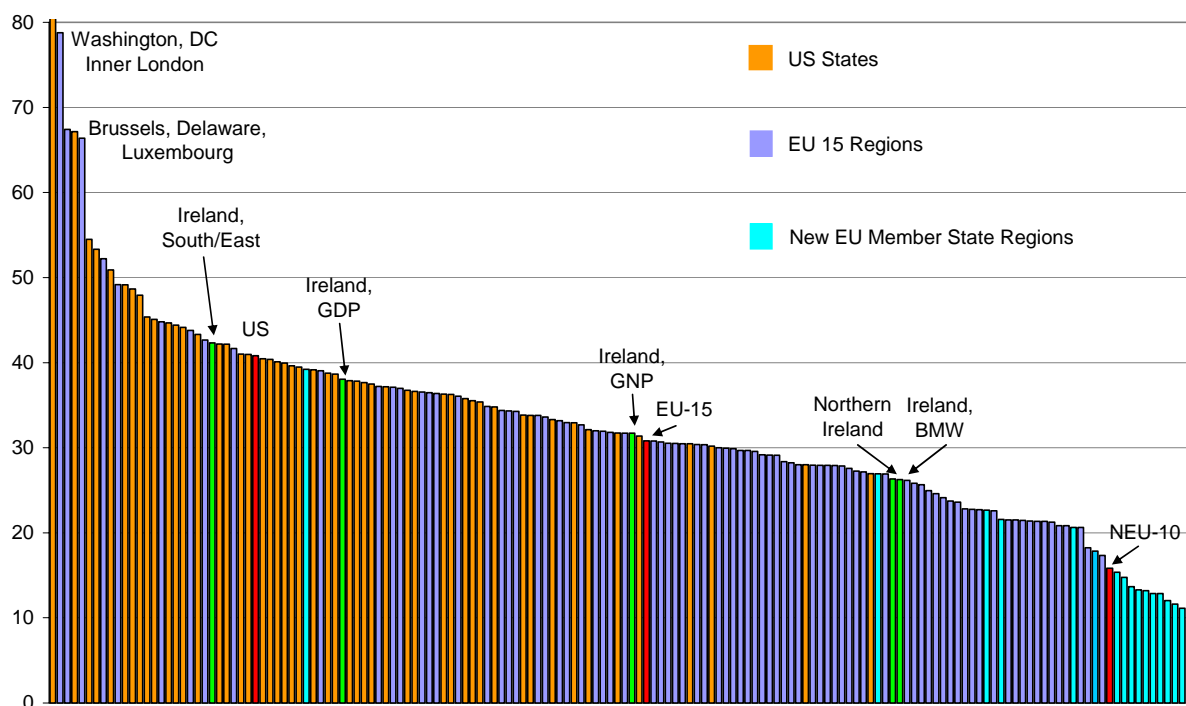
Source: Forfás calculations; based on Groningen Total Economy database, January 2006; CSO National Income and Expenditure accounts, July 2006

* denotes data not available for the period in question; Northern Ireland data start in 1991.

Figure 2 outlines this potential for further catch-up in living standards. It charts per capita output levels in all 50 US states and major EU regions, alongside Irish (GDP, GNP and regional) and Northern Irish figures. With GDP figures, Ireland ranks slightly below the median US state, while using Ireland's GNP per capita figures - a better measure for Ireland's wellbeing - means that Ireland ranks below 45 US states. Regionally, the Ireland-South/East area is among the richest in Europe. There is a large gap between that region and the rest of the island, however. Output per person in Northern Ireland and the Border, Midlands and West regions are very similar, below the poorest US State and also below the EU-15 average.²

A comparison with other regions shows the remaining potential for productivity growth, particularly in the BMW region and in Northern Ireland.

Figure 2: Output per person, US States and EU Regions, 2004 (000s euro)



Source: Forfás calculations; based on Eurostat Regional Indicators and US BEA databases, 2006

² It should be noted that some of this difference in output per person is due to different employment rates (typically lower in the EU than the US) and a shorter working week in the EU, compared to the US.

1.2 Methodology & Scope of the Data

All figures presented, unless otherwise stated, are based on measuring productivity through the value added (VA) approach. This measures revenue minus intermediate input costs, divided by the total number of hours worked in that sector/economy. While they are the best statistics available and are for the most part consistent across time and countries, there are a number of methodological issues and caveats that arise with the VA approach:

- Productivity should measure the quantity of output that an hour's work gives, at a given level of quality. However, there is no 'given level of quality' - changes in quality occur all the time and the statistics rely on the accuracy of sector-specific price deflators.
- The VA approach is dependent on having accurate price deflators that distinguish increased output from inflation. Price deflators are more accurate for sectors that are internationally traded, where the price of goods is not influenced by domestic supply conditions.
- In sectors with countable outputs and relatively constant quality, the computation of physical measures of productivity can also be very useful. For example, in construction, it is possible to use physical measures such as residential units per worker per year. This is discussed further in Box 1.
- There are limitations to comparisons of productivity across sectors, as the scale and mix of factors (in particular the level and type of capital used) differ across industries. This underlines the importance of international comparisons of sectors.

Notes on the calculations:

- The figures (except for Northern Ireland) are sourced from the Groningen Growth and Development Centre's Total Economy and 60-Industry databases. Irish figures have been updated, using the OECD's Detailed National Accounts 2006 edition. Figures have been converted to euro, 2003 prices. This relies on accurate measurement of PPP exchange rates and of inflation (OECD rates are used for both).
- The data presented are per-hour figures, as an important consideration in accurately capturing changes in productivity is the extent to which people are working shorter working weeks (and the extent to which people in Europe work shorter weeks than in the USA). However, the figures collected are averages - often across broad sectors - and actual hours worked in specific industries may differ from the average figures used.
- Finally, this paper makes adjustments to the productivity performance of foreign-dominated sectors of the Irish economy. High Irish productivity levels in modern manufacturing and certain tradable services may reflect the returns from R&D, marketing and management practices undertaken by multinationals in other countries, rather than in Ireland. Given that US firms are the primary source of FDI into Ireland, US levels of productivity are used as an alternative estimate of productivity in sectors with a large multinational presence, namely chemicals, electronics, printing/publishing, computers and finance. The purpose of this adjustment is to present alternative figures for productivity levels in foreign-dominated sectors in Ireland, as standard measures may potentially inflate Ireland's national productivity figures. It could be argued, that since Ireland has attracted many of the leading American firms in these sectors, their productivity levels, and thus of the sectors in Ireland, could be above the US average.

2. Overview of Ireland's Productivity Performance since 1980

This section outlines Ireland's national productivity performance from 1980 until 2005, and at the sectoral level from 1980 until 2003, the latest available data.³ In each case, the same comparator economies have been chosen:

- the EU-14 (i.e. excluding Ireland where possible, EU-15 otherwise), as the majority of Ireland's economic peer group;
- the USA, as the source of much inward direct investment and an important trading partner;
- the UK, as a key trading partner and competitor for foreign direct investment;
- Northern Ireland, where possible;
- Norway, as a relatively small but globalised economy;
- South Korea, as an economy with a recent history of large productivity gains;
- The ten new EU member states, since 1990.

This section examines Ireland's productivity performance - at a national and sectoral level.

2.1 Ireland's Long-run Performance in Productivity

Figure 3 outlines national per-hour productivity performances, as measured by GDP per hour. Since 1980, Ireland has performed very strongly in terms of productivity growth. Ireland went from approximately two-thirds of the output per hour of the rest of the EU and the USA during the 1980s to the same level by 1998. Since then, Ireland's productivity (as measured by GDP per hour) has exceeded levels in both the USA and in the other 14 EU states.⁴

At first glance, productivity in Ireland has converged to the EU and US averages.

Using GNP figures, which measures income to Irish citizens rather than output, brings Ireland's productivity performance more into line with other countries. As Figure 3 outlines, GNP per hour productivity figures indicate that although recent growth rates have been impressive in absolute terms, Ireland's productivity remains below the average of both the USA and the EU-14.⁵

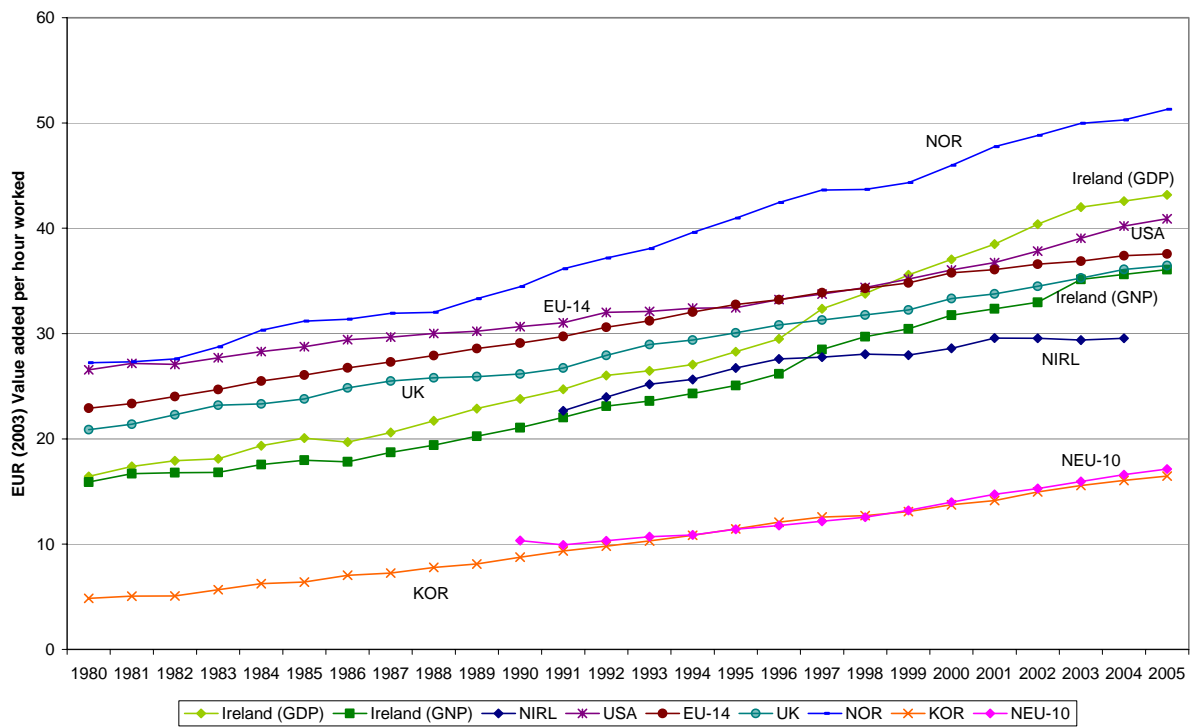
Using GNP, Ireland's performance remains strong but suggests that convergence with the US and EU has not finished yet.

³ For Norway and South Korea, the latest sectoral data are those for 2002. Non-euro figures have been converted to euro using OECD benchmark Purchasing Power Parity conversions.

⁴ At first glance, Norway appears to be phenomenally productive on average. However, excluding Norway's mining sector - a sector that is not covered in the sectoral analysis due its small size in the Irish economy, but which, due to its oil reserves, comprises approximately 20% of value added in Norway but just over 1% of the population - suggests that value added per hour worked in the non-mining economy is actually between the range of €35 and €40.

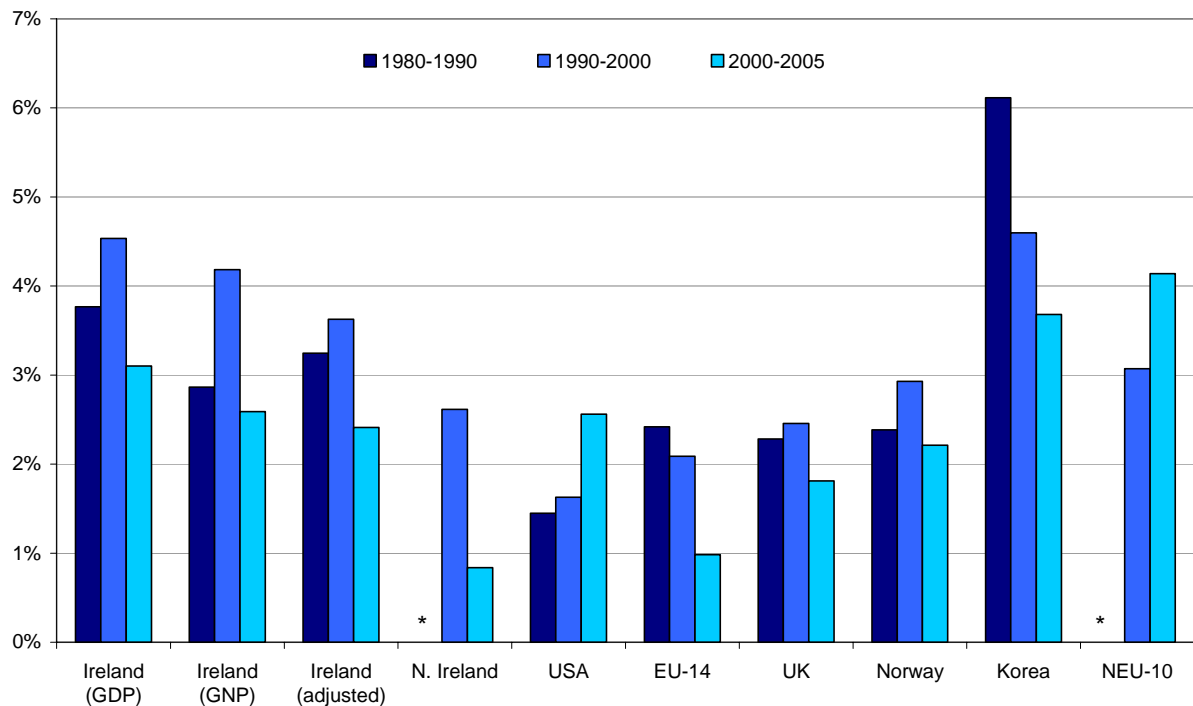
⁵ The EU-14 average also masks differences between very productive countries such as France and Austria and weaker performers, such as Greece and Portugal.

Figure 3: Output per hour worked in selected economies, 1980-2005 (€2003)



Source: Forfás calculations; based on Groningen Total Economy database, January 2006; CSO National Income and Expenditure accounts, July 2006

Figure 4: Growth in output per hour worked in selected economies, 1980-2005 (average annual rates)



Source: Forfás calculations; based on Groningen Total Economy database, January 2006; CSO National Income and Expenditure accounts, July 2006

In Figure 4, the average annual productivity growth rate for each five-year period is shown. Three figures are shown for Ireland:

- GDP per hour worked;
- GNP per hour worked; and,
- An adjusted GDP figure (as outlined in Section 5.5).

Productivity in Ireland grew faster than the other economies studied between 1980 and 2000.

By GDP measures, Irish productivity has grown faster in each period (more than 3%) than either the EU-14 or the USA did in any period. The other two sets of figures reveal a similar trend but at slower growth rates.

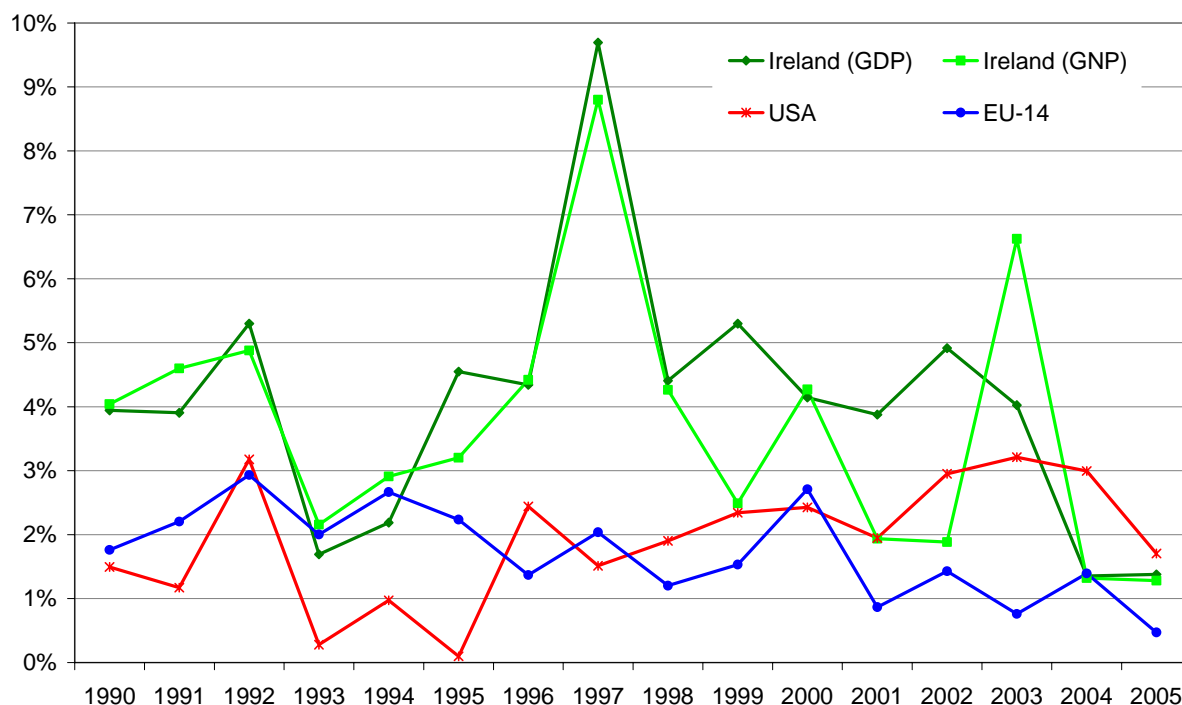
What is striking about all three sets of figures is that average productivity growth in Ireland between 2000 and 2005 was lower than at any time since the early 1980s, although still high by international comparisons. Productivity growth in Northern Ireland appears to have slowed significantly since the early 1990s. At the same time, productivity growth has accelerated in the USA, averaging 2.5%, and in the 10 new EU member states, at above 4%. This compares with 3% in Ireland, close to 2% in the UK and Norway, and just 1% in the EU-14.

All measures point to a recent slowdown in Irish productivity growth.

Figure 5 explores the annual figures for Ireland (GDP and GNP), the USA and the EU-14. It shows that growth in output per hour worked - the key determinant of rising living standards - has slowed from above 4% (according to GDP figures) between 1995 and 2003 to less than 1.5% per annum in 2004 and 2005, according to both GDP and GNP figures.

This is particularly pronounced for the years 2004 and 2005.

Figure 5: Growth in output per hour worked in Ireland, the USA and the EU-14, 1990-2005



Source: Forfás calculations; based on Groningen Total Economy database, January 2006; CSO National Income and Expenditure accounts, July 2006

2.2 Broad Sectors in the Irish Economy

Productivity varies across sectors, as well as across countries and over time. For the purposes of the following analysis, six broad sectors of economic activity are identified within each economy, including two each within manufacturing and services:⁶

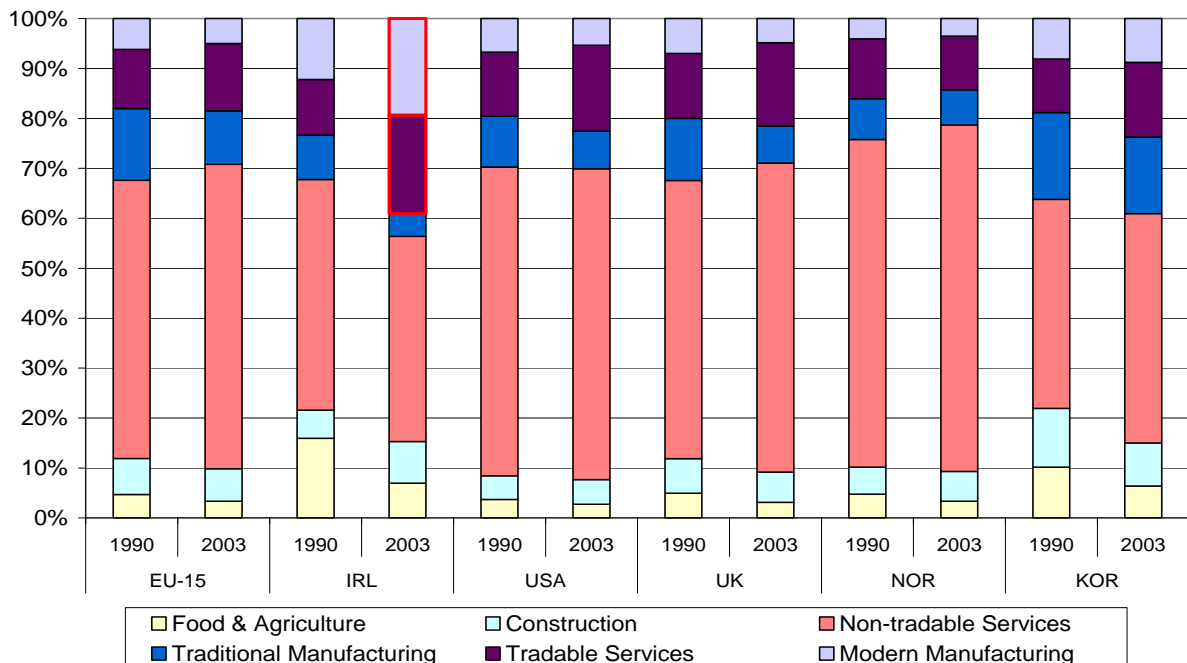
1. Agriculture and food processing (including drinks and tobacco).
2. Construction.
3. Traditional manufacturing, defined to include textiles/clothing, wood/paper, minerals/materials, transport manufacturing and furniture.
4. Modern manufacturing, defined here to include those sectors in Ireland dominated by multinational firms: chemicals, electronics and printing/publishing (including reproduction of software).
5. Internationally tradable services, defined here to include communications, hotel/catering, finance and computers/R&D
6. Non-tradable services, defined here to include wholesale/retail trade, transport, utilities, real estate, public services and other services (e.g. legal and advertising services).

Productivity varies across different sectors. This analysis reviews six main sectors of the economy: agriculture, construction manufacturing (traditional and modern) and services (tradable and non-tradable).

Figure 6 breaks down total value added across each of these six areas of economic activity for 1990 and 2003. It highlights the relative importance of these sectors across the range of selected countries. The contribution of an individual sector depends on two factors, how many people are employed in a sector and how productive those employed in that sector are.

A sector's contribution to output is a combination of productivity and employment.

Figure 6: Proportion of Gross Value Added attributed to broad sector, in selected economies, 1990 and 2003 (%)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

⁶ Due to its small size in Ireland and its disproportionate capital intensity, the mining sector has not been included in the analysis.

As can be seen from Figure 6, what have been termed 'non-tradable' or domestically trading services form a large proportion of each country's total value added. This is unsurprising, as non-tradable services (including the public sector) form the largest single proportion of total employment in each economy (almost 58% in the EU in 2003). What is striking about the Irish productivity breakdown is the huge contribution played by 'modern' manufacturing in the overall figure (highlighted in red), significantly larger than any other economy. Together with 'tradable services', these small sectors account for a disproportionate amount of economic activity in Ireland.

'Non-tradable' services make the largest contribution due to their share in employment.

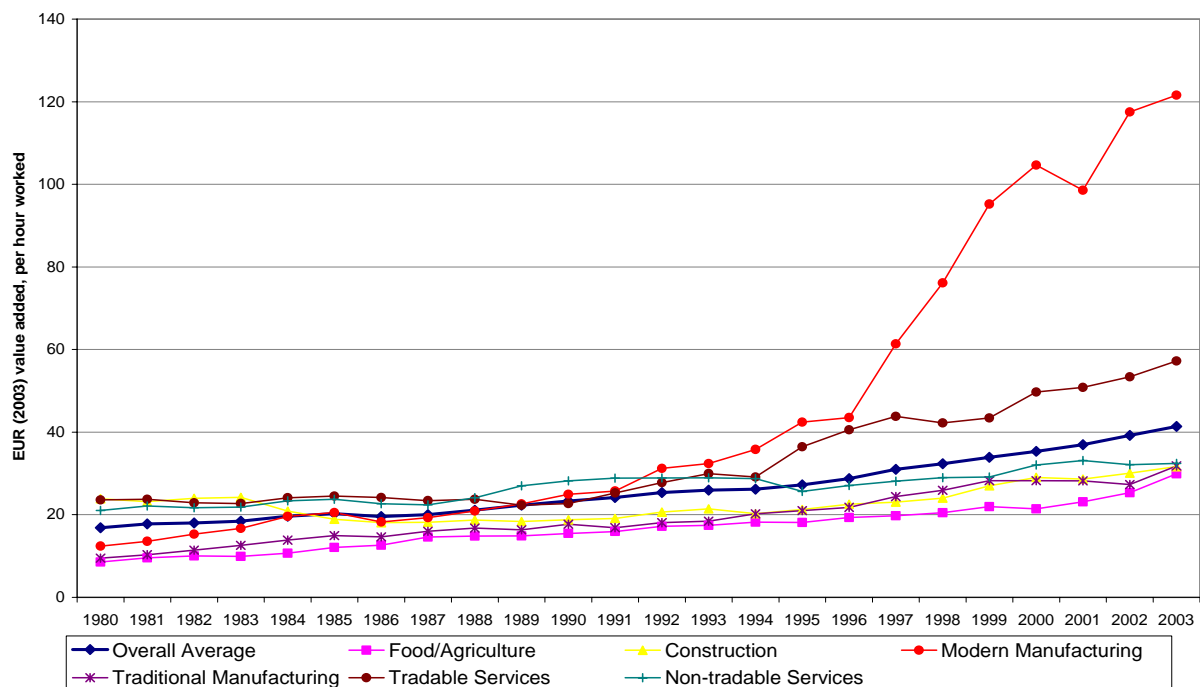
This is confirmed in Figure 7, which examines productivity in the Irish economy by charting per-hour productivity in each of the six areas of economic activity and comparing them to the economy-wide average. The economy-wide average productivity level in 2003 was €41. The most obvious feature of Figure 7 is the detachment in recent years of the modern manufacturing series from all other sectors, with apparent labour productivity over three times the average level, which itself is raised because of the high level in the modern manufacturing sector. The only other sector above the national average is tradable services.

However, 'modern' manufacturing and tradable services make a large contribution in Ireland.

The next section assesses the productivity performance of each sector in greater detail. Each sector is discussed in terms of its importance in the Irish economy, recent trends nationally and across the sample and absolute levels. Specific figures for each sector are provided in Appendix II (Figures A2.1 to A2.19).

Each sector is now discussed in greater detail.

Figure 7: Output per hour worked across broad sectors of the Irish economy, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.gqdc.net>; revised Irish figures from OECD National Accounts

3. Agriculture and Food Processing

SUMMARY

Agriculture and the food, drink and tobacco sector comprised 10% of total hours worked in Ireland in 2003, down from over 22% in 1980. In primary agriculture, despite productivity gains during the 1980s, absolute productivity levels remain low and the productivity gap with the US is increasing. In food processing, Ireland's performance appears very strong, particularly since the mid-1990s, although these figures may be affected by the presence of foreign multinationals. Overall, productivity levels in the sector are below the economy-wide average.

3.1 Overview

Just under 10% of all labour in Ireland works in the agriculture and food processing sector, which also includes the drink and tobacco industries. This is a share that has fallen substantially from 22.2% in 1980.

10% of labour in Ireland works in agriculture or food processing. Productivity in this sector compares well with other countries.

Figure 7 outlines the trend in per-hour productivity in agriculture and food processing from 1980 to 2003. Averaging over the whole sector, per-hour productivity stood at about €30 per hour in 2003, below the economy-wide average of €41. However, productivity levels compare favourably with other countries.

3.2 Agriculture⁷

Since 1980, per hour productivity in basic agriculture has approximately doubled, as smaller and less productive farmers left the sector. Productivity gains have not been as large as in the US or the UK, however, and relative to other sectors of the economy, overall productivity levels remain low, at €15 in 2003 (Figure A.1). While per-hour productivity is higher than the EU average, the productivity gap with the US is increasing. This gap was about 40% in 2003.

Productivity in basic agriculture is very low and recent gains have been small.

3.3 Food, Drink and Tobacco

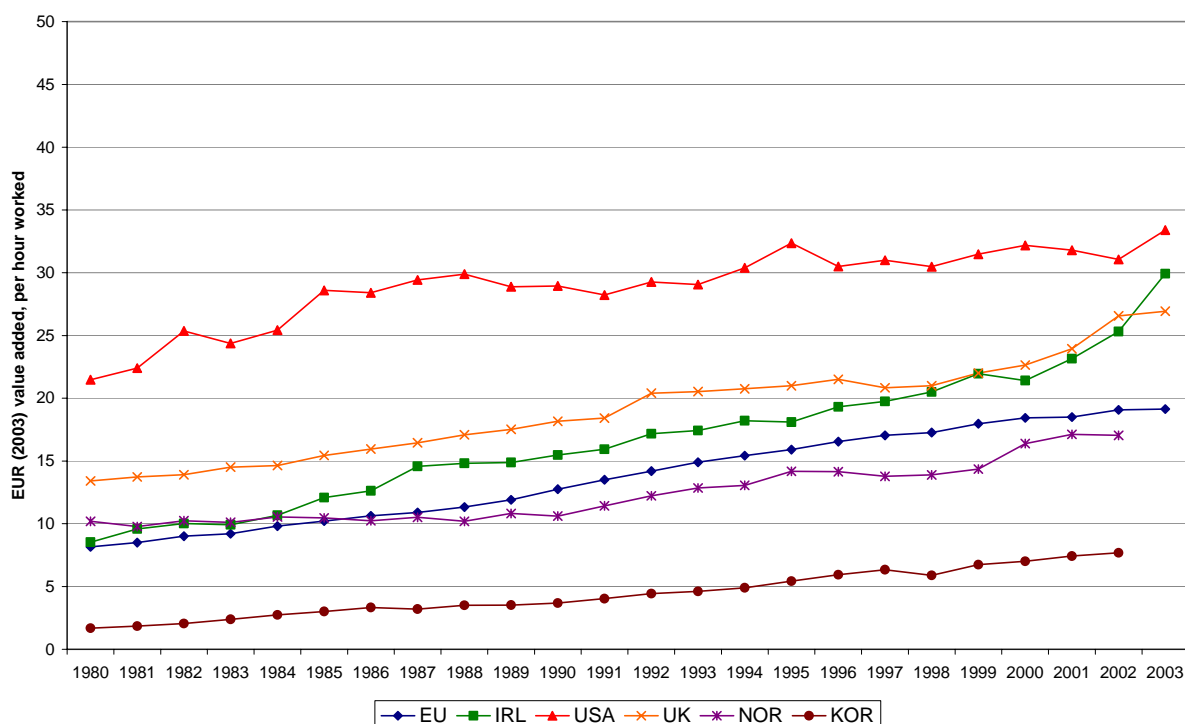
Productivity is higher in the production of food, drink and tobacco, with value added typically twice as large as in basic agriculture itself across the countries and time period. In Ireland, productivity in the sector has risen sharply, from €15 in 1980 to €60 per hour in 2003, well above the next most productive economy, the USA (Figure A.2). It is interesting to note that Ireland's productivity performance is high in this sector, as it is one of the predominantly indigenously-owned sectors that is export-intensive. However, these figures could be distorted by the presence of MNC activities in Ireland.

Productivity in food processing, which is an export-intensive sector, is high by international standards. This may reflect the presence of multinationals.

Overall Ireland's productivity performance in agriculture and food processing is at least as good as the EU average for the sector, but it is below average productivity in Ireland.

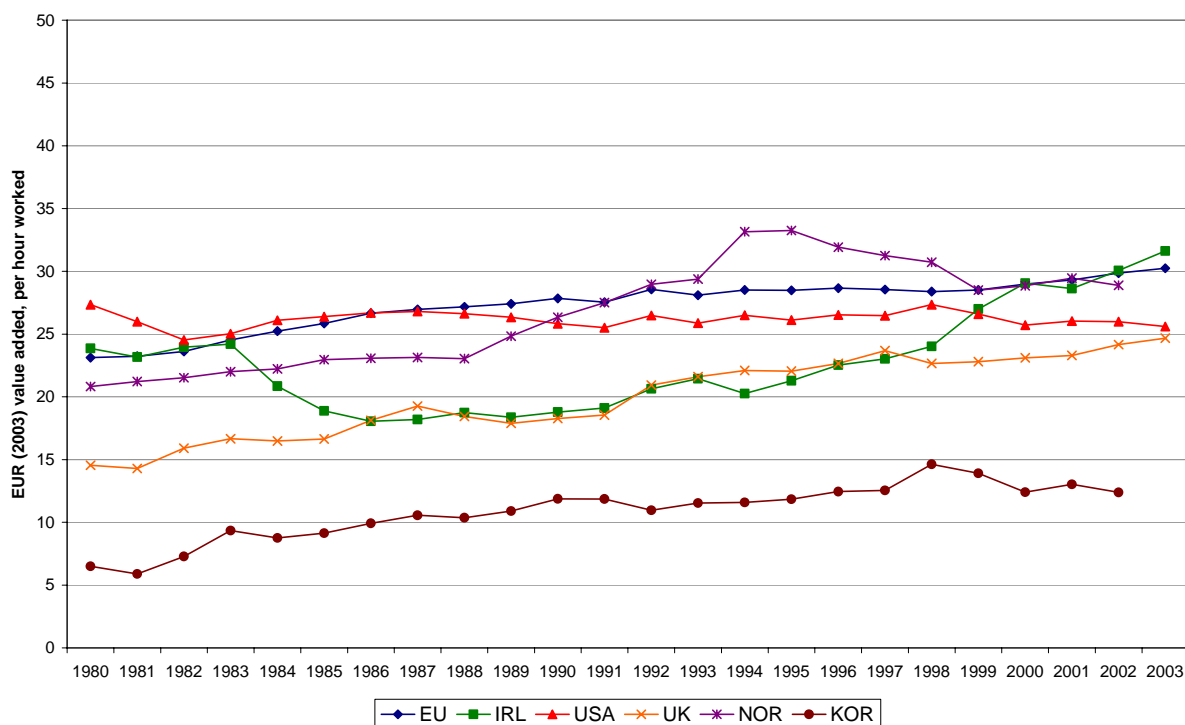
⁷ Graphs outlining the performance of specific sectors from 1980 to 2003 are contained in Appendix I.

Figure 8: Output per hour worked in food and agriculture, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure 9: Output per hour worked in construction, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

4. Construction

SUMMARY

The construction sector comprised almost 11% of total hours worked in Ireland in 2003, up from 9% in 1990. Productivity, based on value added measures, fell during the 1980s but rose from €20 an hour in 1994 to over €30 per hour in 2003, leaving productivity levels on a par with those in other countries. Using a physical measure of productivity, the number of residential units divided by the number of hours worked, productivity rose by one-third between 1993 and 2003.

4.1 Overview

In 2003, the construction sector accounted for almost 11% of total hours worked in the Irish economy, up from just over 7% in 1990. Figure 9 charts the evolution of per-hour productivity in the construction sector in each of the economies under consideration from 1980 onwards.

Construction accounts for almost 11% of employment.

While productivity in construction was stagnant in the USA over the period, and rose slowly in the EU, it dipped in Ireland during the 1980s before rising steadily during the Celtic Tiger period. Productivity rose from about €20 per hour in 1994 to over €30 per hour 9 years later, an increase of over 50%. This placed Ireland on a par with its economic peer group, where per-hour productivity in 2003 generally lay between €25 and €30 per hour.

Productivity has improved since the mid-1990s.

Box 1. Physical Measures of Productivity in Construction

Other analyses of productivity trends in Ireland have suggested that there was little productivity growth in construction between 1998 and 2003. These are also based on value added (VA) methods, but with different deflators, highlighting how sensitive VA productivity estimates are to assumptions about price and quality changes. A physical measure of productivity can give a more reliable indicator of productivity.

An alternative estimate of productivity based on physical output can be calculated by dividing the number of residential units completed in a particular year by the number of hours worked in the sector. An appropriate adjustment also has to be made for changes in the size and quality of new homes. Therefore, productivity would increase if output were maintained in the face of lower employment or a shorter working week, or if more or larger homes were built with the same amount of labour.

Due to the physical nature of construction, it is possible to measure productivity through number of homes built.

Based on this physical measure, productivity in the Irish residential construction sector grew by 32 per cent from 1993 to 2003. This estimate suggests that while it took on average 33 workers a year to complete 10 homes in 1993, today it only takes 25 workers to build the same number of homes of a similar size as in 1993. These figures are taken from a forthcoming Forfás report on productivity in the construction sector. It will be published in November 2006 and will be available from the Forfás website, <http://www.forfas.ie>.

By this measure, productivity grew one-third between 1993 and 2003.

5. Manufacturing

SUMMARY

Manufacturing accounted for 12.5% of hours worked in 2003, down from 17.2% in 1980. Increased employment in modern manufacturing (from 4.7% to 6.6%) has hidden an even sharper fall in employment in traditional manufacturing (from 12.5% in 1980 to 5.9% in 2003).

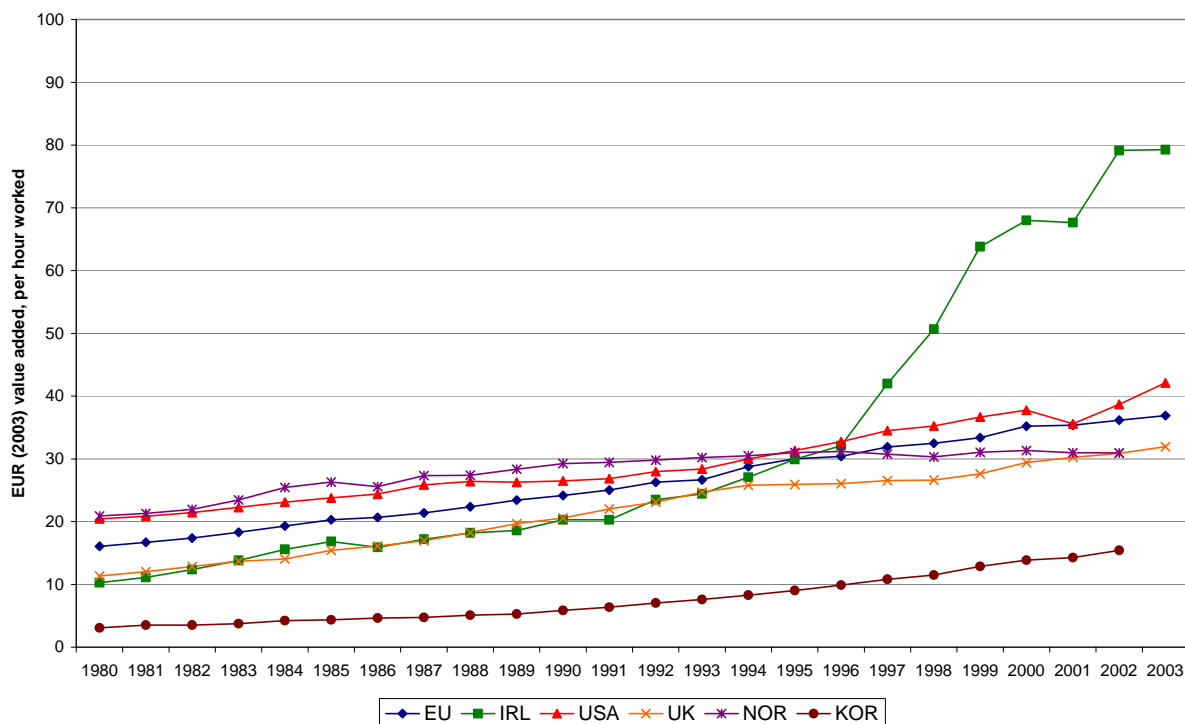
Their productivity performances also differ starkly. Value added from modern manufacturing dwarfs traditional manufacturing. In modern manufacturing, however, productivity statistics may be distorted by the presence of many MNCs in Ireland. Adjusting for this almost halves hourly productivity in manufacturing in Ireland in 2003. In traditional manufacturing, productivity did grow three-fold during the period under consideration but that growth has slowed from 6.4% during the 1980s to 3% between 1999 and 2003. In transport goods and in the wood and paper products sector, in particular, a gap exists between Irish and US hourly productivity figures.

5.1 Overview

In 2003, manufacturing industries accounted for 12.5% of all employment, as measured by hours worked, in Ireland. This is less than the EU-15 average of 15.5% but close to the USA average of 11.1%. Figure 10 outlines the simple average per-hour productivity levels across all manufacturing from 1980 onwards. According to this measure, Ireland has performed phenomenally, rising from relatively low levels in 1980 to outstrip other economies by 1997 and continuing to rise steadily since then.

Manufacturing accounts for 12.5% of hours worked. At first glance, Ireland has become very productive in manufacturing.

Figure 10: Output per hour worked in manufacturing, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

5.2 “Modern” versus “Traditional” Manufacturing

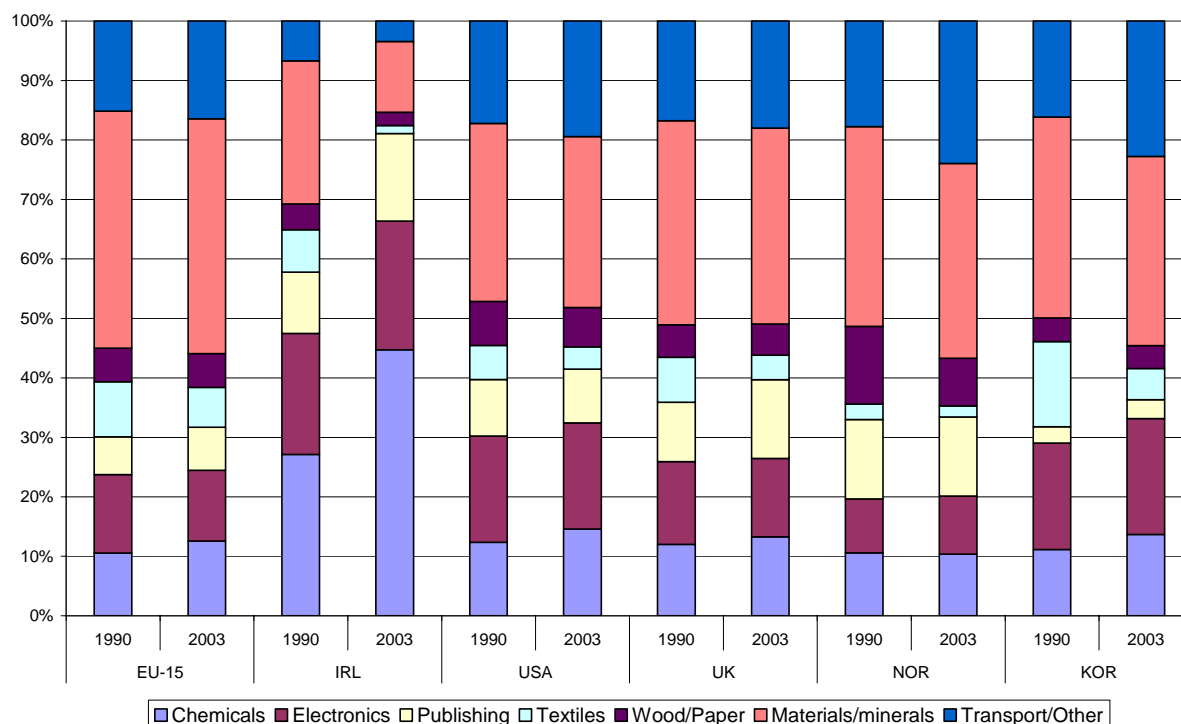
What is unusual about productivity growth in Irish manufacturing industry is its concentration. Figure 11 breaks down total value added in manufacturing into various sectors. For the purposes of this discussion, a distinction will be made between two segments of manufacturing activity - ‘modern’, comprising chemicals, electronics and printing/publishing, and ‘traditional’, including manufacture of textiles, wood and paper products, plastics, metals and minerals, transport goods and furniture.⁸

To outline different performances, two segments of manufacturing are identified.

As is shown in Figure 11, the three ‘modern’ sectors of manufacturing dominate Ireland’s manufacturing productivity performance, accounting for 80% of value added in the sector in 2003. At the same time, in employment terms, Ireland’s ‘modern’ manufacturing sector, while large by international standards (just under 6% of total hours worked), comprises only half of total hours worked in manufacturing. These modern sectors are driven by the performance of a relatively small number of foreign-owned, in particular American, manufacturing plants. According to CSO data, foreign-owned firms accounted for four-fifths of all value added in Irish manufacturing in 2003.⁹

In Ireland, one segment - chemicals, electronics and publishing - dominates value added in manufacturing. This is driven by foreign firms.

Figure 11: Proportion of Value Added in Manufacturing attributed to sub-sector, in selected economies, 1990 and 2003 (%)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

⁸ While manufacturing has been broken down into two stylised sectors, ‘modern’ and ‘traditional’, these classifications are broadly based on the nature of the final products produced. ‘Traditional’ manufacturing firms can, of course, utilise advanced materials, technologies and management practices.

⁹ Of those firms, American firms - just 40% of all foreign firms here - accounted for almost two-thirds of all value added (Lane and Ruane 2006, Table IV.2).

5.3 The “Modern” Manufacturing Sector

Employment in the ‘modern’ manufacturing sectors - chemicals, electronics and printing/publishing - was 6.6% in 2003. While this is significantly more than its level in 1980 (4.7%), employment in the sector is in decline, with a peak of just under 8% occurring between 1997 and 1999. Furthermore, while these figures are high relative to other economies (EU: 4%, US: 3.7%), when making economy-wide observations, it is important to remember that the sector employs only 1 in every 15 workers in Ireland.

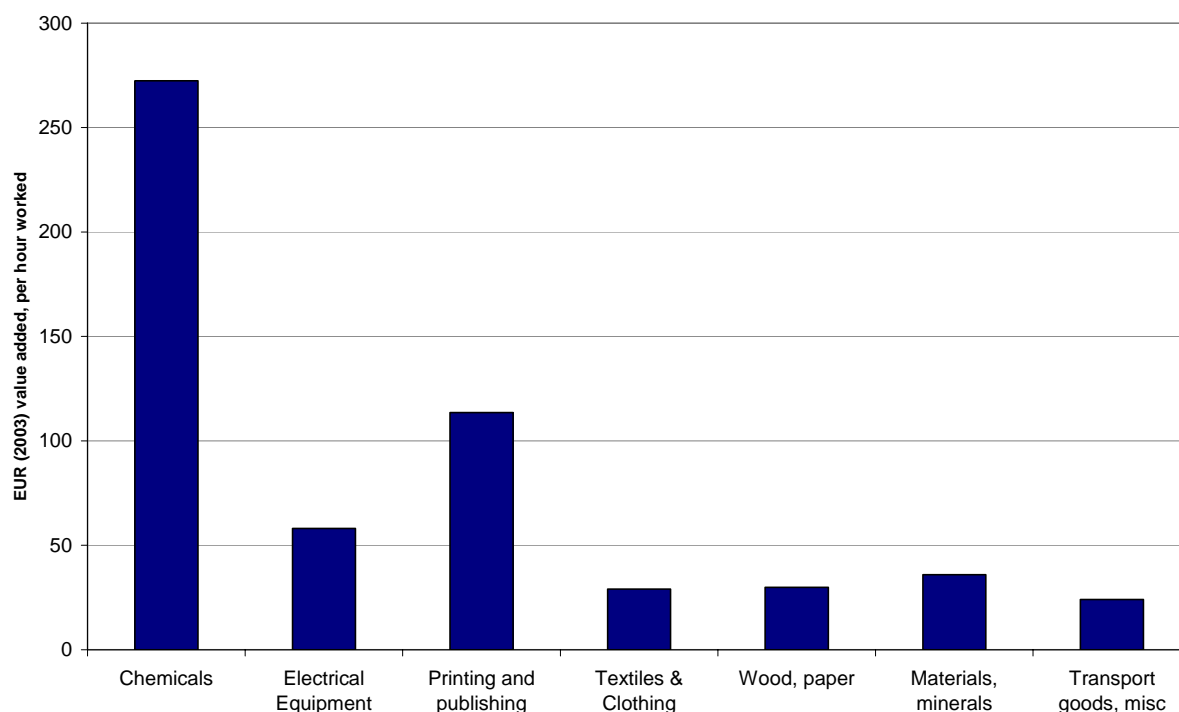
‘Modern’ manufacturing accounts for 6.6% of employment, more than in the EU and US.

Overall Performance

Figure 12 highlights Ireland’s dependence on modern manufacturing. The three sectors highlighted have vastly higher productivity statistics than all of the other sectors. Even within modern manufacturing, variation exists, with per-hour productivity appearing highest in chemicals. All three ‘modern’ sectors have performed extraordinarily well since 1980. The concern regarding the measurement of productivity in these sectors is that output figures that could be distorted by multinationals companies based in Ireland. While the high Irish output levels in modern manufacturing may represent world-beating levels of productivity, high productivity levels in modern manufacturing may include the returns from R&D, marketing and management practices undertaken by multinationals in other countries rather than in Ireland. One exercise in adjusting for this is described in Section 5.5.

Productivity is far higher than elsewhere in manufacturing. Traditional methods of measuring productivity may overstate true levels.

Figure 12: Output per hour worked across sub-sectors of manufacturing, Ireland, 2003 (€ 2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Chemicals

Employment in the chemicals sector increased steadily during the 1980s, from 1.3% of total hours worked to 1.6% and has been at or above this level since. In chemicals, productivity has risen from level of €16 per hour in 1980 to more than €250 per hour in 2003 (Figure A.7). Productivity in the chemicals sector in the EU and the US ranged between €70 and €85 per hour in 2003.

Per-hour productivity in chemicals is very high in Ireland ...

Electronics

In electronics, employment comprises 3.65% of total hours worked, higher than 1980 (2%) but falling from a peak in 2000 of 4.7%. Per-hour productivity in Ireland is now almost 300 times its quality-adjusted level for the early 1980s.¹⁰ Ireland's electronics sector has significantly higher productivity levels than the EU or the US (Figure A.8).

... and has grown 300-fold in electronics, where quality adjustments have been made.

Printing and Publishing

The printing and publishing sector, which includes the reproduction of software, accounts for approximately 1.3% of total hours worked, similar to its share in 1980 (1.2%). This masks a trough in 1984 (1.1%) and a peak in 1994 (1.5%). It is a sector comprising two very different sub-sectors, both traditional paper-based printing industries and more modern methods of reproduction, in particular reproduction of software.

Likewise, in printing and publishing (which includes software) productivity appears very high compared to elsewhere.

Printing and publishing, the most productive sector in manufacturing in 1980, has more than quadrupled its per-hour productivity since then (Figure A.9). There is an increasing gap between Ireland and other countries from the mid-1990s on, with per-hour productivity elsewhere between €30 and €40 but greater than €100 in Ireland in 2003.

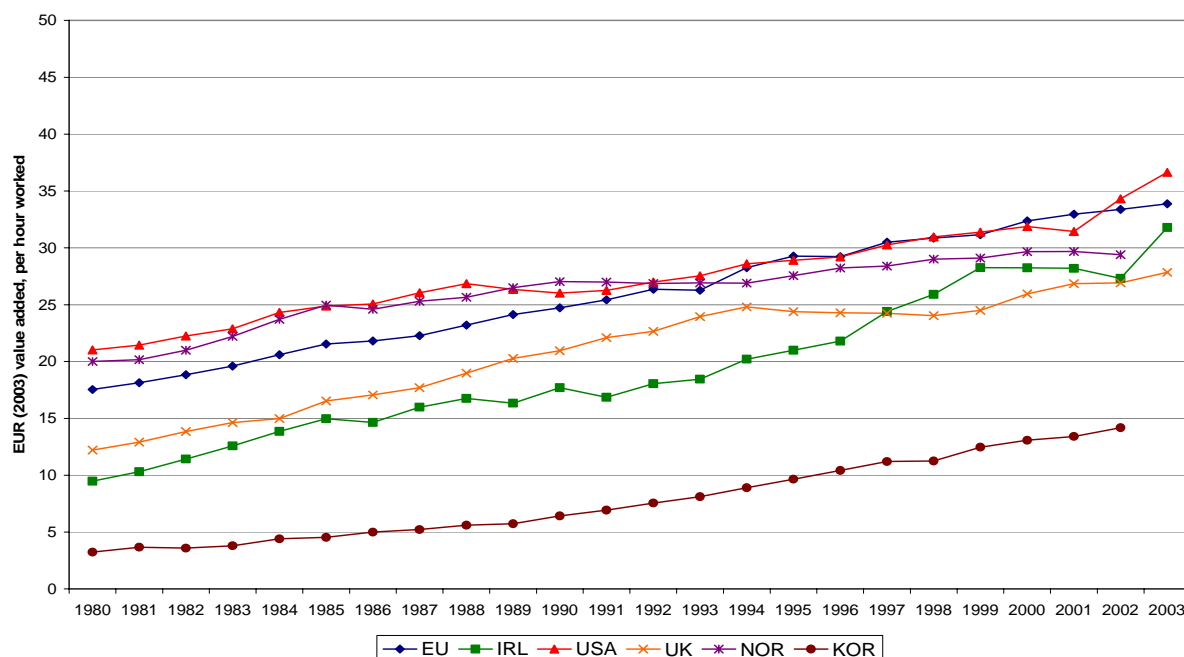
5.4 The "Traditional" Manufacturing Sector

'Traditional' manufacturing comprises textiles and clothing, wood, cork and paper products, various materials and metals, including coke, rubber, plastics and fabricated metal products, and a miscellaneous category, which includes transport manufacturing and furniture products. Data from the Irish Census of Industrial Production, outlined in Lane and Ruane (2006), indicate that over 90% of firms in 'traditional' manufacturing are Irish-owned. The employment share of this sector in Ireland is in decline, more than halving in the space of 20 years. It was 5.9% in 2003, down from 12.5% in 1980. This is below the US average (7.6%) and well below the EU average (11.6%).

'Traditional' manufacturing in Ireland employs less than 6% of the workforce, a share that has fallen from 12.5% in 1980. This is below EU and US averages.

¹⁰ Price and quality changes in the sector have been calculated with particular emphasis on the changes in microprocessor power that have occurred since 1980.

Figure 13: Output per hour worked in 'traditional' manufacturing, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Overall Performance

In this sector, the productivity performance was solid between 1980 and 1998 (Figure 13). During that period, productivity trebled and the performance was strong during the mid-1990s, at a time when other economies experienced little productivity growth. Between 1999 and 2002, however, productivity in traditional manufacturing in Ireland actually fell, while internationally productivity continued to rise. Whereas productivity grew by on average 6.4% during the 1980s and by 4.8% in the 1990s, the average for the period 1999-2003 was just 3%. Despite the growth, the productivity gap with the US and EU persists. As Figure 14 depicts, growth between 1980 and 2003 was of similar scale across all sub-sectors. Therefore, any weakness in traditional manufacturing would appear to be a sector-wide phenomenon, with the possible exception of textiles.

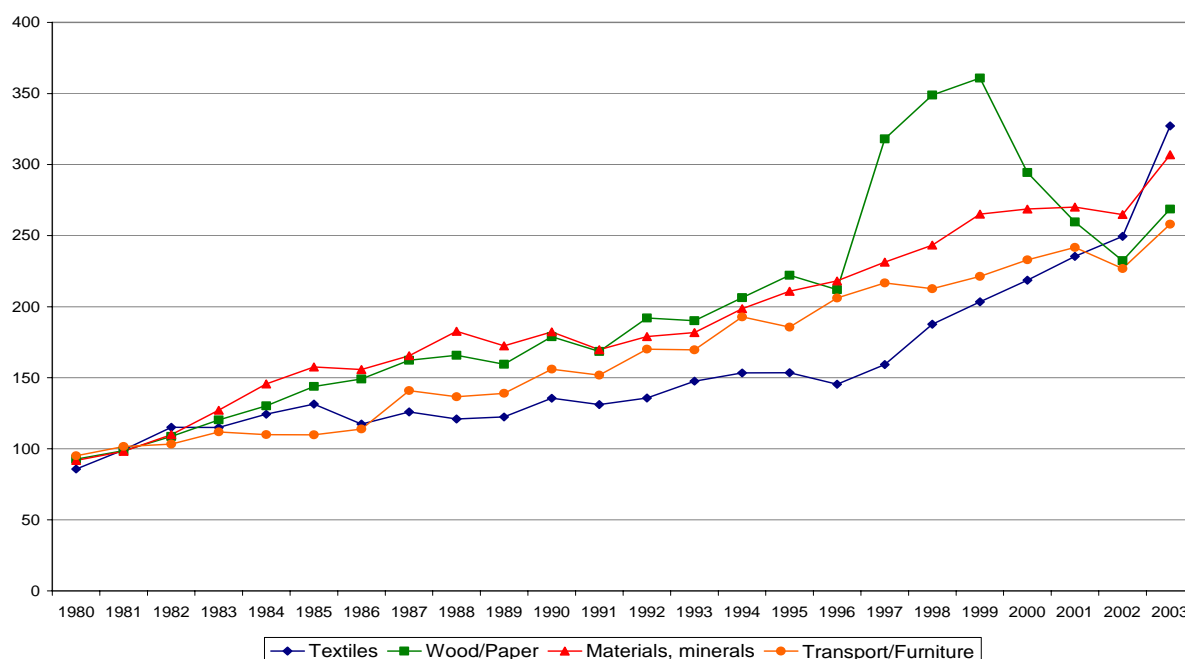
From the early 1980s to the late 1990s, productivity increased steadily. Growth has slowed however, particularly between 1999 and 2003. This has been spread across all sectors.

Textiles and Clothing

The textiles and clothing sector in Ireland has shrunk considerably, falling from 2.3% of total hours worked in 1990 to less than 0.5% in 2003. Ireland's relative productivity performance has improved over the period, with figures now above the US average (Figure A.3). As employment has fallen, productivity trebled since the early 1980s. While productivity in textiles is low by economy-wide standards, it is no longer the lowest of the traditional manufacturing sectors.

Productivity in textiles, a sector that has shrunk considerably since 1980, has trebled since the early 1980s.

Figure 14: Output per hour worked in 'traditional' manufacturing, Ireland, 1980-2003 (1980-1982=100)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Wood and Paper

Employment in the wood and paper sector has also fallen recently, from 1.2% of total hours worked in 1980 to 0.7% in 2003. Traditionally, of all traditional manufacturing sectors in Ireland, per-hour productivity was high in the wood and paper sector. The sector performed well up until 1999 with high productivity particularly in the late 1990s (Figure A.4). There was a sharp fall in productivity between 1999 and 2002. The US-Ireland productivity gap was 14% in 2003.

In wood and paper products, productivity has weakened since 1999, having performed reasonably well until then.

Materials and Minerals

Employment in materials and minerals has fallen gradually from 5.2% of total hours worked in 1980 to 3.3% in 2003.¹¹ This makes it the largest sub-sector within traditional manufacturing. Over that period, the sector in Ireland has narrowed the productivity gap with the rest of the EU and with the US (Figure A.5). Like other traditional manufacturing sectors, productivity growth in materials and minerals slowed after 1998, although there was a jump in value-added per hour worked in 2003.

In the largest sub-sector, materials and minerals, productivity has risen and the gap with the US has narrowed.

Transport and Furniture

Manufacturing of transport goods, furniture and 'miscellaneous' goods comprised 1.4% of total hours worked in 2003, down from 2.6% in 1980. Productivity grew relatively steadily, particularly in the decade between 1987 and 1997 (Figure A.6). The gap with US productivity fell from 60% in 1980 to just 32% in 2001. Slower productivity growth in Ireland, combined with stronger productivity growth in the US, widened the productivity gap in this sector to almost 40% in 2003. Korean productivity has almost converged with Irish levels in this sector.

In transport and furniture, employment has fallen and productivity gap with the EU and US has widened in recent years.

¹¹ This sector includes the manufacture of rubber and plastics, non-metallic mineral products, basic metals, fabricated metal products and mechanical engineering.

5.5 Alternative Estimates of Productivity in Modern Manufacturing

The figures for modern manufacturing - and as a consequence Irish manufacturing overall - are impressive, but there is concern regarding how accurately they reflect productivity in these sectors. Many multinationals are based in Ireland and have regional headquarters here. This means that output figures for Irish affiliates may include the returns from R&D, marketing and management practices undertaken by multinationals in other countries, rather than in Ireland.

Overall figures for manufacturing may reflect the concentration of MNC activities in Ireland.

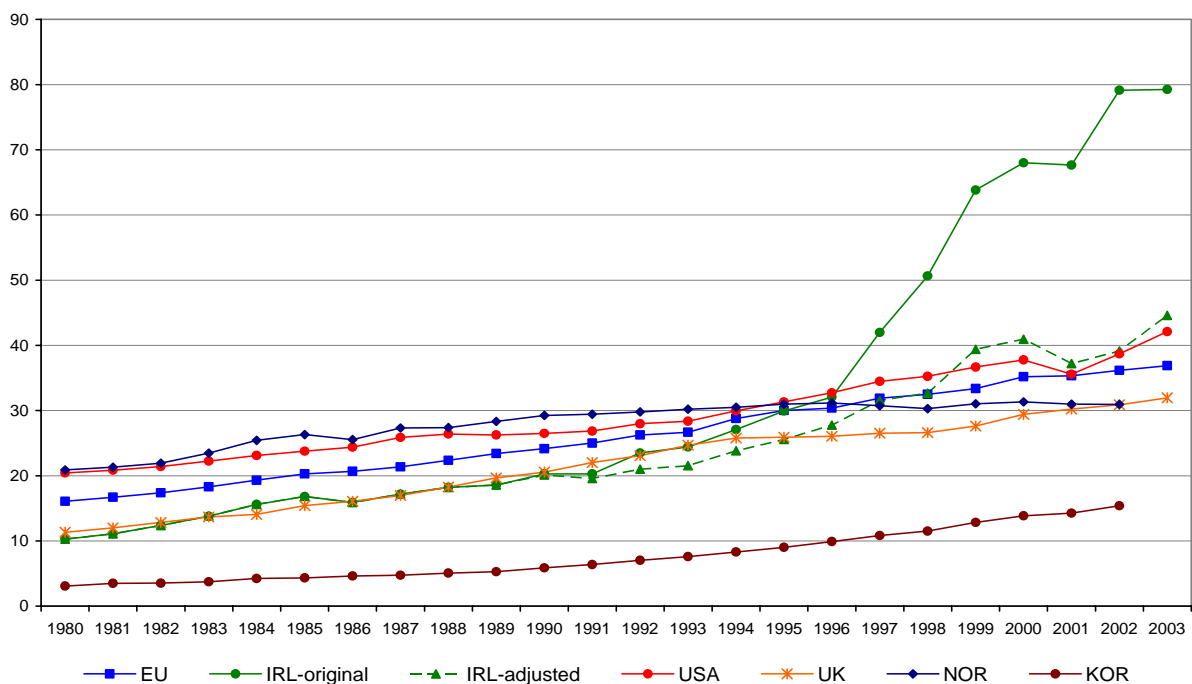
For an alternative estimate of Irish productivity in manufacturing, an adjusted series has been calculated. It substitutes American levels of per-hour productivity for Irish values, in modern manufacturing sectors for those years where apparent productivity in Ireland exceeds US levels (Figure 15). This allows for Irish productivity in these sectors to be among the highest in the world - which may be the case, given Ireland's export successes in these sectors - but it also gives some downward adjustment.

Setting per-hour productivity in these industries in Ireland to US levels to adjust for this...

The adjusted series almost halves manufacturing productivity levels in 2003. The original series continues to rise sharply in the late 1990s, reaching a level of over €80 in 2003. With the adjusted series, Irish manufacturing productivity still performs well internationally. It surpassed the EU and US averages in 1998 and, having dipped in 2001, exceeded €40 an hour in 2003. This reflects the assumptions about modern manufacturing and its strong employment weighting within Irish manufacturing.

...halves productivity in 2003, but still suggests strong average Irish productivity levels in manufacturing.

Figure 15: Output per hour worked in manufacturing, in selected economies, with adjusted figures for Ireland, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

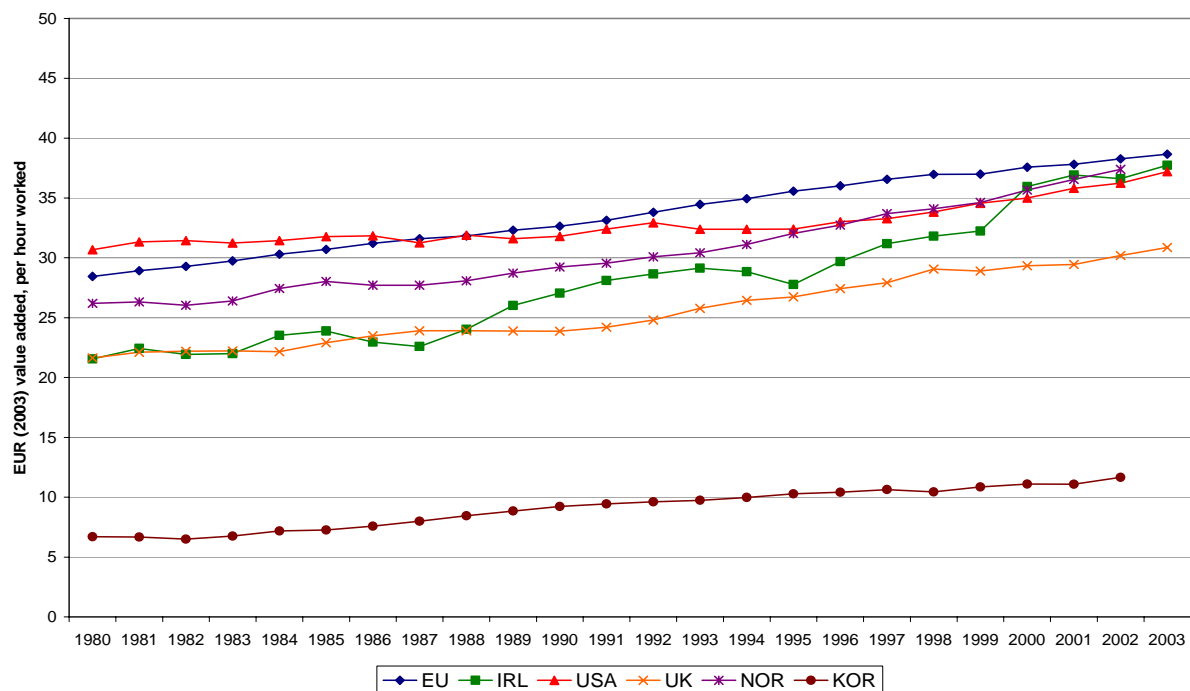
6. Services

SUMMARY

Services account for the bulk of employment in OECD economies, including Ireland, where its employment share increased from 51% in 1980 to 67% in 2003. Measuring productivity in services is more difficult due to unobservable variations in quality. A distinction is made between tradable and non-tradable services.

- Tradable services include computers/R&D and finance, where value added in Ireland is very high, and communications, where productivity has increased recently, but also tourism, where productivity remains low.
- Non-tradable services, where a significant productivity gap remains in utilities, while transport and the wholesale and retail trades have performed poorly. Public services require different methods to measure productivity. In public services, simple measures of overall productivity suggest that Ireland performs well relative to the public sectors of other countries.

Figure 16: Output per hour worked in services, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggd.net>; revised Irish figures from OECD National Accounts

6.1 Overview

The services sector now forms the bulk of OECD economies, accounting for just over 70% of total hours worked in the EU, almost 80% in the USA and almost 67% in Ireland. This marks a continuation of the shift away from agriculture through manufacturing which started with the spread of the Industrial Revolution. Figure 16 outlines the productivity performance of services across selected economies from 1980 to 2003. Overall, the productivity performance of services is generally growing steadily.

Services form the bulk of OECD economies. Value added measures of services productivity appear to be growing steadily.

A methodological issue with measuring productivity in the services sector is that it is more difficult to control for quality changes in services than in manufacturing. While manufactured goods have measurable attributes (e.g. the processing power of a computer), a key aspect of services is often an immeasurable quality (e.g. the attentiveness of staff at a restaurant or the quality of a hairstyle). In addition, given the high labour intensiveness and non-tradable nature of many services, increased output may simply reflect price inflation rather than growth in the quality or quantity of outputs.

VA methods have difficulty in capturing changes in the quality of services.

6.2 "Tradable" versus "Non-tradable" Services

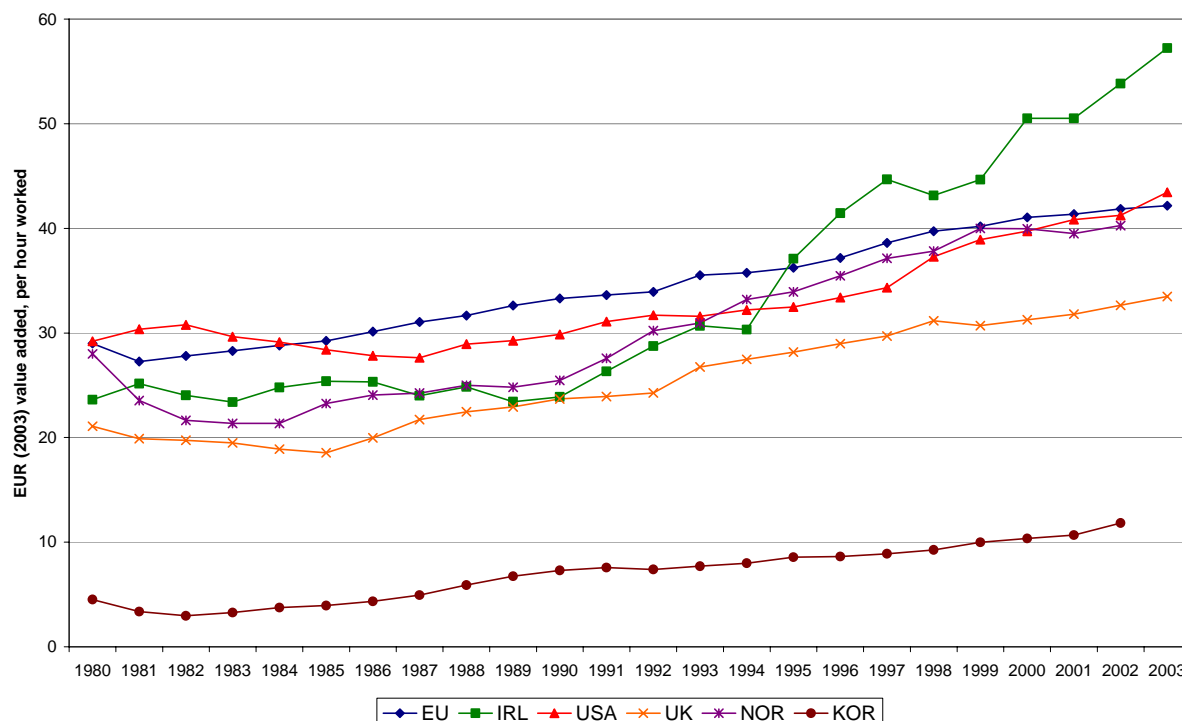
Just as a distinction was made within manufacturing between 'modern' and 'traditional', two segments of services are identified:

- 'tradable', comprising communications, tourism (hotels and catering), finance, and computers and R&D; and,
- 'non-tradable', which includes wholesale and retail trade, transport services, utilities (electricity, water, gas), real estate, public services and other services (including for example legal services and advertising services).

A distinction is made between two main segments of services, 'tradable' and 'non-tradable'.

This distinction is made on the basis of the broadly discernible difference between services that are or could be traded internationally and those that (currently) require proximity to consumer demand and are in that sense not internationally tradable.¹²

Figure 17: Output per hour worked in 'tradable' services, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

¹² Technological changes may be rapidly altering these distinctions, however; in education, it is now possible for grinds in mathematics to be given using VOIP software over the internet, e.g. from Indian PhD students to Irish undergraduates.

6.3 "Tradable" Services

The tradable services category includes communications, tourism (hotels and catering), finance and computers (including R&D). They are among the most productive sectors in the economy, according to value added methods. In Ireland, the sector comprised just under 15% of total hours worked in 2003, up from 10% in 1980. This is close to the US level (14.6%), while the EU average is lower, at 11.7%. Figure 17 outlines the productivity performance of tradable services since 1980. As was the case with modern manufacturing sectors, Ireland's productivity in tradable services appears very high when compared internationally, with productivity almost 50% higher than the EU or the USA.

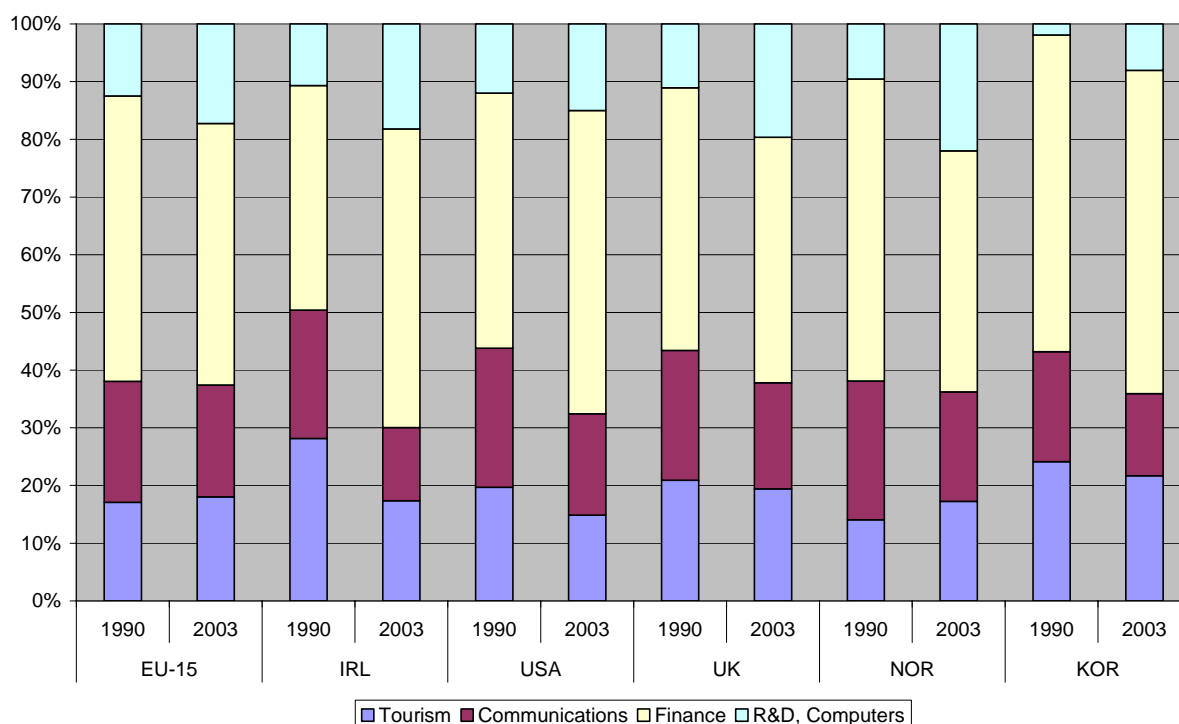
Tradable services include communications, tourism, finance and computers. Irish figures show it to be very productive on average.

Overall Performance

Figure 18 outlines the respective contributions to value added in 'tradable' services in 1990 and again in 2003. Despite its small employment share, communications makes a large contribution across all economies. Of all tradable services, productivity levels in tourism - in Ireland and elsewhere - are below those in other sectors and well below national averages. Finally, the contribution from Ireland's financial sector has grown considerably since 1990.

Communications forms a relatively large part of output. Ireland's finance sector has grown considerably since 1980.

Figure 18: Proportion of value added in tradable services attributed to sub-sector, in selected economies, 1990 and 2003 (%)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Communications

Employment in communications stood at 2.3% in 2003, down from 3.4% in 1980, the only tradable services sector to fall in size since 1980. In the early 1990s, productivity in communications started to increase noticeably and steadily. Across all economies, technological innovations have revolutionised existing means of communication and introduced new means of communication. As a consequence, the rate of productivity growth in communications has accelerated. Per-hour productivity was approximately €60 per hour in Ireland in 2003, on a par with the EU and the US averages (Figure A.10).

There have been large productivity gains in communications since 1995.

Tourism

Employment in the tourism sector in Ireland increased from 3.9% in 1980 to 6.4% in 2003.¹³ This makes it one of the largest sectors under consideration, as large as either traditional or modern manufacturing. However, productivity levels and growth rates are low, relative to the rest of the economy. Output per hour worked in Ireland is low compared to other sectors, with per-hour productivity below €20 per hour (versus an economy wide average of €41 per hour). In terms of growth rates, both in Ireland and internationally, productivity in the sector has been stagnant or falling slightly since 1980 (Figure A.11).

Productivity in tourism is low and stagnant. Irish productivity levels are between the EU and US averages.

Finance

Employment in the finance sector in Ireland has grown since 1980, from 2.2% to 4.2%. The statistics indicate that the Irish financial services sector is far more productivity than those in other leading countries (Figure A.12). Given the gap between the figures in Ireland and the figures for elsewhere since 1995, there is some concern that the presence of multinationals, particularly IFSC-based, has distorted apparent productivity in financial services in Ireland.

Productivity in finance is high, but the figures may be distorted by the presence of MNCs.

Computers and R&D

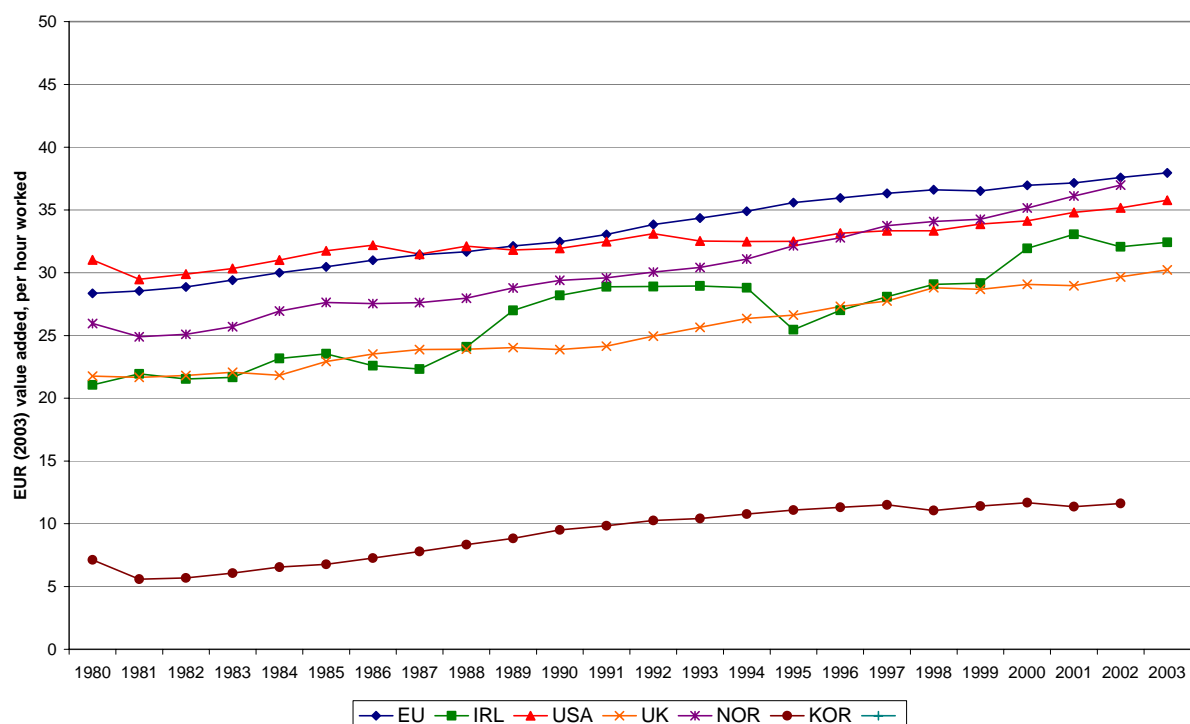
As is the case throughout the tradable services sector, employment in computers and R&D has grown substantially over the period under consideration, from 0.2% in 1980 to 1.2% in 2003.¹⁴ Based on value added measures, Ireland is a leader in productivity in the computers and R&D sector, with productivity three to four times the US/EU averages. The figures show a steady decline from 1980 until 1995, and an even sharper rise to 2000. Such sharp changes indicate that there may be distortions due to the presence of MNCs in Ireland. In the EU and the US, productivity is close to €50 per hour, a level that has risen, but not steadily, over the period covered (Figure A.13).

Productivity in computer services is high, but the figures may be distorted by the presence of MNCs.

¹³ Strictly speaking, what is classed here as the tourism sector is solely hotels and catering, which includes licensed premises. The tourism sector would not necessarily include all this activity, but would include substantial components of retail activity and other services.

¹⁴ The computers and R&D services sector includes: software and hardware consultancy and supply, data processing and databases, maintenance and repair and other computer related activities; and research and development in natural sciences, engineering, social sciences and humanities. The bulk of employment and of output comes from the computer services segment.

Figure 19: Output per hour worked in 'non-tradable' services, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

6.4 "Non-tradable" Services

Non-tradable services comprise wholesale and retail trade, transport, utilities, real estate, public services and other services. In Ireland, more than half of total hours worked are in this sector. In the EU and the US, the sector is bigger and comprised almost 60% and 65% of hours worked respectively. The non-tradable services sector is therefore by far the largest of all the broad sectors under examination. That is, a €5 increase in average per-hour productivity in this sector will make a much larger contribution to overall economic growth - and by extension living standards - than in any other sector, including manufacturing.

Non-tradable services form the single biggest broad sector of the economy. It is also the hardest sector in which to measure productivity.

Overall Performance

Caution must be exercised when using value added figures for non-tradable services. There are significant measurement issues surrounding the use of the method in relation to non-tradable services, as outlined in Section 6.1 and discussed in further detail for public services below. Figure 19 outlines the productivity performance in non-tradable services since 1980. It highlights that VA productivity levels in Ireland are generally above UK levels but below EU and US levels. Across all countries, productivity is generally rising.

The figures suggest that productivity is not significantly out of line with national averages.

Wholesale and Retail Trade

12% of total hours worked in Ireland are in wholesale and retail trade. This is on a par with the EU and US averages. Internationally, productivity levels in the sector are poor relative to economy-wide averages. Productivity has risen steadily across the board in most

Ireland's performance since 1980 in wholesale and

economies examined, including Ireland (Figure A.14). This masks an erratic performance from 1990 to 1998. Between 1998 and 2003, productivity has improved steadily.

retail trade has been erratic.

Transport Services

The employment share of transport has been stable at 3.9% in 2003 compared to 3.6% in 1980. The general productivity trend in the transport services industries is upwards, with the average EU productivity increasing from about €20 per hour in 1980 to €35 per hour in 2003 (Figure A.15). In Ireland, however, transport has performed poorly since 1998. Between 2000 and 2003, productivity averaged €25 per hour, below the economy-wide average of €41. The sector lags its EU and US counterparts by 25% and 15% respectively.

In transport services, Ireland has performed poorly since 1998 and productivity levels are low.

Utilities

Utilities - including electricity, gas and water supply - comprised 0.7% of total hours worked in Ireland in 2003, down from 1.2% in 1980. Internationally, the utilities sector has both the highest productivity levels and the fastest growth rates within the non-tradable services sector. Korea has performed particularly well since the early 1980s, while the UK - as well as the EU to a lesser extent - has closed the productivity gap with the US. Ireland, however, has performed least impressively of all countries (Figure A.16). While productivity in the Irish utilities sector grew from below €20 in the mid-1980s to €60 in 2003, there remains a large lag between Ireland and the USA (60% in 2003).

The performance of utilities in all economies has been strong. Ireland has performed well but a significant productivity gap remains.

It is instructive to compare the relative international performances of the communications and utilities sectors.¹⁵ These are areas that are susceptible to influence by government policy and where state-owned and former state-owned companies are dominant market players. While both are small in employment terms, they underpin the performance of the whole economy, given the services they supply. In communications - which has been significantly deregulated in recent years - Ireland's performance is on a par with the EU and US averages. In utilities, which is still largely under State control, per-hour productivity in Ireland has improved but still lags the US by about 60%.

In communications, there have been huge productivity gains, while in utilities, still under State control, a productivity gap remains.

Real Estate

Real estate comprises 0.7% of total hours worked, below the EU average. It is an extreme outlier in terms of per-hour productivity (Figure A.19). Due to the large sums with which the industry deals - and its percentage fee system - productivity appears to be very high.

Productivity is difficult to measure in real estate.

Public Services

Public services accounted for approximately 21% of total hours worked in Ireland in 2003, up from 16.6% in 1980. This compares with just under 22% in the EU and 26% in the USA. This means that it is the largest of the specific sectors under investigation and thus the most important in terms of the effect of an improvement in productivity. However, it is also the sector to which the value added approach is least applicable.

The public sector is the largest single specific sector...

¹⁵ Care is required in interpreting these figures. As utility companies are often monopolies, 'value added' may be reflecting profitability rather than productivity, thus overstating their absolute and relative performance.

'Value added' in the public service reflects payment to factor services by the government, rather than a market price capturing benefits to final users. Therefore, a government that decided to double salaries would double apparent productivity overnight. The figures available indicate that 'value added' in the public sector is generally stable, which is to be expected. There was a general upward trend in the EU and Norway but a general downward trend in the US. In Ireland, the per-hour figure rose sharply from 1987 to 1992 but was generally stable otherwise, and lay in 2003 at a level below the EU average (Figure A.17).

...but also the one to which value added is least applicable.

Measuring productivity in public services requires a change in emphasis, from inputs and expenditure to outputs and outcomes. These methods, and some preliminary findings, are discussed in more detail in Box 2.

Box 2 discusses measuring productivity in the public sector.

Other Services

Other services, including legal, technical and advertising services, the renting of machinery and services not elsewhere classifiable, comprised 11.7% of total hours worked in Ireland in 2003. This is below the EU and US averages of 14% and 16% respectively, but above the 1980 figure of about 7%.

'Other services' comprises 12% of the Irish workforce.

According to the figures, Irish 'other' services have high productivity levels, compared with other economies and relative to other sectors in the Irish economy. The worry with these figures is that they may reflect high prices in sheltered sectors of the economy, rather than high productivity of the workforce (Figure A.18).

Productivity levels are high, but there are concerns about measurement.

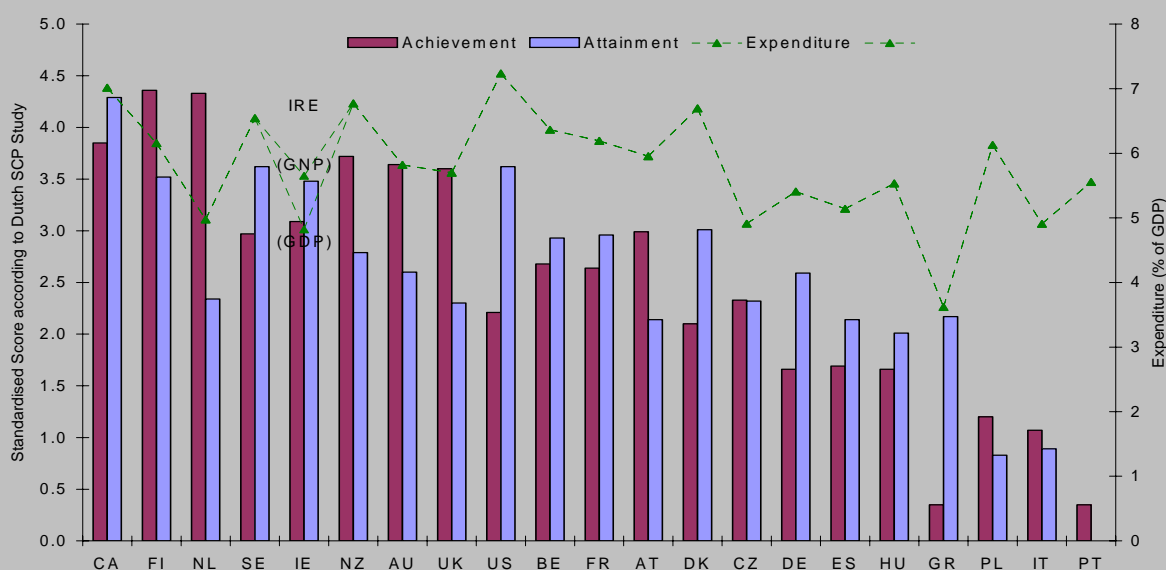
Box 2. Measuring Productivity in Public Services

Measuring productivity in public services is very important in gauging the overall labour productivity performance in an economy. This is not only because the public sector is the largest sector in the Irish economy (and indeed across the OECD), but also because of the importance of the services it provides. The civil service is responsible for designing and implementing policy and managing the broader public sector. The public sector also provides a wide range of services to citizens and businesses. In addition to their obvious direct benefits for citizens, the health and education sectors help determine the fitness and quality of the workforce in the economy.

As noted, the value added method of measuring productivity is not directly applicable to the public sector. This is because the services provided are generally non-market activities and thus do not command a price, so monetary *output* measures are difficult to develop. It is still possible to measure public sector productivity, by examining physical *outputs* and *outcomes* of various public services, relative to the amount of resources used. The current work of the Institute of Public Administration may lead to the development of more comprehensive measures of Irish public sector productivity in the future. Based on international literature, it is possible to provisionally assess the productivity performance of some key areas of the public sector: education, health and public administration. The following paragraphs review Ireland's performance based on international studies, before a discussion of estimating productivity for public sector organisations' corporate services functions.

In **education**, the quality of outcomes can be assessed in terms of both *achievements* (on internationally standardised test results) and population-wide *attainments* (e.g. proportion with qualifications). By combining both sets of indicators to get one measure of outcomes (as the Dutch SCP Office have done), this may then be set against the costs of education (e.g. in euro or number of hours worked) to measure productivity. Figure B2.1 ranks the composite education score of 21 EU and OECD countries for 2001, comprising achievement (reading, maths, and science) and attainment (in the 25-34 age group). Ireland (IE) ranks fifth strongest overall in terms of outcomes (the average of achievement and attainment).

Figure B2.1 Composite Score in Education, with Expenditure on Secondary Axis



Source: Social and Cultural Planning Office, Netherlands; OECD Education at a Glance

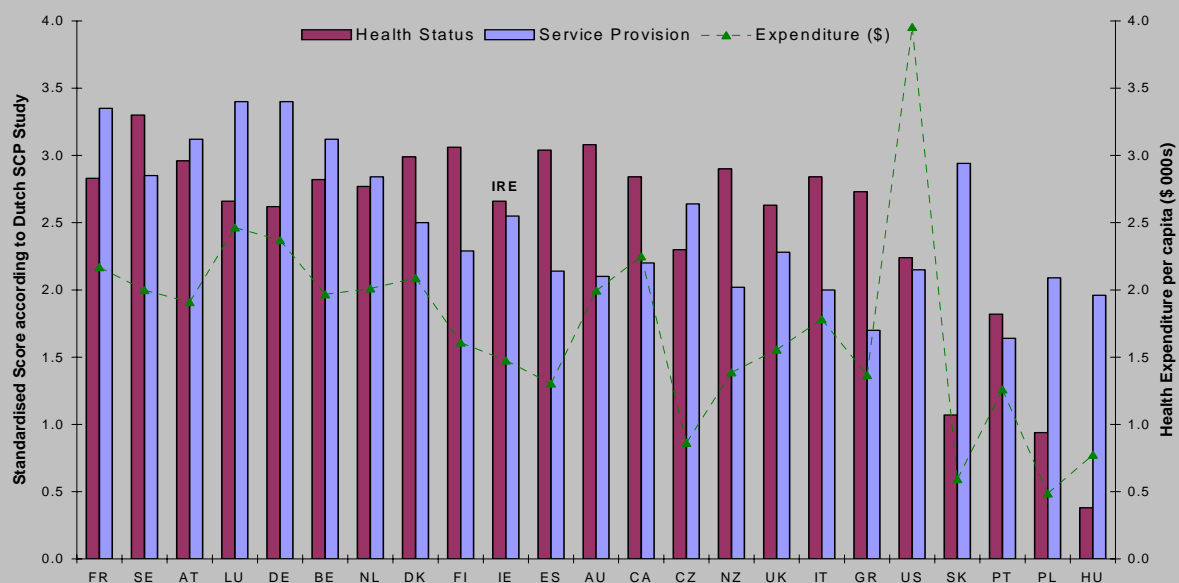
Box 2. Measuring Productivity in the Public Sector (continued)

To give an indication of productivity, Figure B2.1 also plots expenditure on education, as a proportion of GDP (and GNP for Ireland) over the period 1995-2001. Ireland spends a below average proportion of its national income on education. Dividing the composite score by expenditure provides a crude productivity score. Ireland performs the best among the countries if GDP figures are used. If GNP figures are taken, Ireland still lies among the top performers. Overall there is some correlation between expenditure and outcomes, although the experiences of the USA and Denmark indicate that using high levels of resources does not guarantee the best outcomes. Further research is required to quantify outputs and outcomes of the education system and to assess the relationship between expenditure and outcomes.

The quality of the **healthcare** sector can be measured through the success of its aims - the extent to which outcomes are achieved (health status) - and the success of its processes - the means by which the outcomes are achieved (service provision). The aims (e.g. *low mortality rates, high life expectancy, high proportion of healthy years*) can be combined into an indicator of health status (as calculated again by the Dutch SCP Office). The quality of service provision in healthcare can also be measured, looking at key components such as inpatient care (*occupancy rate*), outpatient care (*doctor's consultations*) and public confidence. It is then possible to assess productivity of the health system comparing these indicators to the costs and the human resources involved.

Figure B2.2 measures outcomes in the health sector, combining outcomes and processes. Ireland ranks 10th. Like education, this ranking is adversely affected by the quality of outcome - in this case, health status. Figure B2.2 also plots expenditure per capita (1990-2001 average) and shows a reasonably clear positive relationship between resources expended and overall score in health, aside from the USA, which again performs poorly. Dividing the composite score by expenditure provides a crude productivity score: Ireland performs slightly above average. This assumes that national health systems alone determine these health outcomes. In reality, they are also determined by cultural and environmental factors. Finally, using alternative outcome indicators, from for example the Euro Health Consumer Index, would give Ireland a poorer ranking.

Figure B2.2 Composite Score in Health, with Expenditure on Secondary Axis

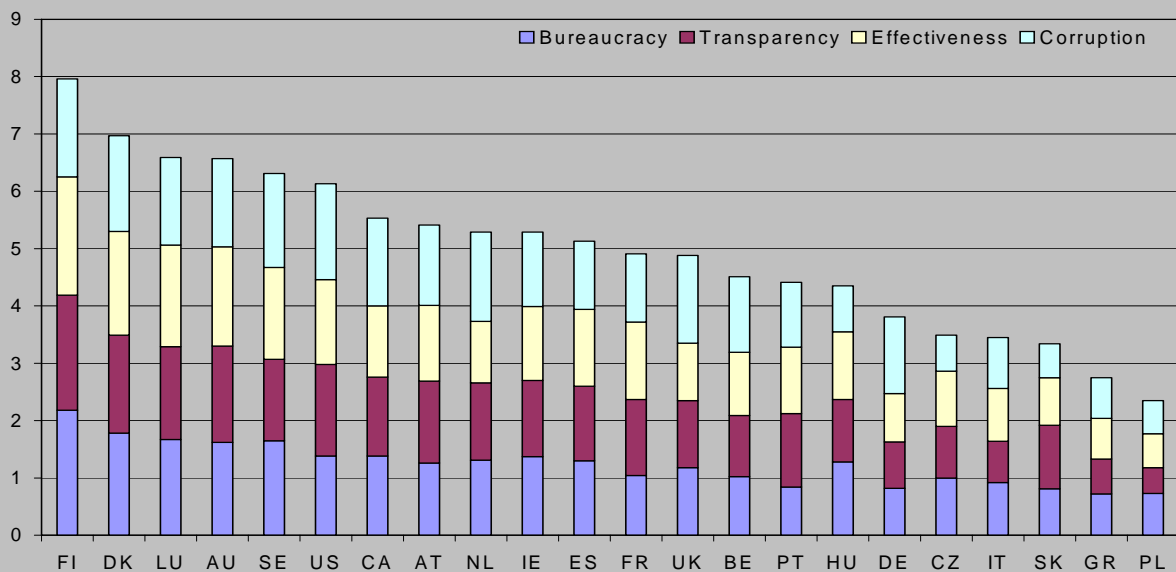


Source: Social & Cultural Planning Office, Netherlands; OECD Health at a Glance

Box 2. Measuring Productivity in the Public Sector (concluded)

The quality of **public administration** is difficult to measure given its broad range of functions. The SCP office has used survey data from IMD and Transparency International to derive standardised scores on the quality of public administration, with weighting given to bureaucracy, transparency, effectiveness and corruption. A high score indicates a stronger performance. Ireland performs just above the median country, below North American and Scandinavian countries but above Mediterranean and most continental European countries.

Figure B2.3 Quality of Public Administration



Source: Social & Cultural Planning Office, Netherlands

Lastly, many functions within the public sector have private sector equivalents, in particular **corporate services** (e.g. human resources, IT services, finance and accounts, public/media relations). By selecting organisations with similar attributes such as size, it is possible for public sector organisations to benchmark their inputs and outputs. However, limited public information is available in this area.

In summary, measuring public sector productivity is not straightforward. The value added method of productivity is often not applicable. However, it is very important to have some benchmarks of productivity in the sector, with public services comprising more than 20% of all hours worked in Ireland in 2003. To measure productivity, it is necessary to shift the focus from inputs to physical outputs and outcomes instead. By analyzing these in conjunction with the resources used, one can gain an insight into the productivity performance of this sector.

Preliminary evidence suggests that in education and health, which comprise almost one-sixth of the workforce, Ireland has higher productivity levels than the OECD average. There are issues around service provision and services quality, however, as well as around the indicator chosen. Given the importance, diversity and complexity of the public sector, an in-depth assessment of the productivity performance of Ireland's public sector is merited.

7. Summarising Ireland's Productivity Performance Since 1980

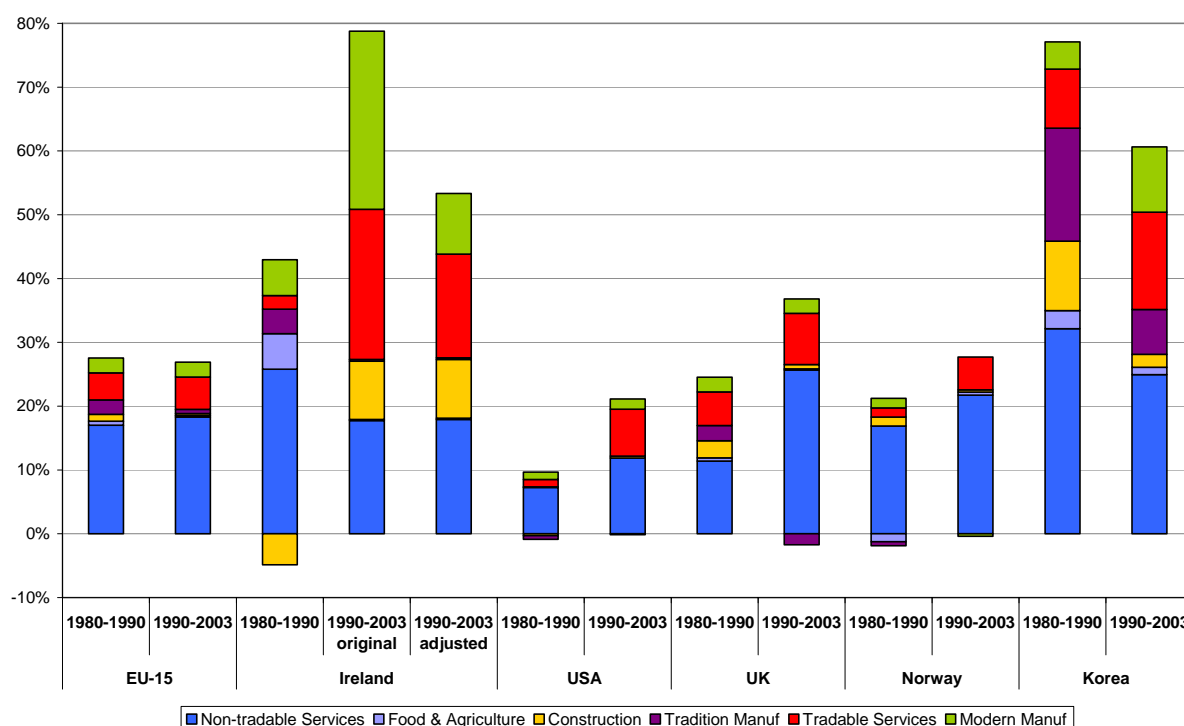
7.1 Where has Ireland's Productivity Growth come from?

Figure 20 examines the overall percentage change in per-hour productivity across the periods 1980-1990 and 1990-2003, and attributes those changes to broad sectors. For the latter period, it includes the adjusted Irish series, as described in 5.5 and applied to modern manufacturing and also to finance and computer services.¹⁶

Services have driven productivity growth in the EU/US.

Due to its large size, the non-tradable services sector typically forms the largest component of productivity growth in each economy and period.

Figure 20: Percentage change in per-hour labour productivity (€2003), attributed to broad sectors, in selected economies, 1980-1990 and 1990-2003, with adjustments for MNC activities in Ireland



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

During the period 1990-2003, Ireland's non-adjusted productivity gains were driven by the modern manufacturing sector - of the 78% increase in per-hour productivity over that period, over one-third (28%) can be attributed to a sector which employs less than 7% of the total workforce. Tradable services accounted for a further 24% while construction also made a noticeable contribution to productivity growth. Traditional manufacturing and agriculture/food processing, on the other hand, made contributions to Ireland's per hour productivity that were no greater in 2003 than they were in 1990. This was driven by their falling employment shares. During the same period, productivity gains in the EU and the USA were almost solely driven by services - with small gains in

Between 1990 and 2003, modern manufacturing - and construction and tradable services - dominated Ireland's productivity growth.

¹⁶ This adjustment is made throughout the period in Computers/R&D, from 1992 in Chemicals, from 1994 in Printing/Publishing, and from 1999 in Electronics.

modern manufacturing also in both economies.

7.2 Ireland's Overall Performance

The adjusted productivity estimates suggest that Irish per-hour productivity has risen by 53% in the period 1990-2003, or by 3.3% per annum, rather than the 4.6% suggested by the original figures. These revised figures are summarised below, in Table 2.1. Figure 21 presents economy-wide average productivity level using the original and adjusted figures for Ireland. It shows that Ireland has performed well since 1980, with labour productivity doubling over the period. However, similar to GNP figures presented in Section 2.1, the adjusted figures suggest that Ireland has not yet converged with the EU and US averages, lagging by over €3 an hour, or about 8%.

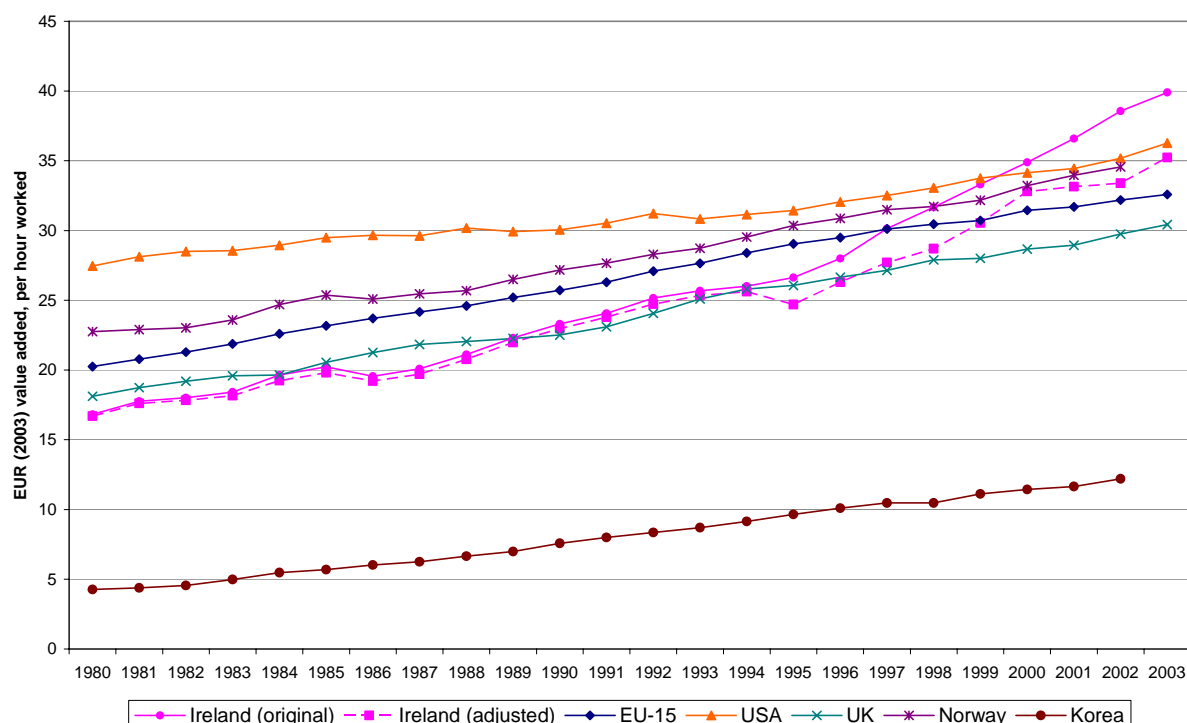
Adjusting for MNC activities suggests that productivity grew by 3.3% a year from 1990 to 2003.

Table 2.1 Average annual percentage change in per-hour labour productivity in selected economies, with adjustments for MNC presence in Ireland

	EU	Ireland (original)	Ireland (adjusted)	USA	UK	Norway	Korea
1980-1990	2.46%	3.24%	3.28%	0.85%	2.22%	1.78%	5.88%
1990-2003	1.85%	4.57%	3.34%	1.48%	2.34%	1.88%	3.71%

Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure 21: Per-hour labour productivity (€2003) in selected economies, 1980-2003, with adjustments for MNC activities in Ireland



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

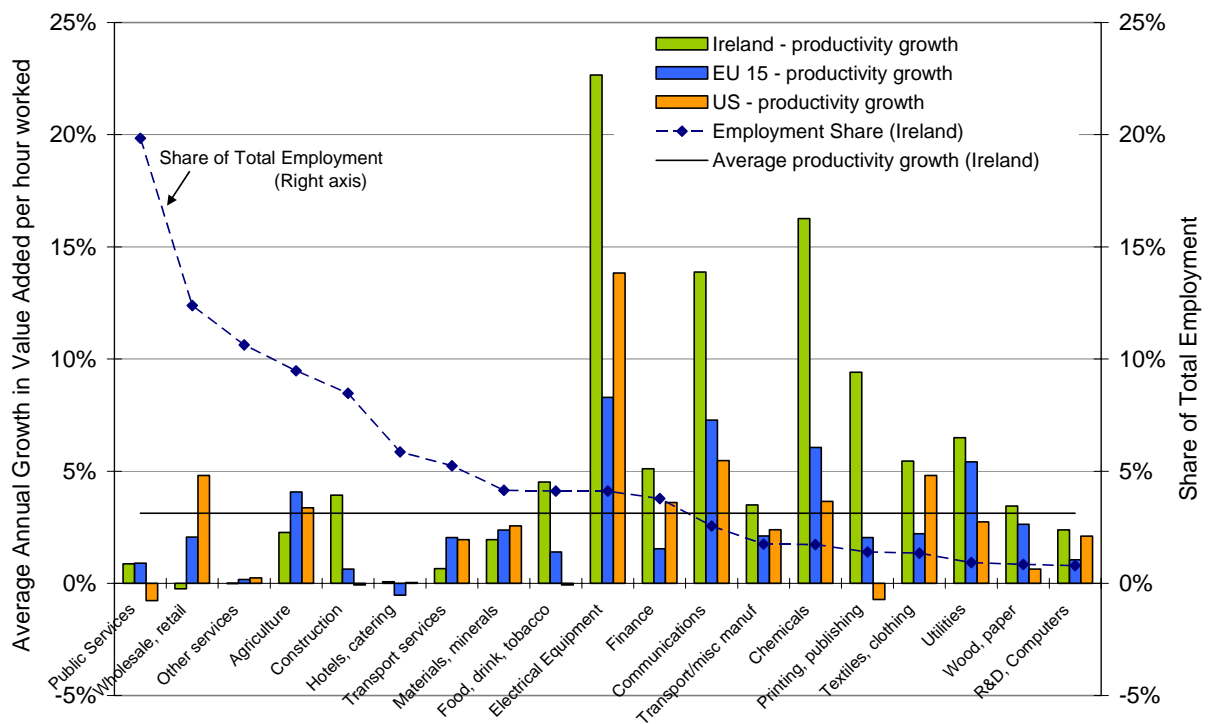
7.3 The Base of Ireland's Productivity and Ireland's Productivity Growth

The final two figures cover productivity growth and productivity levels in Ireland, the EU and the USA. Figure 22 charts average productivity growth, with the sectors arranged from left to right by employment share in Ireland, over the period 1990-2003. It highlights the narrow base of Ireland's productivity performance. Of the eight largest sectors in Ireland, seven sectors comprising over two-thirds of all hours worked over the period 1990-2003 show below average or negative growth in productivity. Of the large sectors in Ireland, only in construction did productivity noticeably improve.

Ireland's productivity growth has had a narrow base, with small sectors performing best and larger sectors performing poorly. This is, however, broadly in line with the EU and US averages.

The sectors recording the highest levels of productivity growth were sectors accounting for less than 5% of the workforce each and are concentrated in modern manufacturing and tradable services. It should be noted that this pattern is not significantly different from the EU-15 and US averages, which are also plotted. One important exception is the performance of the wholesale and retail trades, particularly in the USA, where the sector recorded above average growth during the period.

Figure 22: Average Productivity Growth by Sector, ranked by Employment Share, in Ireland, the USA and the EU-15, 1990-2003

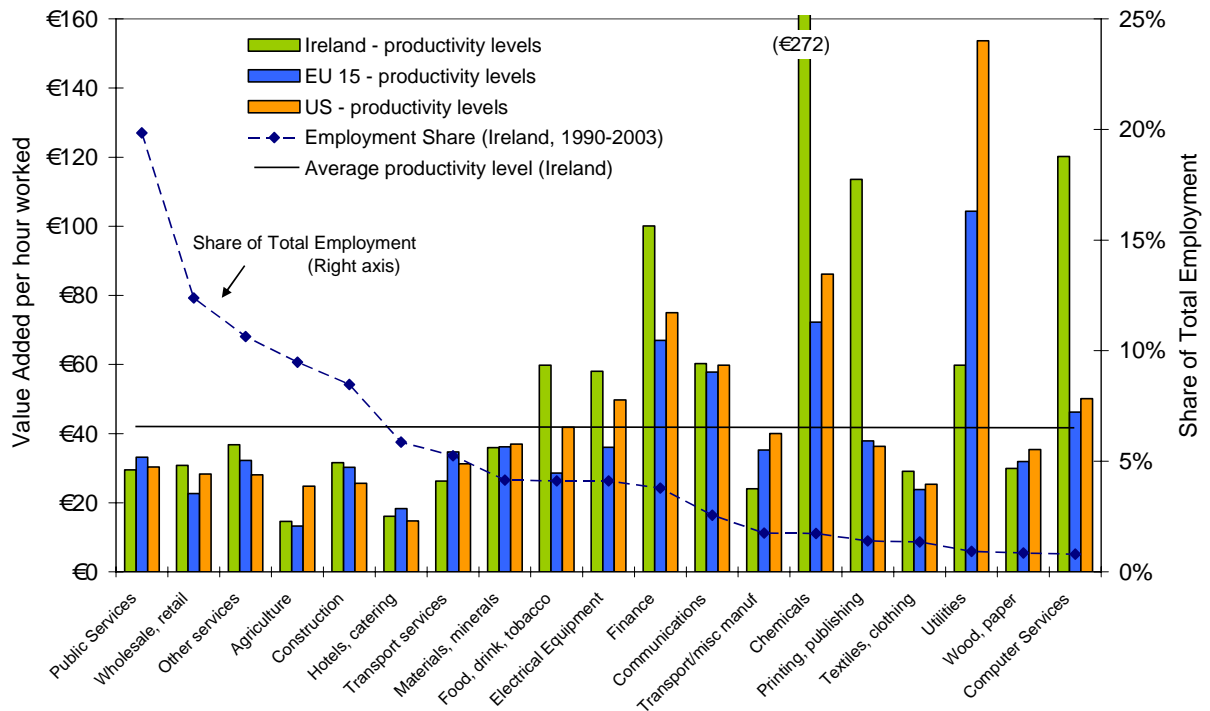


Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure 23, lastly, charts average productivity levels in 2003, with the sectors arranged from left to right by employment share over the period 1990 to 2003. Due to different factor weightings across sectors, cross-sectoral comparisons may be less instructive than international comparisons. Again, the larger sectors have below average productivity levels while smaller, typically internationally trading, sectors perform better than the economy wide average.

Productivity levels are below average in Ireland's largest sectors.

Figure 23: Average Productivity Levels by Sector, ranked by Employment Share, in Ireland, the USA and the EU-15, 1990-2003

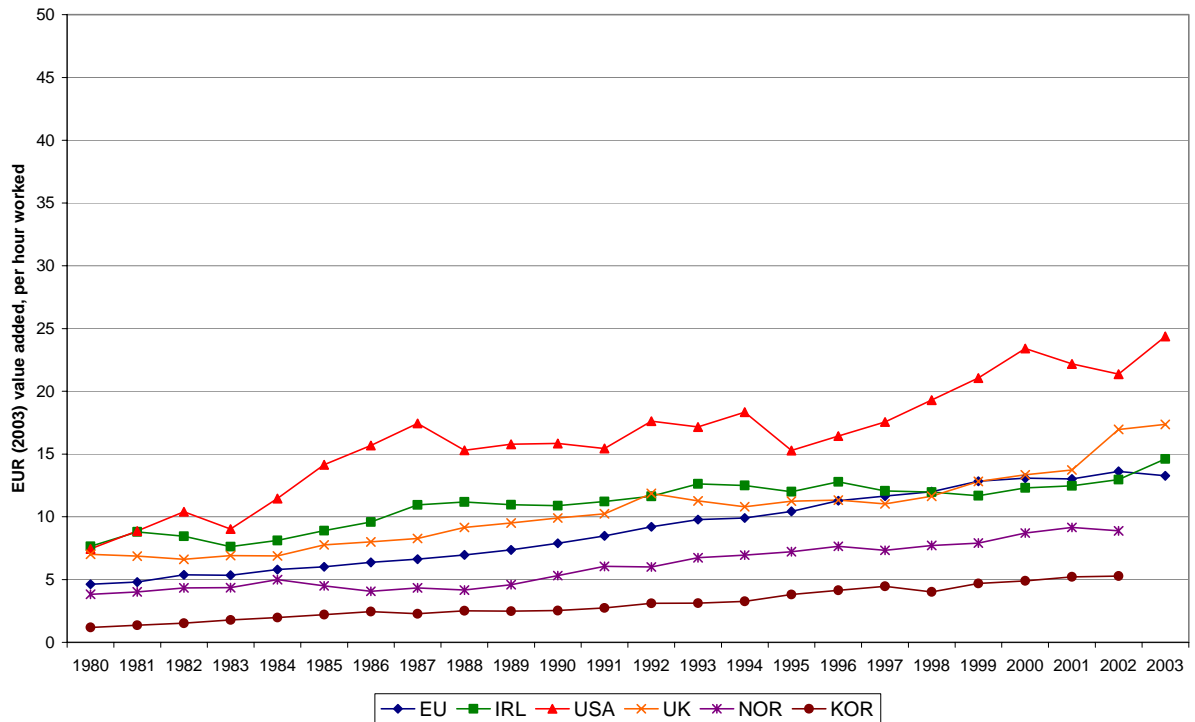


Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

**Detailed Assessment of Ireland's
Productivity Performance
1980-2005**

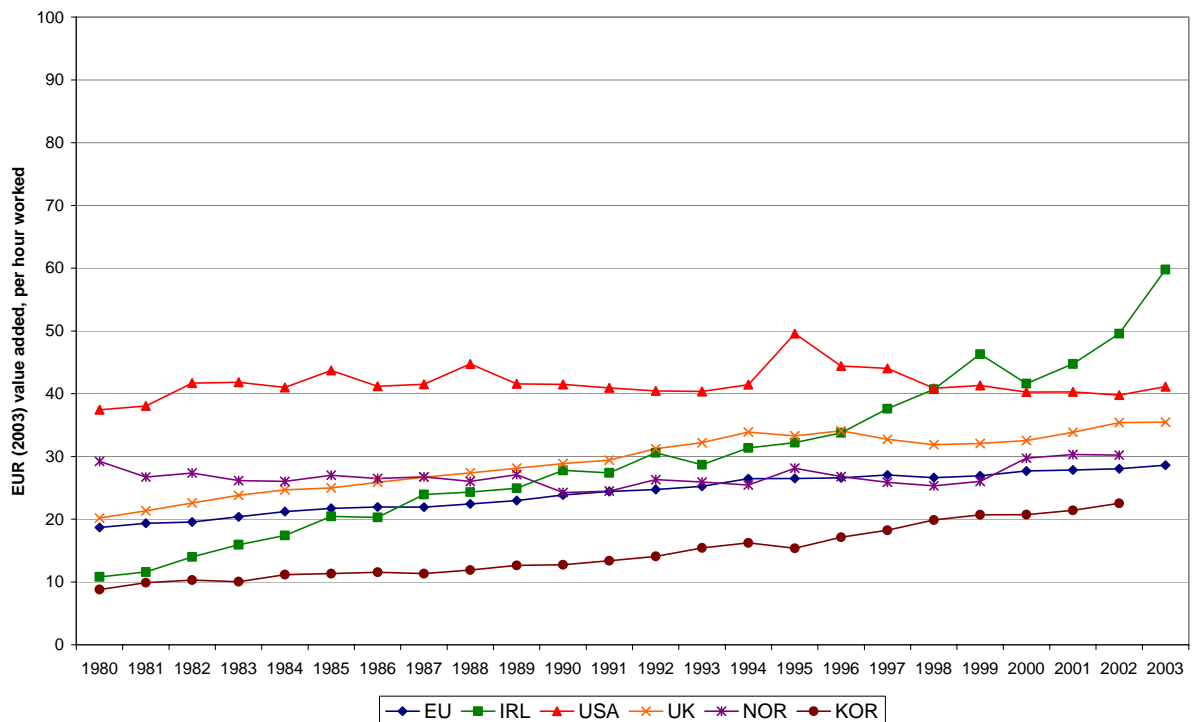
**Appendix:
Per-hour productivity
in specific sectors, 1980-2003**

Figure A.1 Output per hour worked in basic agriculture, in selected economies, 1980-2003 (€2003)



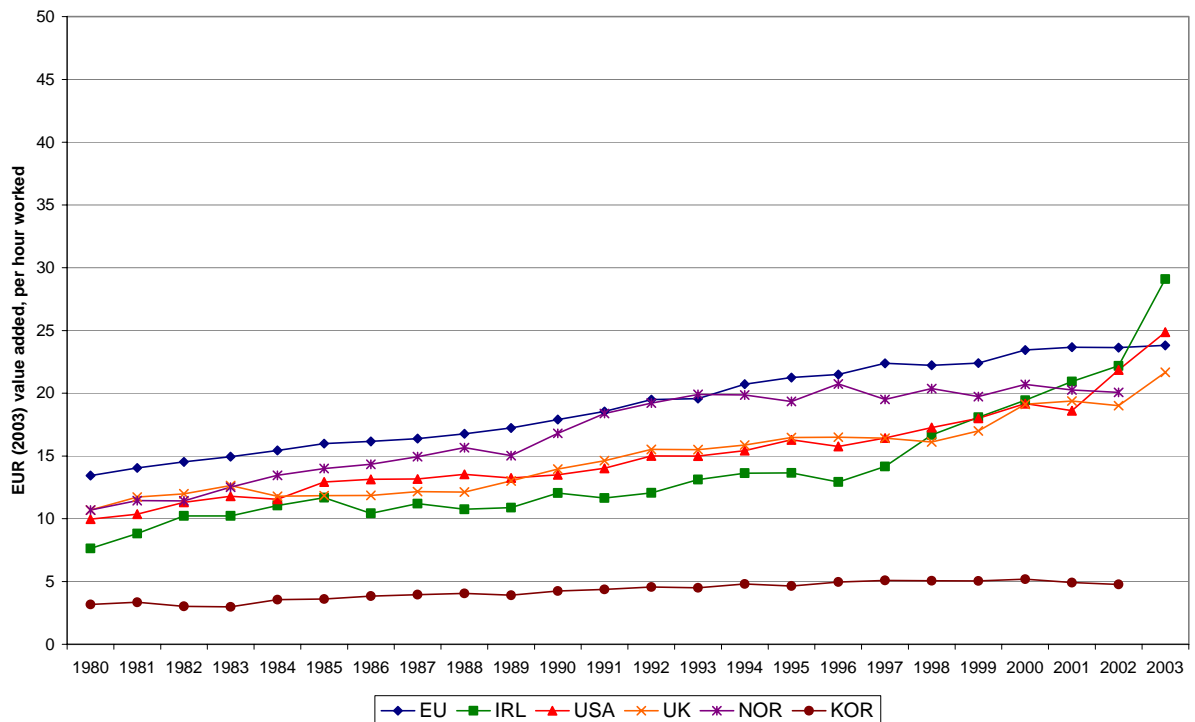
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.2 Output per hour worked in food, drink and tobacco, in selected economies, 1980-2003 (€2003)



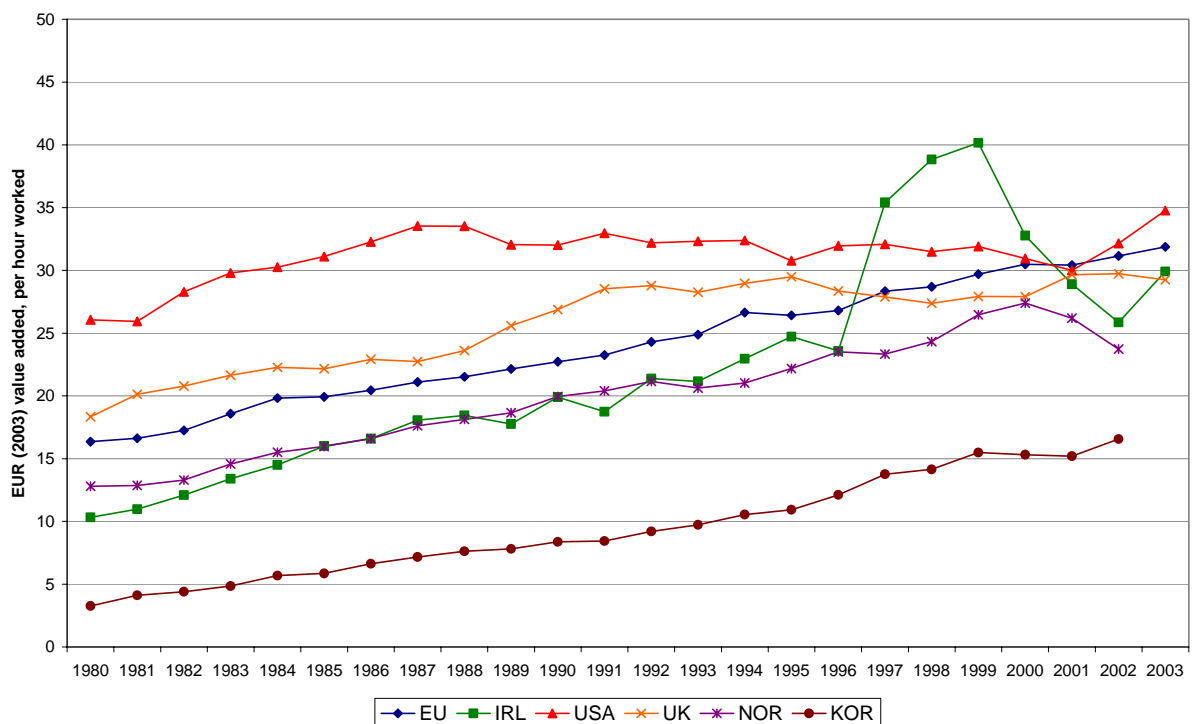
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.3 Output per hour worked in textiles and clothing, in selected economies, 1980-2003 (€2003)



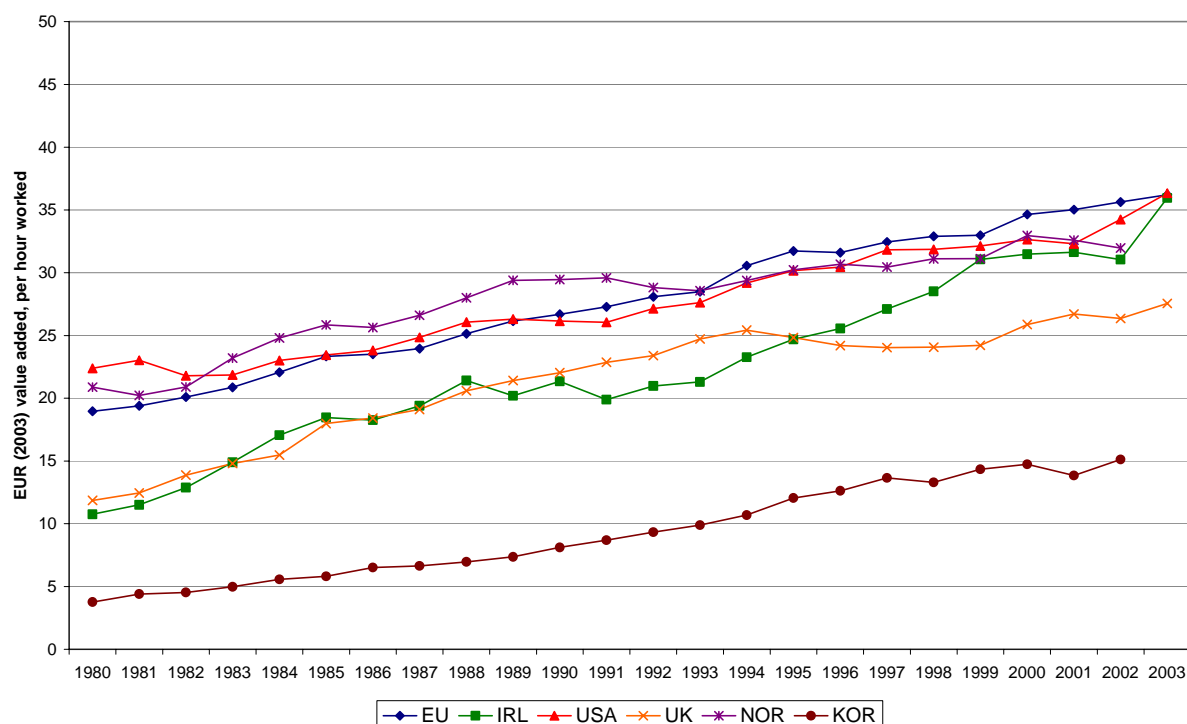
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.4 Output per hour worked in wood and paper, in selected economies, 1980-2003 (€2003)



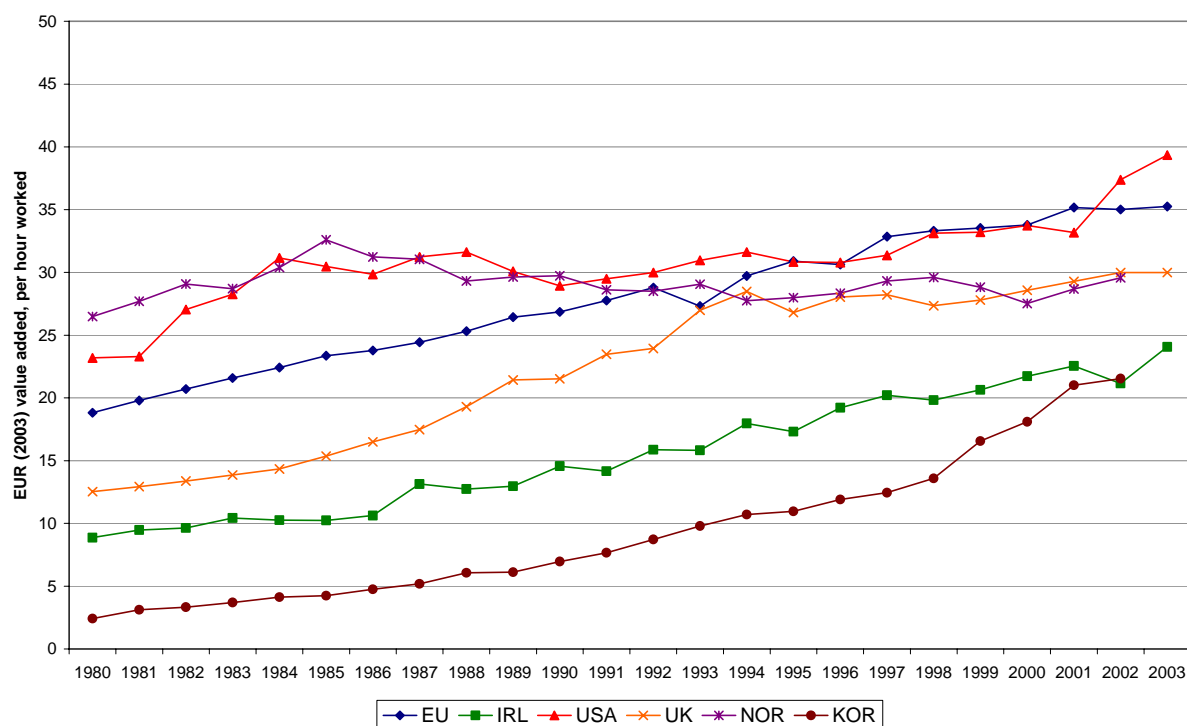
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.5 Output per hour worked in materials and minerals, in selected economies, 1980-2003 (€2003)



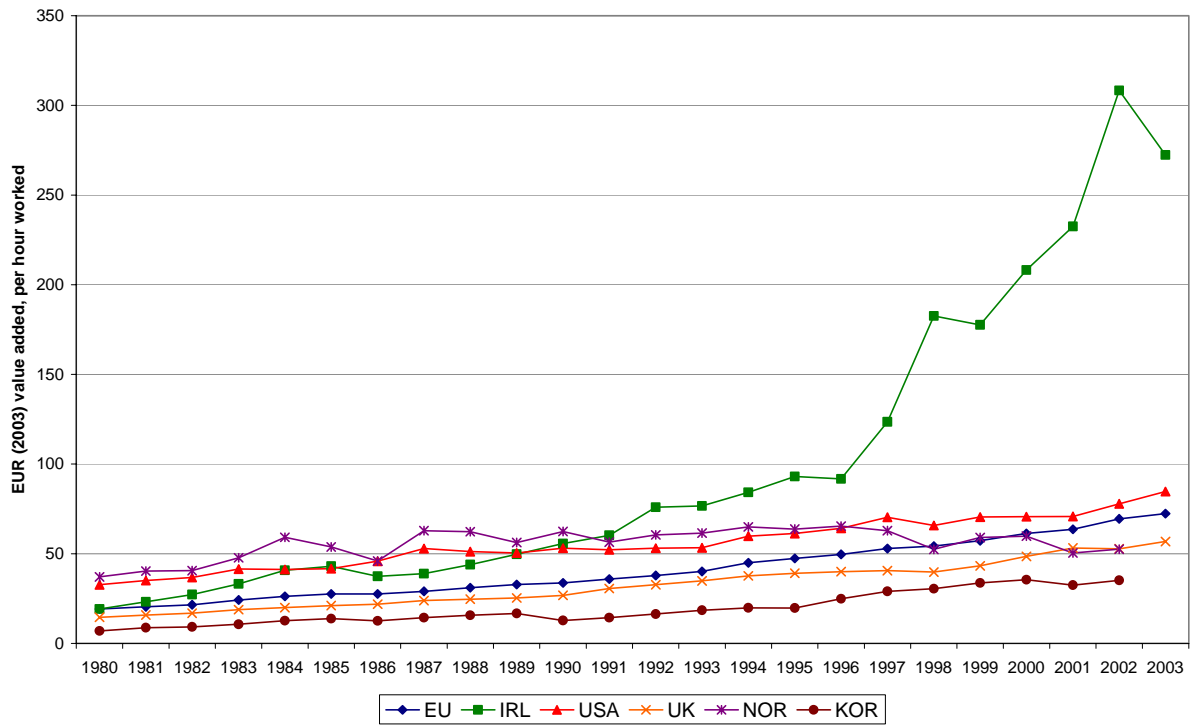
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.6 Output per hour worked in transport and furniture, in selected economies, 1980-2003 (€2003)



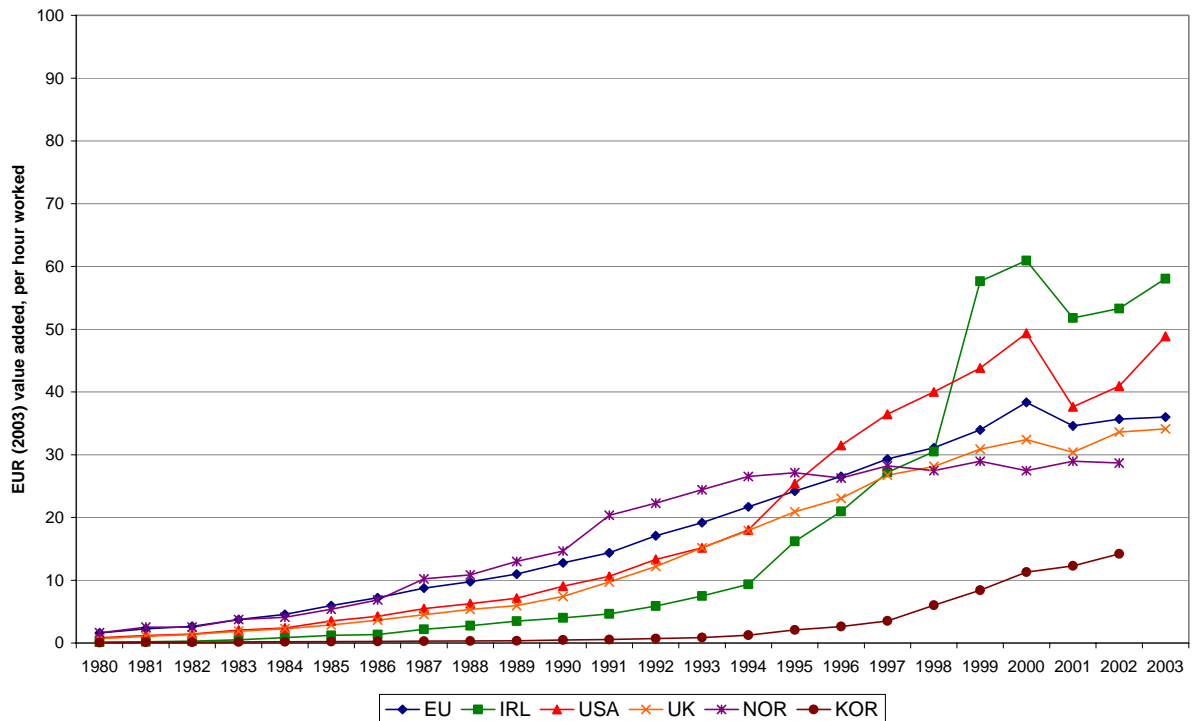
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.7 Output per hour worked in chemicals, in selected economies, 1980-2003 (€2003)



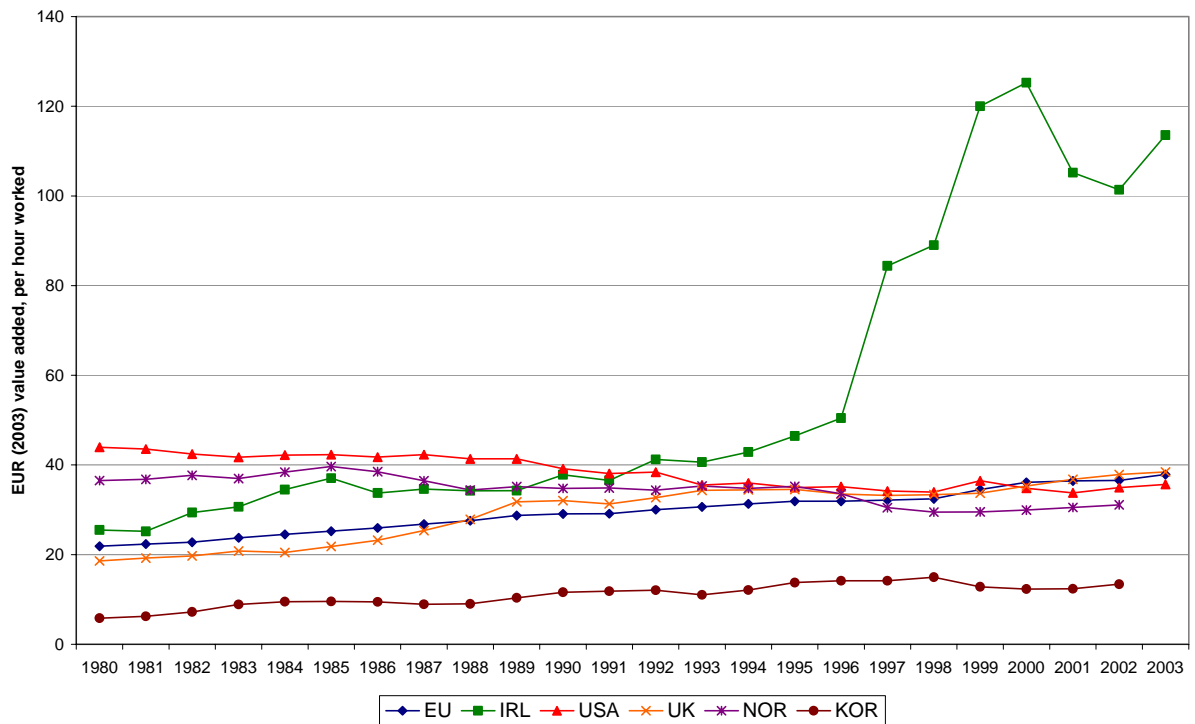
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.8 Output per hour worked in electronics, in selected economies, 1980-2003 (€2003)



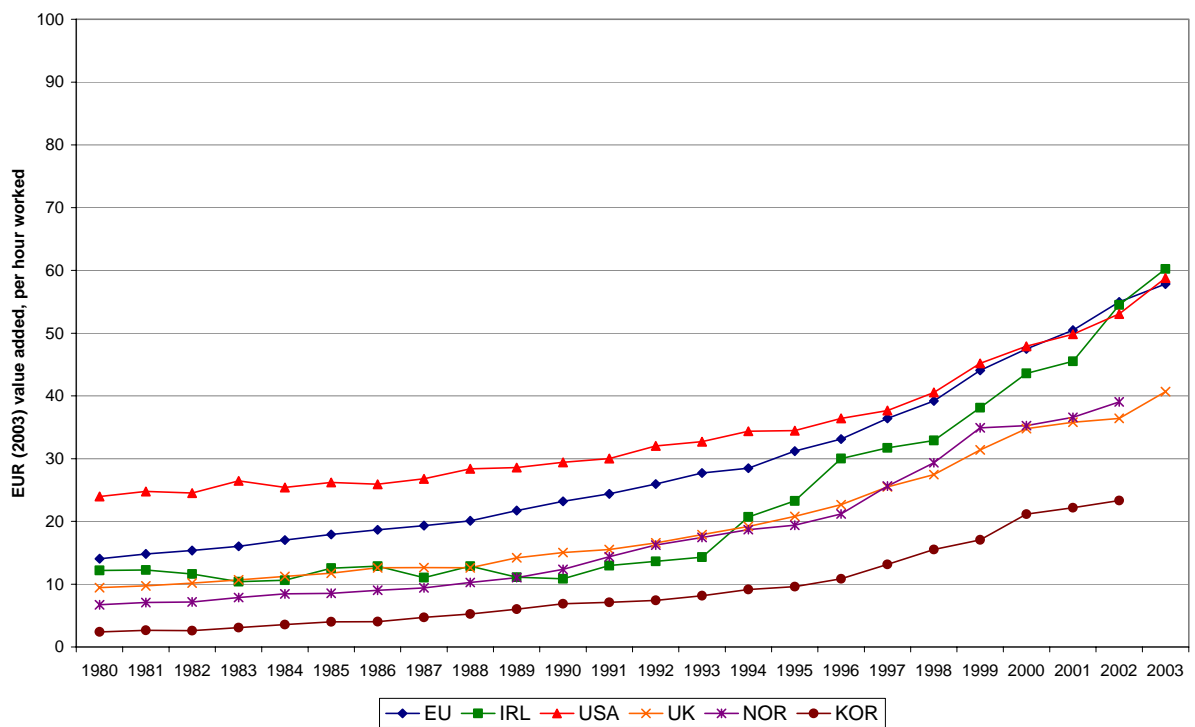
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.9 Output per hour worked in printing and publishing, in selected economies, 1980-2003 (€2003)



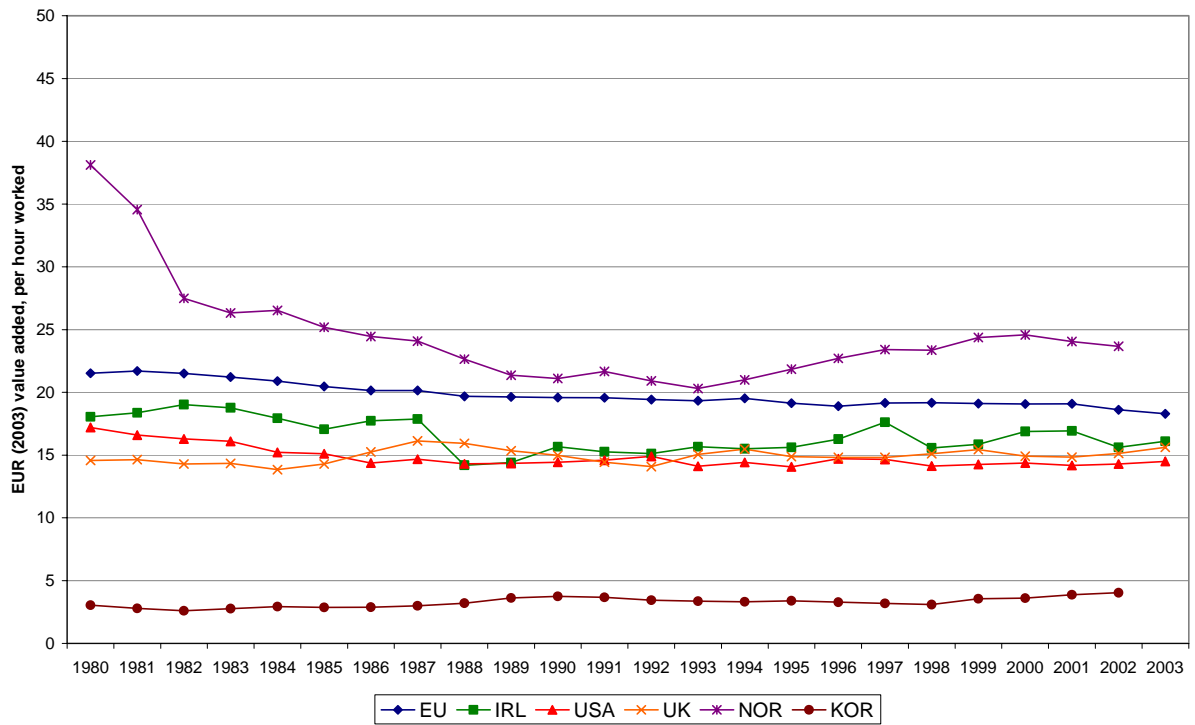
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.10 Output per hour worked in communications, in selected economies, 1980-2003 (€2003)



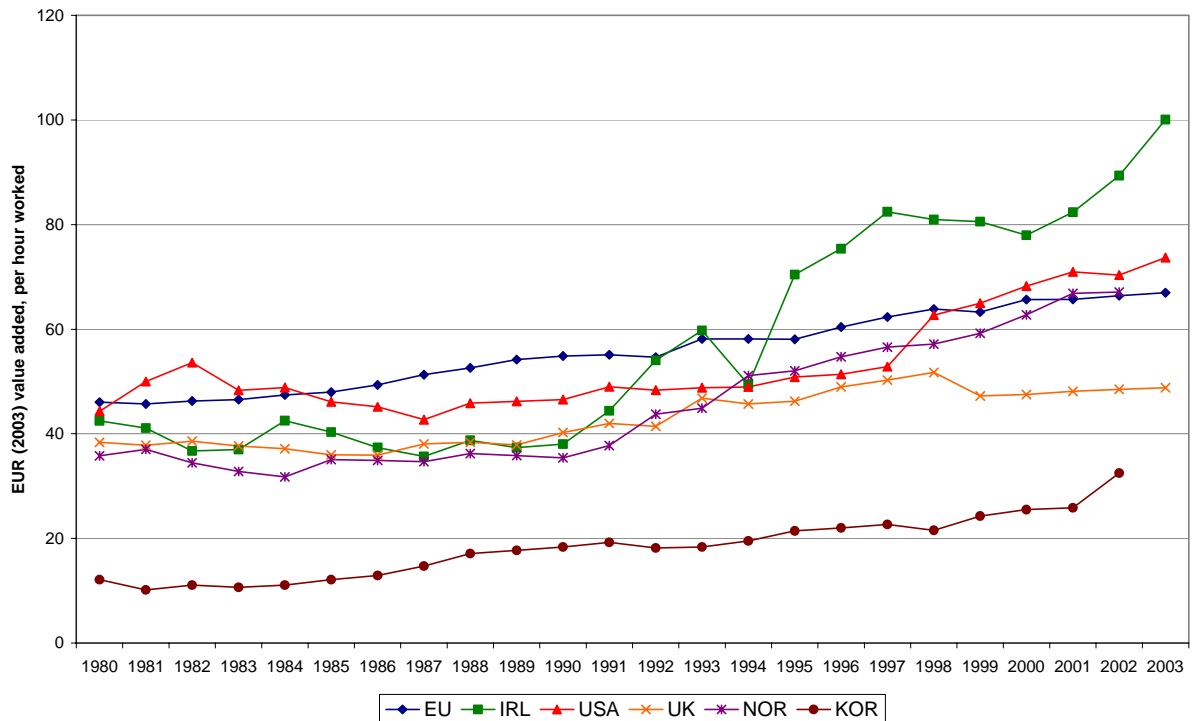
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.11 Output per hour worked in tourism, in selected economies, 1980-2003 (€2003)



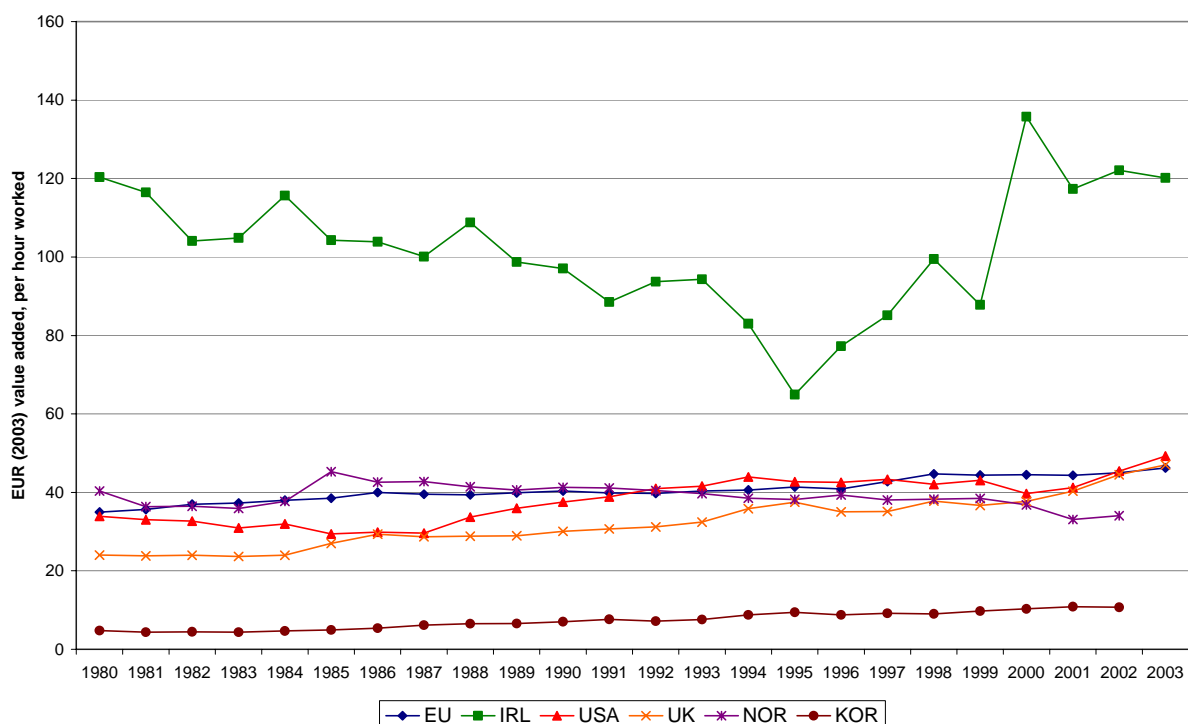
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.12 Output per hour worked in finance, in selected economies, 1980-2003 (€2003)



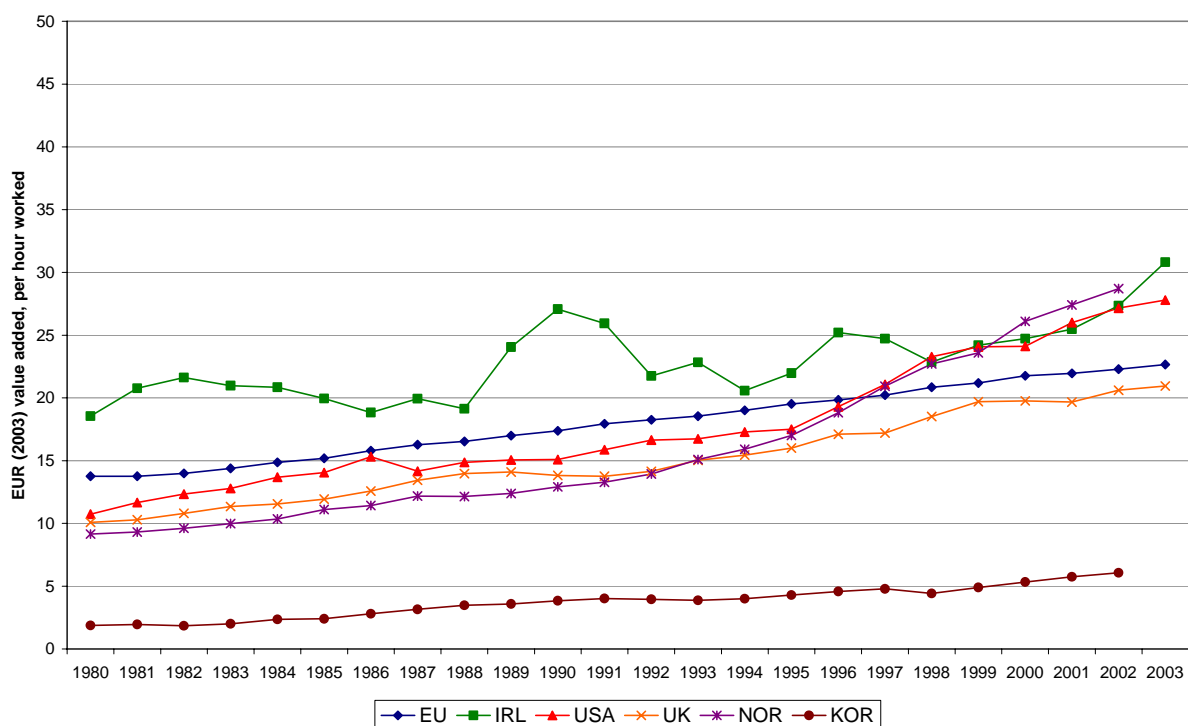
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.13 Output per hour worked in computers and R&D, in selected economies, 1980-2003 (€2003)



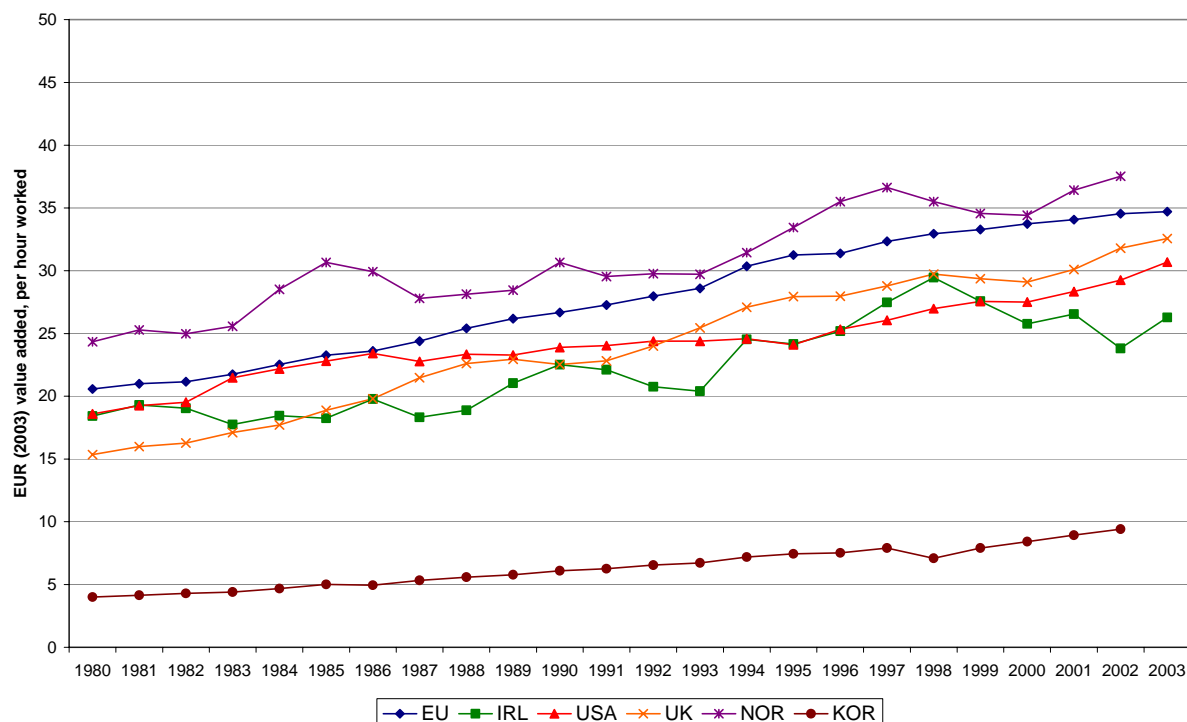
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.14 Output per hour worked in wholesale and retail trade, in selected economies, 1980-2003 (€2003)



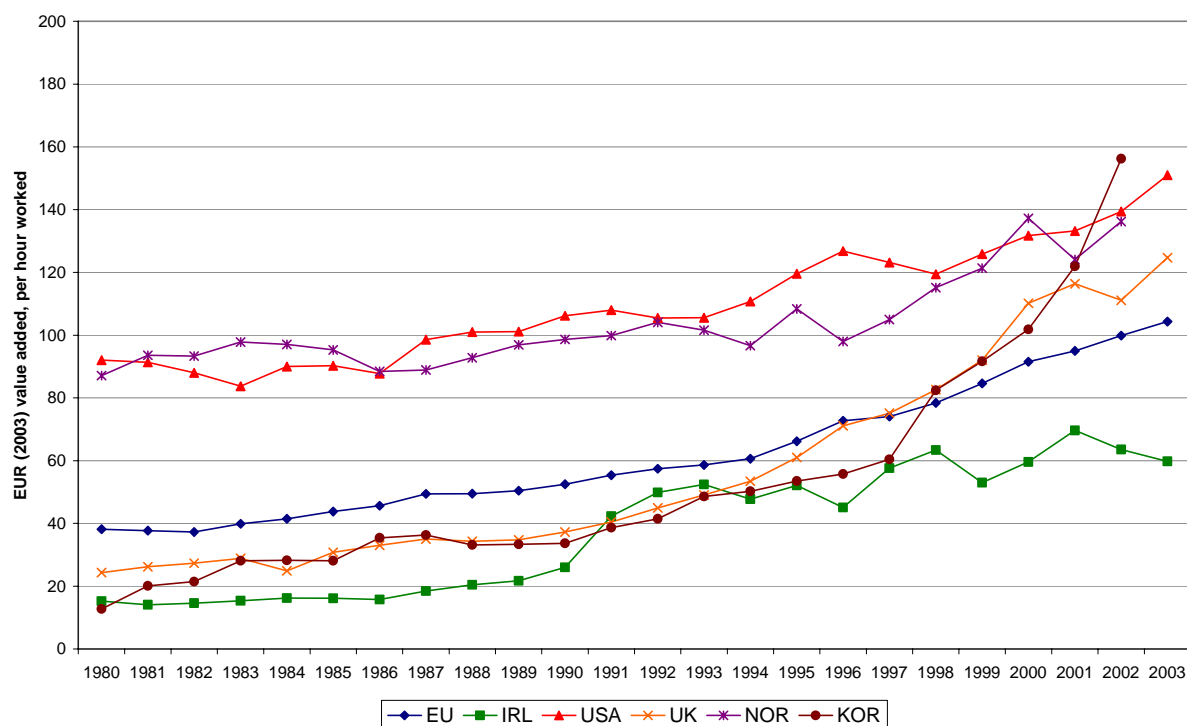
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.15 Output per hour worked in transport services, in selected economies, 1980-2003 (€2003)



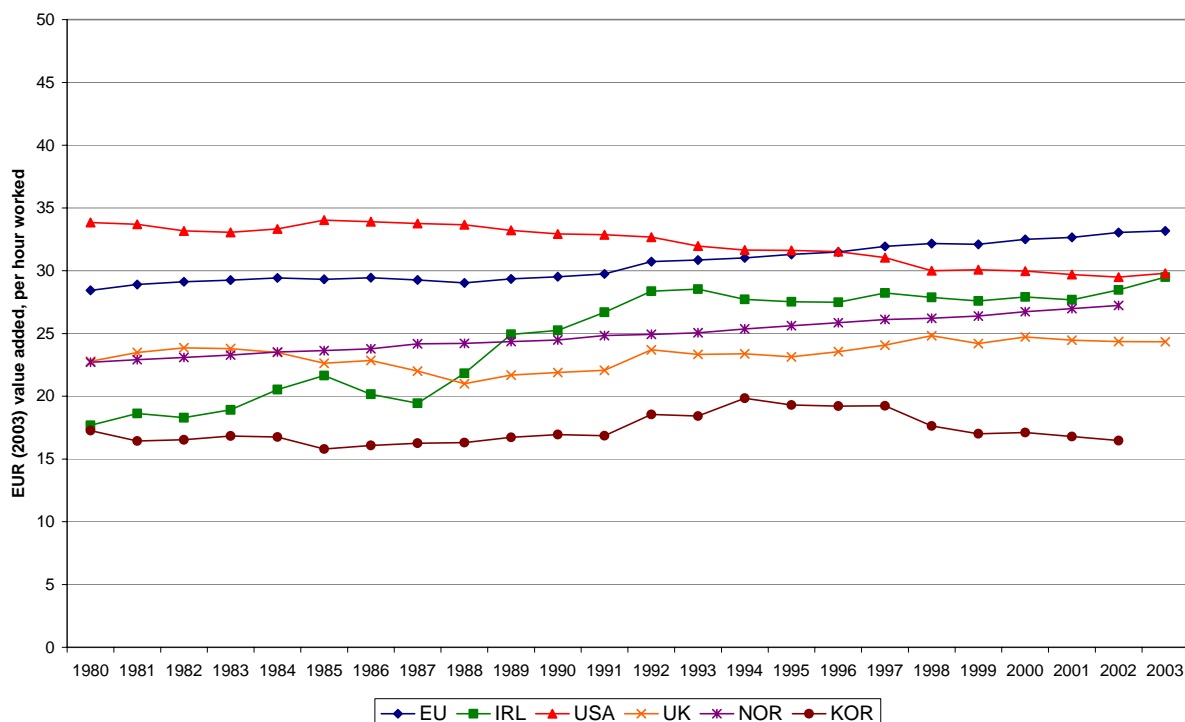
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.16 Output per hour worked in utilities (electricity, water and gas), in selected economies, 1980-2003 (€2003)



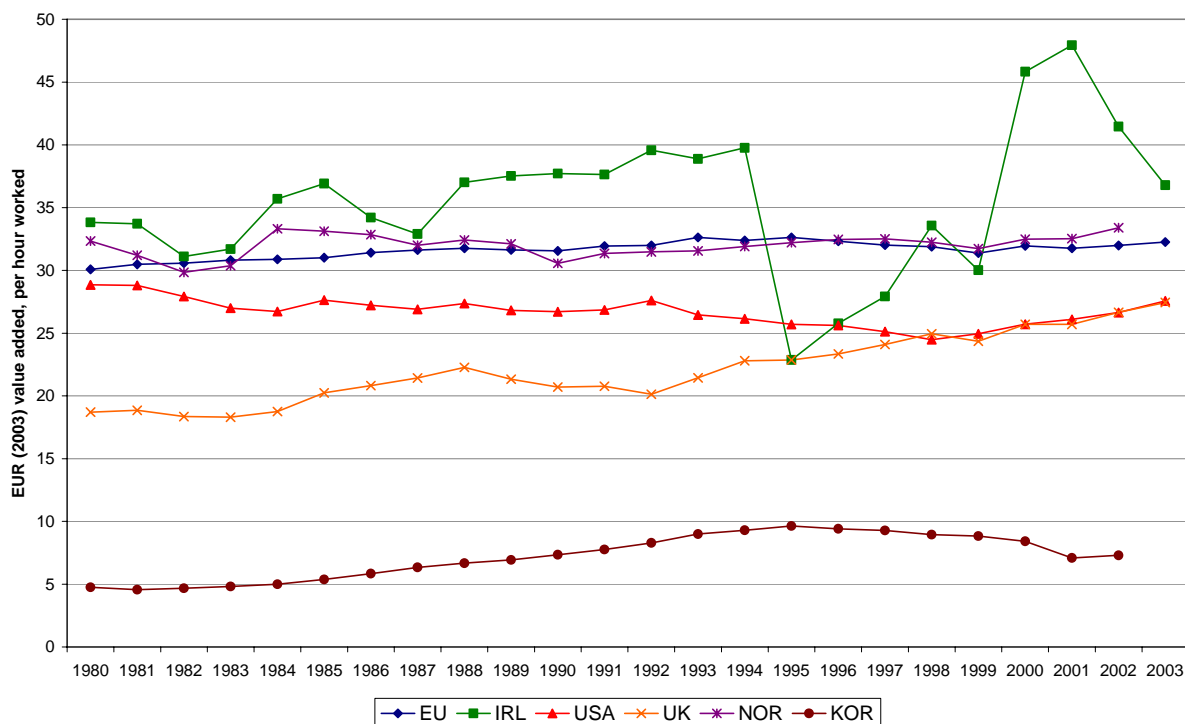
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.17 Output per hour worked in public services, in selected economies, 1980-2003 (€2003)



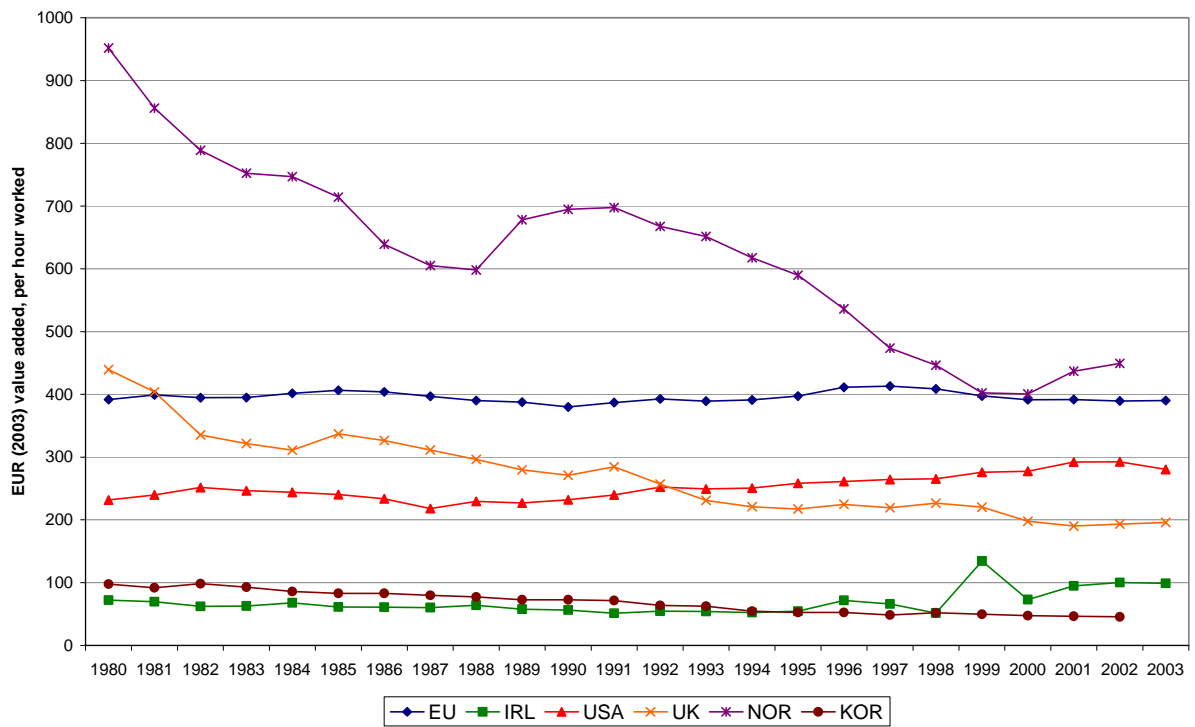
Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.18 Output per hour worked in other services, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts

Figure A.19 Output per hour worked in real estate, in selected economies, 1980-2003 (€2003)



Source: Forfás calculations; based on Groningen Growth and Development Centre, 60-Industry Database, October 2005, <http://www.ggdc.net>; revised Irish figures from OECD National Accounts