

Productivity in Ireland: Trends and Issues

by Mark Cassidy¹

ABSTRACT

This paper provides a review of aggregate and sectoral trends in Ireland's historical and more recent productivity performance. It shows that aggregate productivity growth has been quite strong, on average, over the past forty years with an acceleration in the growth rate during the 1990s. This pick-up in growth was primarily driven by the performance of a small number of foreign dominated high-technology sectors; productivity growth in the more traditional manufacturing sectors and the services sector was more modest. The paper also examines Ireland's medium term productivity potential in the context of some generally accepted determinants of productivity including macroeconomic stability, a favourable regulatory environment, good access to risk capital and other forms of finance, high educational standards and conditions favourable to innovation and R&D activity.

Section 1. Introduction

For a mature economy like Ireland, with employment levels close to those of developed economies generally, productivity developments are the key to future growth potential. This is not to dismiss the importance of more traditional determinants of growth, namely increasing the usage of labour and capital resources. However, when an economy is operating at close to full employment conditions, the potential for further growth from this source is inevitably more limited.

An increase in productivity means the ability to produce more from a given set of inputs. This can come about, for example, through improvements in organisational and working practices and technological know-how. Generally speaking, improvements in productivity are realized at the level of the firm; economy wide productivity levels (growth rates) are, therefore, primarily an aggregation of the productivity levels (growth rates) of individual firms. It is difficult, therefore, for Government and policy makers to have a *direct* impact upon productivity developments, except through efficiency improvements in the provision of public services. However, by ensuring that institutional structures and policy settings are supportive of investment, entrepreneurship and innovation, economic policy can have a central role in determining the productivity potential of an economy.

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Ireland's productivity performance over the past forty years has been reasonably good by international standards, coinciding with the opening up of the economy from the late 1950s. This partly reflects "catch up" factors as productivity and per-capita output levels converged with the EU average. As a result of very strong productivity growth during the late 1990s, Irish labour productivity levels have risen substantially such that GNP per worker is now roughly equal to the EU average. Strong productivity growth during this period was largely driven by substantial foreign direct investment inflows from the United States and sectoral change in industry – i.e. a continuing shift of capital and labour from agriculture and relatively low productivity manufacturing towards high-technology sectors including chemicals and ICT sectors – and was facilitated by macro and micro-economic reforms implemented since the late 1980s, favourable exchange rate and international economic developments, increased European integration and the availability of a young, relatively well-educated workforce.

Productivity growth, however, weakened since 2001, in line with the economic slowdown experienced in most developed economies. This is partly a cyclical phenomenon; productivity changes are well known to be pro-cyclical picking up strongly in the early stages of an economic upturn and tending to weaken in a downturn; this reflects the slow lagged response of employment to output changes. If and when the domestic economy recovers from the current slowdown, it is unlikely, for a number of reasons, that labour productivity growth can recover to the very high rates of the late 1990s. Nevertheless, the prospects for future productivity growth remain reasonably favourable so long as appropriate economic conditions can be ensured. This would include a sound macroeconomic environment, flexible labour and product markets, well-developed financial markets and institutional structures and policy supportive of the accumulation of physical and human capital, entrepreneurship and research and development activity.

This paper explores some of the issues relating to productivity in Ireland. The following section introduces the concept of productivity and provides a general overview of some of the main determinants of productivity growth. Section 3 reviews some historical and sectoral trends in Ireland's productivity performance while an assessment of the economy's medium term productivity potential, in the context of the general determinants of productivity growth outlined in Section 2, is provided in Section 4. Section 5 concludes.

Section 2. Determinants of Productivity Growth

As the key determinant of long-run economic growth, measures of productivity constitute core economic indicators. There are

two generally accepted measures of productivity: labour productivity and total factor productivity. Whereas labour productivity measures economic output per unit of labour, total factor productivity relates output to the *combined* usage of factor inputs, namely labour and capital. There is a clear relationship between the two concepts in that changes in labour productivity can be decomposed into three components: (i) the quantity and quality of physical capital, (ii) the quality of labour input (i.e. educational attainment, skills and experience of the workforce) and (iii) total factor productivity. Total factor productivity, therefore, is the part of output growth that cannot be explained by changes in the quantity or quality of factor inputs; instead it reflects changes in technology, knowledge, organization and efficiency.²

As an important determinant of competitiveness, living standards and potential output, the concept of labour productivity is of significant policy relevance. It is also intuitively appealing and easier to measure than total factor productivity. The proximate causes of labour productivity growth include investment in human, physical and knowledge capital. Going beyond these proximate causes are the economic conditions that support high productivity levels or strong, long-term productivity growth rates. Among the most important considerations in this regard, identified by international institutions such as the OECD, IMF and European Commission, are sound macroeconomic fundamentals, a regulatory environment favourable to business and entrepreneurship, good access to risk capital, the skills, knowledge and educational attainment of the workforce and conditions favourable to R&D activity. A wide range of empirical studies by these institutions has confirmed the importance of these factors.³

(i) Macroeconomic Policy

Empirical evidence from OECD countries suggests that a sound macroeconomic environment, including well-managed public finances, not too large a government sector and price stability, can contribute to raising trend productivity growth in the medium term through a positive impact on confidence and by promoting efficient resource allocation.⁴

In particular, the *variability* of inflation appears to be an important negative influence on output per capita, supporting the hypothesis that uncertainty about price developments affects growth via its impact on economic efficiency. The effect of the

2 As they are calculated as a residual, estimates of total factor productivity growth also include any measurement errors.

3 For an overview of these studies see, for example, EU Commission (2003) and OECD (2003).

4 OECD, 2003, chapter 2.

level of inflation is somewhat less clear cut – perhaps because of the low levels of inflation currently observed across most OECD countries.⁵ However, high inflation usually goes hand-in-hand with more variable inflation. Moreover, high inflation, even if not subject to substantial variability, can have negative growth effects in so far as it leads to shortening of time horizons which is inimical to long-term investment, distorts the true measure of profit and can have disincentive effects if the tax regime is not indexed.

The size of government is also thought to have an impact on growth. The overall tax burden, if pushed beyond a certain limit, is estimated to have a negative effect on output per capita while public investment can “crowd out” private investment through higher real interest rates. In addition to the size effect, the literature also suggests specific effects stemming from the financing and composition of public expenditure. A particularly negative effect is found for tax structures with a heavy weight on distortionary taxes, which affect the choices of households and firms with respect to the level and composition of their (human and physical) capital investment and discourage entrepreneurship. Direct taxes, including taxation on income and profits, are generally considered more distortionary than lump sum taxes or taxes on goods and services – although indirect taxes can also have an impact on cost competitiveness. The composition of public expenditure also appears to be important with a greater positive impact for productive investment, including expenditure on infrastructure, and investment in education than for expenditures not directly related to growth including inefficient systems of subsidies and transfers.

(ii) Regulation

Excessive regulation and administrative burdens can hinder entrepreneurship and business development. Improvements in the regulatory environment, therefore, can have a positive effect on productivity growth. Related to this, greater competition, leading to more efficient and flexible markets, can enable firms to achieve higher productivity growth through organisational change and less slack in the use of inputs. By contrast, an uncompetitive environment results in prices being higher than they would otherwise be and output and employment being less than is socially optimal. In addition to static gains in productivity levels, dynamic gains can also be realized if increased competition requires firms to continue to innovate and develop new products.⁶ It has been estimated, for example, that structural reforms implemented in OECD countries during 1985 to 1995,

5 Further reductions in inflation, when inflation is already low, may have negative effects through nominal wage rigidities creating market inefficiencies. A more significant impact of the level of inflation would likely be found in a study including high-inflation countries.

6 For an overview of the empirical analysis, see, for example, Bassanini and Ernst (2002), Scarpetta and Tresselt (2002), Salgado (2002).

including lowering regulatory burdens and increasing standards of competition, increased total factor productivity growth by 0.2 to 0.3 percentage points on average.⁷ By increasing the efficiency and flexibility of markets, economic reform can also leave the economy better able to deal with economic shocks, an issue which is of particular relevance for countries participating in EMU which no longer have recourse to independent monetary or exchange rate policies.

Flexible *labour markets* can also be productivity enhancing if they allow for a more efficient (re) allocation of existing labour resources. For example, flexible labour markets can help ensure that expanding businesses in innovative sectors can be matched with appropriately skilled workers. OECD studies find that overly strict employment protection legislation, by reducing employment turnover, may in a number of circumstances lead to lower productivity performance and discourage the entry and expansion of firms.⁸ There is also evidence that strict employment protection legislation and certain industrial relations regimes can have a detrimental effect on R&D activity.

(iii) Financial Markets and Access to Risk Capital

A financial system that supports risk takers and new enterprises can have a positive impact on innovation and productivity. There are risks, however, for financial institutions investing in start-up firms or innovative activities which are, by their nature, risky. New or developing businesses, therefore, often find it difficult to obtain external financing. This is of particular importance since new firms are often the most dynamic and the ones with greatest potential for high productivity growth. Hence, it is important that the conditions exist whereby financial markets are geared towards the provision of alternative forms of financing, including venture capital and equity financing, as well as providing finance to more established firms. Among the conditions identified in the recently published Sapir Report for the existence of a suitable venture capital market were the existence of a sufficient quantity of start-up projects so that risks are diversified, an adequate exit route for investors in the form of secondary stock markets, knowledgeable fund managers who can provide significant non-financial assistance to their clients and a willingness on the part of entrepreneurs to share control in exchange for faster growth.⁹

(iv) Educational Attainment

Educational attainment is a key determinant of human capital, which is an important driver of labour productivity. Increasing an economy's skill base can also have a positive impact on total

⁷ Salgado (2002).

⁸ Nicoletti et al. (2001).

⁹ The Sapir Report (2003: p. 38).

factor productivity growth by facilitating structural change and technological improvements. The key requirement for developed economies in this regard is higher education. This is particularly so because of the complementary effects between education and more skilled activities including R&D activities. Both are crucial in enhancing the level of technology, while the productivity of R&D requires high standards of knowledge in the economy. Education is also an important variable in terms of attracting inward foreign direct investment flows, which is particularly important for small open economies like Ireland. Research suggests that internationally mobile capital seeks high education environments as well as other factors such as favourable tax structures, a competitive cost base and low regulation.

The value of human capital can also be affected by the age distribution of the population. Ireland has a relatively young population relative to other EU countries. This can have a positive impact on the dynamism, adaptability and ability to innovate of the workforce. In this respect, the current age profile in Ireland is more conducive to strong productivity growth than many other European countries.

(v) Research and Development Activity

Empirical evidence indicates a positive and robust relationship between R&D activity, particularly in the private sector, and productivity growth. Indeed, this link appears to have strengthened during the 1990s with the expansion of the knowledge intensive ICT-producing sector. Not only are ICT products generally associated with high productivity growth rates, but they can also be a tool for increasing productivity growth in other (ICT-using) sectors. The EU, for example, has lower R&D activity, a lower concentration of high-technology industries and lower ICT penetration rates than the US and this seems to have contributed to the widening productivity gap between the two regions during the second half of the 1990s. This is an area of policy relevance since it is generally accepted that free markets may fail to provide the socially optimal level and direction of R&D activity because of the positive externalities (or spillover effects) from innovation.

R&D can boost productivity either directly through the innovation it produces or more indirectly through the adoption of technologies developed elsewhere. In order to create a supportive framework for R&D activity, an economy needs a well-developed risk capital market, a good system to protect intellectual property rights and good education and research support systems. Small open economies, exposed to foreign R&D through trade, migration and FDI flows, are not necessarily dependent upon domestic R&D activity. In this case, other

framework conditions might include those associated with making the economy an attractive location for inward investment in R&D intensive sectors and ensuring that the economy can capture some of the R&D activity in those sectors, rather than simply being a location for more basic manufacturing activities. As an economy becomes more technologically advanced, however, domestic innovation as opposed to imitation increases in importance.

Section 3. Trends in Irish Productivity

3.1 Aggregate Trends

Irish output and productivity growth rates have, on average, been quite high over the past forty years. Since 1960 real GDP growth has averaged around 4¾ per cent per annum. This compares with growth of around 3 per cent and 3½ per cent in the EU and US, respectively. Table 1 presents a decomposition of economic growth, both GDP and GNP, into employment growth and labour productivity growth during a range of sub-periods between 1961 and 2002. Taking this long-term perspective shows that employment growth in Ireland was very weak before 1990, in line with the experience of the rest of Europe and in contrast to the superior employment performance of the United States. During the 1980s, employment actually made a negative contribution to growth in Ireland. This changed substantially during the 1990s when quite strong employment growth was recorded, particularly during the second half of the decade.

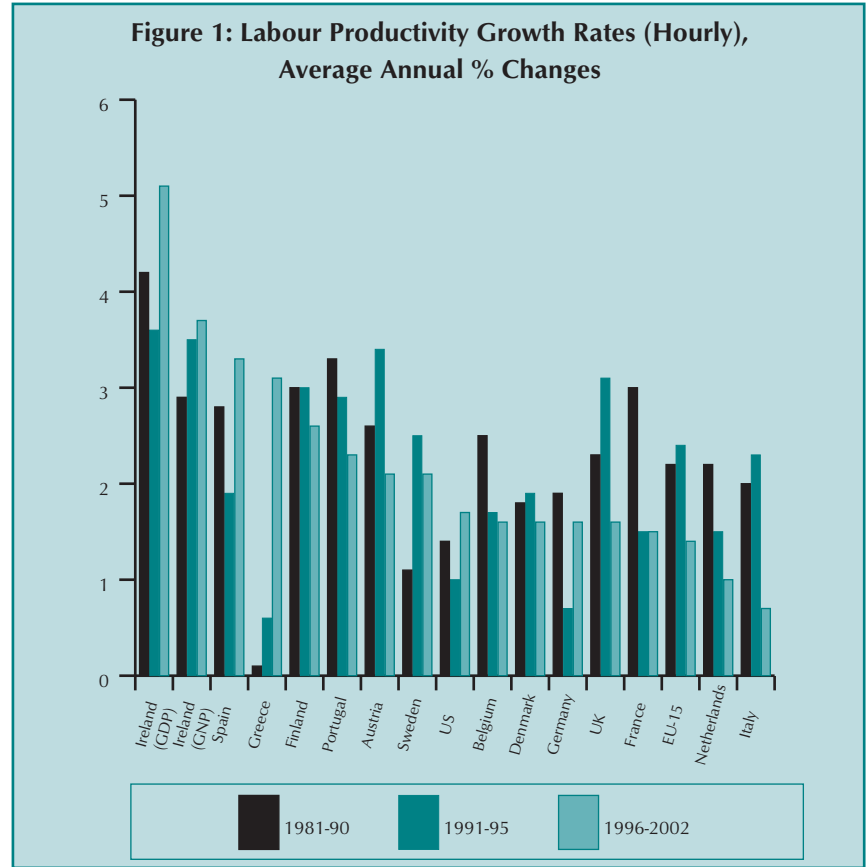
Table 1: Economic Growth, Employment and Labour Productivity Growth Rates (%)

	GDP	GNP	Employment (numbers employed)	GDP per worker (per hour in parenthesis)	GNP per worker (per hour in parenthesis)
1961-2002	4.8	4.0	1.1	3.6	2.8
1961-70	4.0	3.8	0.0	4.0	3.8
1971-80	4.3	3.9	1.0	3.3	2.9
1981-90	3.3	1.9	-0.2	3.5	2.1
1991-95	4.7	4.5	2.0	2.7(3.6)	2.5 (3.5)
1996-2002	8.9	6.9	4.3	4.5(5.1)	2.5(3.7)

Labour productivity growth has been consistently strong since the 1960s, averaging around 3½ per cent per annum when measured as *GDP per worker*, the most common measure used for long-term international comparisons. Since this is a measure of labour productivity rather than total factor productivity it also reflects capital deepening (i.e. changes in capital per worker), changes in the quality of the workforce and any measurement errors. The corresponding growth rates for the EU and US were around 2¾ per cent and 1¾ per cent, respectively. For Ireland it is generally accepted that *GNP* measures of productivity are a more meaningful measure of domestic economic performance

because they exclude the substantial profit outflows of foreign-owned firms. Real *GNP per worker* increased at an annual average rate of around $2\frac{3}{4}$ per cent between 1961 and 2002, which is broadly similar to the average for the EU-15 over the same period.¹⁰ This largely reflects the extremely high labour productivity growth rates in the EU during the 1960s, averaging around $4\frac{1}{2}$ per cent per annum. Since 1980, Irish GNP per worker has increased at an annual rate of around $2\frac{1}{4}$ per cent compared with around $1\frac{3}{4}$ per cent in the EU.

Changes in real GNP per person employed also constitute a somewhat imperfect measure of labour productivity growth in the Irish economy because they fail to account for the significant drop in average hours worked – a shorter working week – in recent years. A more appropriate measure, therefore, is an index of *GNP per hour worked*, which is probably the most meaningful measure of underlying labour productivity growth in the Irish economy. Growth rates in GNP per hour since 1990 are included, in parenthesis, in Table 1 while Figure 1 below shows a comparison of hourly labour productivity growth rates across EU countries since 1980. As can be seen, Irish labour productivity growth rates measured using GNP per hour worked were substantially above the European average during the 1980s, and the highest in Europe during the 1990s.



Source: EU Commission (2003) p.73. GNP figures for Ireland added by the author.

10 In this paper Irish GNP data are compared with GDP figures for other countries. International GNP data are not readily available for many other countries but this is not problematic as there is not the same difference between GDP and GNP in the comparator countries.

As a result of strong output and productivity growth rates during the late 1990s, Irish living standards and labour productivity levels have risen relative to the European average such that GNP per capita and GNP per worker are now roughly equal to the European average and about 70 per cent of those in the US.¹¹ This compares with the situation in 1970 when Irish GNP per capita was around 62 per cent of the EU average and only around 42 per cent of US GDP per capita (Table 2). Productivity levels in Ireland have also increased relative to the EU average over the past thirty years, with a particularly significant increase during the second half of the 1990s. However, while GNP per worker is now roughly equal to the EU average, the level of GNP per hour was still around 7 per cent lower than the EU average in 2000. This reflects the fact that, despite the recent drop, average hours worked per employee in Ireland are above the European average. The Irish employment rate, meanwhile, not included in Table 2, is around 1 per cent higher than the EU average but still around 11 per cent lower than in the US.

Table 2: GDP per capita/per hour (in PPS) US = 100

	GDP per capita		GDP per hour		Working hours per person employed	
	1970	2000	1970	2000	1970	2000
Austria	65.2	79.3	53.7	95.7	101.6	80.8
Belgium	68.3	75.3	66.2	113.7	107.5	82.7
Denmark	84.6	83.9	77.2	95.5	87.3	82.0
Finland	61.6	73.2	52.9	91.9	93.8	87.1
France	73.2	70.7	73.2	105.2	99.4	82.0
Germany	78.7	74.2	70.8	93.4	100.9	81.6
Greece	42.8	47.6	42.9	60.3	112.4	103.5
Ireland	41.9	81.7	39.2	97.7	116.2	90.5
Ireland (GNP)	42.6	70.0	39.9	84.2		
Italy	65.0	73.5	74.7	104.0	97.9	87.0
Netherlands	76.3	79.4	74.8	104.9	93.5	71.7
Portugal	34.7	51.6	24.8	54.1	107.7	93.5
Spain	49.8	57.5	47.1	73.2	105.8	97.1
Sweden	83.8	71.0	76.4	83.1	89.5	86.4
UK	70.8	70.2	58.7	80.3	103.5	88.0
EU-15	69.0	70.3	64.8	90.7	101.0	85.6
USA	100	100	100	100	100	100

Source: EU Commission Sapir Report (2003) p.23. GNP figures for Ireland added by the author.

3.2 Sectoral Trends

Sectoral productivity trends are difficult to assess accurately. Although, internationally, productivity growth in services tends to be quite weak, there is evidence that this can be linked to measurement problems – particularly in terms of calculating the real value of services output.¹² For Ireland there are also difficulties associated with calculating an appropriate value of labour input due to the lack of a consistent series of hours worked for service sub-sectors. As a result, productivity growth

11 It is necessary to exercise caution when comparing EU and US productivity because of methodological problems that can arise related to, for example, problems of deflation of goods with rapid changes in quality and difficulties in choosing the appropriate exchange rate or purchasing power parity. For an overview of the measurement problems associated with comparing productivity growth across countries see, for example, Ahmad et al. (2003).

12 See, for example, Wölfl (2003).

in services is often measured as output per worker, which would imply an understatement of underlying productivity growth because no account is taken of the substantial reduction in average hours worked in many service sectors during the 1990s.

Productivity trends in Irish *manufacturing* industries are also subject to measurement difficulties. It is now generally accepted that productivity levels are inflated to a significant extent by the operations of foreign multinationals in Ireland. The very high values of output per worker in certain foreign-dominated, high-technology sectors, particularly chemicals and pharmaceuticals, suggest that they may include returns to ‘intangible factors’ like research and development and marketing activities which are undertaken mainly outside Ireland.¹³ These do not represent a return to domestic factors of production and should more correctly be attributed as a return to factors in the country of ownership. It also seems likely that productivity data for some foreign-owned multinational firms are artificially inflated by transfer pricing activities. These measurement difficulties should be kept in mind when assessing sectoral productivity developments.

At a broad sectoral level, productivity growth in the labour-intensive market services and construction sectors was significantly slower than in the more capital-intensive industrial sectors during the 1990s (Table 3).¹⁴ Employment growth in the market services and construction sectors was extremely strong over the period 1991-2002, accounting for around 86 per cent of total non-agricultural business sector employment growth compared to a contribution from industry of around 14 per cent. However, industrial output growth was extremely strong and accounted for around 57 per cent of total growth in non-agricultural business sector output, which explains the very strong productivity growth figures in the broad industrial sector. The strong productivity performance of the agricultural sector during this period primarily reflects the decline in agricultural employment. Agricultural output growth has been quite weak since 1991.

Table 3: Sectoral Productivity Growth Rates 1991-2002, Average Annual % Changes (1995 prices)

	Market Services	Industry	Construction	Agriculture
1991-2002	1.9	8.9	-1.0	3.1
1991-1995	0.4	6.4	1.9	2.6
1996-2002	2.9	10.7	-3.0	3.5

Note: Productivity is here measured as output per worker

13 Honohan, Maître and Conroy (1998).
14 Market services exclude education, health, public administration and defence. It is appropriate to exclude these sectors from the analysis because of the difficulties associated with measuring the output of the public sector.

A recent EU Commission study compares *hourly* labour productivity growth in the business sector across EU countries for the period 1996-2000. The results, shown for selected countries in Table 4, confirm the strong aggregate productivity performance of the Irish economy during the late 1990s and also the fact that this performance was driven mainly by developments in the manufacturing sector. While the contribution to growth in percentage points from private services was above the European average, it was less than in some individual countries. Even taking into account the fact that productivity in service sectors is generally weaker than in manufacturing and the measurement difficulties discussed above, the productivity differential between services and manufacturing in Ireland during the late 1990s appears particularly large.

Table 4: Hourly Labour Productivity Growth in the Business Sector (%) 1996-2000 (Contributions from manufacturing and private services)

	Total Business Sector	Contribution from Manufacturing	Contribution from Private Services	Residual Term (Shift and interaction effects) ¹⁵
France	1.3	0.8	0.5	0.0
Germany	2.3	0.6	1.6	0.1
Ireland	8.4	7.3	1.8	-0.7
Italy	0.6	0.3	0.1	0.2
Spain	0.0	0.2	-0.2	0.0
UK	2.6	0.8	1.9	-0.1
EU-15	1.7	0.7	1.0	0.0
USA	3.1	1.2	2.0	-0.1

Source: EU Commission (2003) p.86.

Ireland’s superior productivity performance in manufacturing has been largely a consequence of two factors, namely higher productivity growth in the high-technology sectors than the European average and also a greater degree of specialisation in these sectors. These sectors include chemicals, publishing and printing (which includes manufacture of software products) and electrical and optical equipment (essentially ICT products). The corollary of this is that many indigenous manufacturing enterprises have not realized the same productivity gains over this period and consequently have much lower levels of productivity than the average for the aggregate manufacturing sector.

15 The residual term reflects the impact on aggregate productivity growth of the shifting of labour between sectors. The negative value of this figure for Ireland indicates that the relative shift in employment towards the lower productivity services sectors has had some negative impact on aggregate productivity – although this is far exceeded by the productivity gains within both manufacturing and services which are reflected in the middle two columns. In other words, if employment in manufacturing had maintained its share of total employment over this period, aggregate productivity growth would have been slightly higher because of the higher productivity growth rate experienced in manufacturing.

Table 5 compares employment specialisation and productivity levels in manufacturing with the EU average. The employment share figures show that around 28 per cent of employment in Irish manufacturing is in either electrical and optical equipment or chemicals compared with an EU average of around 17 per cent. Moreover, following strong productivity growth during the 1990s and possibly also some transfer pricing effects, productivity levels, measured as gross value added per person employed, are considerably higher in these sectors in Ireland than elsewhere in the EU.

Table 5: Employment Shares and Productivity Levels in Manufacturing, 2000

	Employment Share (% of total manufacturing employment)		Gross Value Added per Person Employed (€000)	
	Ireland	EU	Ireland	EU
Total Manufacturing	100	100	132.2	51.5
Chemicals	9.1	5.9	532.9	92.5
Electrical and optical equipment	19.0	10.9	121.9	59.5
Pulp, paper printing and publishing	9.3	8.2	168.3	58.8
Transport equipment	3.1	9.2	55.1	57.7
Other Machinery and equipment	5.6	10.8	48.7	51
Other non-metallic mineral products	4.3	4.5	69.3	50.2
Rubber and plastic products	4.2	5.0	44.6	47.1
Basic metals	6.4	14.3	43.9	46.4
Food, beverages and tobacco	19.2	12.7	94.6 ¹⁶	44.9
Wood and wood products	2.4	3.1	39.3	33.9
Textiles	4.4	7.1	29.8	29.5
Leather products	0.3	1.6	28.3	26.8

Source: Eurostat

While the foreign, high-technology sectors of the economy now dominate manufacturing output, manufacturing employment in the more traditional indigenous sectors, including the food, clothing and engineering sectors, is still significant. Productivity growth rates in some of these sectors have been below the EU average. This implies that the productivity position of many employment-intensive sectors is a lot less healthy than is implied by the aggregate data. Moreover, relatively high rates of wage inflation have been widespread across most sectors since the late 1990s, which has resulted in a deterioration in the competitive position of many sub-sectors of manufacturing.

The shifting of resources into sectors associated with high productivity growth has undoubtedly had a positive impact on the aggregate productivity performance of the economy over the past 15 years. As a result of the structural changes that have taken place over this period, the Irish economy now has a much

16 High productivity levels in the Irish food sector are largely accounted for by the ‘other foods’ sub-sector which only accounts for around 5 per cent of total employment in the food sector. Excluding this sector would reduce the labour productivity levels of the food sector, although domestic data indicate that they would remain somewhat above the EU average.

higher share of total manufacturing output and employment concentrated in high-technology sectors than any other EU country. Ireland also has a greater degree of productive specialisation and, consequently, less diversity in its manufacturing sector than any other EU country.¹⁷ There is a risk that the high degree of productive specialisation might leave the economy somewhat exposed to sector specific shocks, as was evident during the recent slowdown in the global ICT sector. Moreover, in Ireland the high-technology sectors are dominated by foreign multinationals, which are potentially mobile and not as embedded in the domestic economy as indigenous firms. In order to limit the economy's exposure to the risk of sector specific shocks, it would appear unwise for industrial policy to focus *exclusively* on attempting to shift resources into high value-added sectors. Instead the emphasis should be on improving the productivity performance of all sectors of the economy, while at the same time facilitating structural changes that are taking place.

A shift-share analysis of US and EU productivity growth rates over the past twenty years provides useful insight into how aggregate productivity growth can be decomposed into within-industry effects (i.e. changes in the productivity growth rates of individual sectors) and structural change effects (i.e. changes in productivity growth arising from sectoral reallocations). EU Commission analysis shows that during this period the bulk of productivity growth has come from within-industry effects, accounting for between 80-95 per cent of aggregate productivity growth in the case of the EU and from 100-120 per cent of the change in the US.¹⁸ In other words, the shifting of resources between sectors in the US has actually had a negative impact on aggregate productivity growth — since workers have on average been moving into lower productivity service sectors. Despite this, productivity growth has been stronger in the US than in the EU since the mid-1990s. This reflects stronger productivity growth in the US within certain industries, particularly the ICT-producing sectors and ICT-using service sectors including wholesale and retail trade and financial intermediation. This again highlights the need for policy settings and institutional structures that not only facilitate the transfer of resources towards more productive sectors but also support productivity growth across all sectors, including the more traditional manufacturing sectors and the non-traded service sectors.

3.3 Summary

In summary, aggregate productivity growth in Ireland has been quite strong over the past 40 years, particularly during the second half of the 1990s. Since 1960, GNP per person employed has increased at around $2\frac{3}{4}$ per cent per annum, around three

17 For an overview of sectoral specialisation in Irish manufacturing see the Central Bank Autumn Bulletin 2003, Box A.

18 EU Commission (2003) pp. 75-77.

quarters of a percentage point less than growth in GDP per person employed. Since 1996, GNP per person employed has increased at an annual rate of around $2\frac{1}{2}$ per cent. While this might seem relatively low in the context of GNP growth of almost 7 per cent over the same period, it has been noted that underlying labour productivity growth, measured as GNP per hour worked, was around $3\frac{3}{4}$ per cent which was very high by international standards. While the level of Irish GDP per worker is now second only to Luxembourg in the European Union, GNP per worker is roughly equal to the EU average. However, this means that productivity levels, measured as GNP per hour worked, are still somewhat below the EU average because of the higher average hours worked per employee in Ireland. This would suggest that there is still scope for Irish productivity levels to improve relative not only to the US but also relative to some of the higher productivity EU countries.

Sectoral trends indicate that aggregate productivity growth during the 1990s was mainly driven by the performance of the high-technology manufacturing sectors. A number of reasons why these trends ought to be interpreted with caution were noted, including difficulties associated with the measurement of output and labour input in the services sectors and difficulties in interpreting the very high productivity levels in some foreign-dominated high technology sectors. Notwithstanding these considerations, it seems clear that the very high aggregate productivity levels and growth rates in manufacturing conceal considerable divergence across sub-sectors of manufacturing. Most importantly, it is evident that many traditional, labour intensive sectors have not enjoyed the same high productivity growth rates in recent years. This has implications for the competitiveness of many of these sectors given that many of them have been associated with high rates of wage inflation since the mid 1990s. This underlines the importance of focussing on the productivity performance of all sectors of the economy in the years ahead, as well as ensuring that economic structures facilitate sectoral reallocations into expanding sectors.

Section 4. Productivity Issues for the Irish Economy

A number of factors explain Ireland's strong productivity performance over the past forty years and also the acceleration in productivity growth during the second half of the 1990s. Physical capital, technology transfer and productivity have been boosted by high-tech foreign direct investment inflows from the US, sectoral shifts in industry towards high-technology sectors, investment in human capital and infrastructural improvements. Productivity growth has been facilitated in more recent years by macroeconomic stability, including fiscal stabilisation, increased European integration and structural reform of product, labour and capital markets.

The recent slowdown in labour productivity growth was largely a consequence of cyclical (demand-side) considerations. However, even if and when the economy recovers, it is unlikely that labour productivity growth can recover to the very high rates of the late 1990s. Experience from other countries suggests that the additional impact of new foreign direct investment eventually begins to decline. Moreover, as the economy develops and consumer incomes increase, the composition of Irish output is likely to show a shift from manufacturing to lower-productivity service sectors.

Notwithstanding these considerations, the prospects for future productivity growth remain reasonably favourable. This section examines these prospects in the context of the underlying framework conditions for strong productivity growth identified in Section 2.

Macroeconomic Conditions

The European Central Bank's commitment to low inflation and the fiscal requirements of the Stability and Growth Pact provide a framework for macroeconomic stability in the euro area. The Irish experience of recent years, however, shows that inflation differentials can persist for a period within a monetary union. Moreover, individual countries within EMU are still vulnerable to country specific shocks or can be affected in different ways by symmetric euro area shocks, which cannot be addressed by the single monetary policy. In this case, economic stability requires appropriate national non-monetary policy measures to deal with such shocks. This is particularly relevant for the Irish economy for two reasons. First, Ireland still has a high share of its trade with non-euro area countries, which makes the economy more exposed to exchange rate volatility, particularly against sterling. Any decision in the future by the UK to join EMU would obviously reduce the potential economic dislocation from this source. Second, the Irish economy is the least diversified in the euro area, with a particular concentration in some volatile high-technology sectors, which increases the likelihood of sectoral shocks having potentially widespread macroeconomic effects.

On a more positive note, there appears to have been some convergence towards more common business cycle characteristics across euro area countries, including Ireland, in recent years. This is beneficial because it enhances the effectiveness and appropriateness of a single (euro area) monetary policy. At a national level, adjustment to country-specific shocks can also involve counter-cyclical demand measures through implementation of fiscal policy. In order to be in a position to stabilise output through fiscal expansion during an economic slowdown, while adhering to the terms of the Stability and Growth Pact, it is necessary that appropriate fiscal policy be implemented during periods of strong economic

expansion (i.e. slightly restrictive policy) so that the budget balances on average over the business cycle.

Turning to the microeconomics of budgetary policy, the size and composition of government expenditure and taxation can also have an effect on economic growth. Ireland has a relatively low level of tax incidence and government expenditure, as a percentage of GDP, compared with the EU average. The Irish economy also performs well in terms of the composition of tax revenues with a very low corporation tax rate, now standardised at 12.5 per cent across all sectors, and a reasonably low income tax rate by international standards. Low direct taxes of this type can have a positive incentive effect on labour supply, enterprise and innovation. The composition of public expenditure can also impact on productivity growth. Strong public capital investment during the late 1990s went some way towards redressing the inadequacies in the economy's physical infrastructure which had become evident during the 'Celtic Tiger' years. Over the past two years, the balance of public expenditure growth has shifted somewhat from capital to current spending, as a means of financing, first, higher employment and, more recently, higher wages including benchmarking in the public sector. Given the infrastructure deficit that still exists, it would appear as if a gradual shift in the balance back towards capital expenditure and other productive expenditure, with due consideration to the quality and value of public investment and the need to adhere to the terms of the Stability and Growth pact, could provide a boost to productivity growth in the medium term. This is likely to be helped by the recent relaxation of EU rules on private sector investment in Government projects.

Regulation

Well-functioning product and labour markets are important in providing the degree of wage and price flexibility that is required to ensure macroeconomic stability. Flexible markets also have a direct impact upon productivity growth, as was noted in Section 2. Ireland is one of the less regulated countries in the OECD with a regulatory environment that is reasonably favourable to enterprise, in terms of barriers to entry, market openness, profit tax rates and the flexibility of the labour market. In its *Annual Competitiveness Report (2003)*, the National Competitiveness Council published a range of comparative competitiveness indicators, compiled from a variety of sources including the World Economic Forum, the IMD World Competitiveness Yearbook and Forfás/OECD Science and Technology indicators. Some of these are reproduced in Table 6, ranked out of 16 countries, where the lower the ranking the lower the burden of regulation and the more competitive the business environment. Ireland performs quite well in terms of the regulatory burden, levels of bureaucracy and the administrative burden on start-up enterprises. In terms of labour market regulation, Ireland also

ranks well in international comparisons, with a more flexible labour market, including less strict employment protection legislation, than most countries in Europe.

Despite this relatively favourably ranking, policy can still have a role in promoting entrepreneurship and creating a supportive framework for start-up and developing businesses. In practice, this means reducing red tape and other unnecessary legal or administrative barriers to doing business, ensuring the availability of operational support (managing, marketing, R&D skills etc.) to new and expanding enterprises, improving access to finance and skilled workers and promoting a culture of entrepreneurship and risk taking.

Table 6: Indicators of Regulation and Competition: Rank out of 16 countries

	Regulation Indicators			Competition Indicators		Labour Market Regulations
	Burden of regulation	Levels of bureaucracy	Administrative burden for start-up firms	Intensity of local competition	Competition legislation	
Ireland	2	6	6	=13	10	4
Denmark	8	2	8	=13	2	2
Finland	1	1	1	=9	1	6
France	13	13	16	=15	9	15
Germany	14	15	11	=2	3	16
Hungary	5	9	5	11	15	3
Italy	16	14	15	12	12	11
Japan	14	12	12	4	11	8
Korea	9	11	8	=5	13	14
Netherlands	11	7	7	=5	5	9
New Zealand	7	5	3	=5	4	7
Poland	12	16	14	=15	16	13
Spain	5	8	12	=9	14	10
Sweden	10	3	8	=5	7	12
UK	3	10	3	2	8	5
US	4	4	1	1	6	1

Source: Annual Competitiveness Report 2003: National Competitiveness Council
Note: The lower the rank the lower the burden of regulation and the more competitive the business environment

Ireland performs less well in comparisons of the intensity of local competition and competition legislation. In recent years the Competition Authority has identified several areas, primarily in the services sector, which can be regarded as being somewhat lacking in competition. These have included public utilities and public transport, retail distribution and a range of professional services. Increased competition and regulatory reform in these and other sheltered sectors of the economy would not only improve productivity performance in these sectors but could also ease the upward pressure on the input costs of the traded sector and thus help maintain competitiveness. Already, the Competition Act 2002 has contributed to this process by strengthening competition law and the powers of the Competition Authority. The impetus for further progress in the coming years will partly come within an EU framework, as part

of the Lisbon Agenda. However, the speed of progress and the extent of the application of policy will largely be determined at a national level and, consequently, domestic policy action can have a role in ensuring more effective competition in previously sheltered sectors of the economy.

Financial Markets/Access to Risk Capital

Greater competition in the financial sector can increase access to and reduce the cost of finance for business. In recent years the Competition Authority has been engaged in a study of competition in the banking sector in Ireland, including the market for loans to small and medium enterprises. As noted in Section 2, there is also a need for alternative forms of financing for new businesses, apart from banks, including seed, venture and equity capital. In this respect policy can have a role in promoting investments in risky or innovative projects. In Ireland, the Business Expansion Scheme and the associated Seed Capital Scheme give fiscal incentives to investors in new and expanding businesses; in Budget 2004 both schemes were extended until end-2006. However, survey evidence suggests that Irish entrepreneurs still find it difficult to obtain adequate funding, particularly seed capital (Global Entrepreneurship Monitor 2002).

The supply of venture capital in Ireland increased substantially during the late 1990s under the EU Seed and Venture Capital Programme 1994-1999. However, the capital raised was primarily for projects based in Dublin and also primarily in software related projects. An important element of the Seed and Venture Capital Programme 2000-2006 will be to reduce any regional or sectoral imbalances in the raising of venture capital and also to target funds towards small and medium sized enterprises at their early stage of development.¹⁹ This is particularly important in the current entrepreneurial climate since new businesses often have to compete on international markets at an early stage of their development. The new programme is also being implemented in a very difficult environment since, internationally, venture and seed capital is in short supply, following the downturn in the ICT sector and the slowdown in growth across most developed countries from 2001. This underlines the importance of setting the appropriate policy framework to support start-up businesses and also the development of businesses during periods of expansion.

Education and Human Capital

As the importance of innovation and technological progress has increased, so too has the premium on higher education. The Irish economy performs well in this regard with a high share of its population having completed higher education. Indeed, OECD data indicate that the share of the population that has completed

19 Enterprise Ireland: Seed and Venture Capital Programme 2000-2006.

third-level education is the highest in the EU and not far below the share in the US (Table 7). Ireland also ranks well in terms of science and engineering graduates; a recent European Commission report placed Ireland highest in terms of the number per thousand of population, among 12 countries including the US, UK and the larger European countries. Given the importance of innovation and R&D, there are also benefits to be derived from ensuring close linkages between the business sector, research institutes and the third level education system.

On the other hand, Ireland also has a relatively high share of its population that has not completed secondary education. This suggests a potential role for policy in reducing the number of students leaving school before finishing secondary education, particularly in economically disadvantaged areas, and also in the re-training of workers who have already left school early and do not have skills that are in demand in the workplace. Fiscal incentives and a more flexible third level system might have a positive effect in terms of encouraging workers to improve their skills through part time education. The National Competitiveness Council has also identified science, mathematics, modern languages and ICT as subjects that are particularly relevant in the current enterprise environment and which should, therefore, be promoted in primary and secondary school curricula. All levels of the education system can also play a role in fostering a culture of entrepreneurship and supporting potential entrepreneurs.

Table 7: Educational Attainment of the Population aged 25-64 years (%) 2000

	Below upper secondary	Upper secondary and post-secondary	Tertiary
Austria	24.3	61.8	13.9
Belgium	41.5	31.4	27.1
Denmark	19.8	53.7	26.5
Finland	26.2	41.5	32.3
France	36.1	40.6	23.0
Germany	17.4	59.4	23.2
Greece	48.6	33.6	17.8
Ireland	42.4	22.0	35.6
Italy	56.7	33.2	10.0
Luxembourg	47.3	34.6	18.1
Netherlands	45.0	32.0	22.2
Portugal	80.1	10.8	9.0
Spain	59.7	16.2	23.6
Sweden	19.4	49.0	31.6
United Kingdom	37.1	36.9	26.1
EU-15	38.9	37.3	23.8
USA	12.3	50.3	37.3

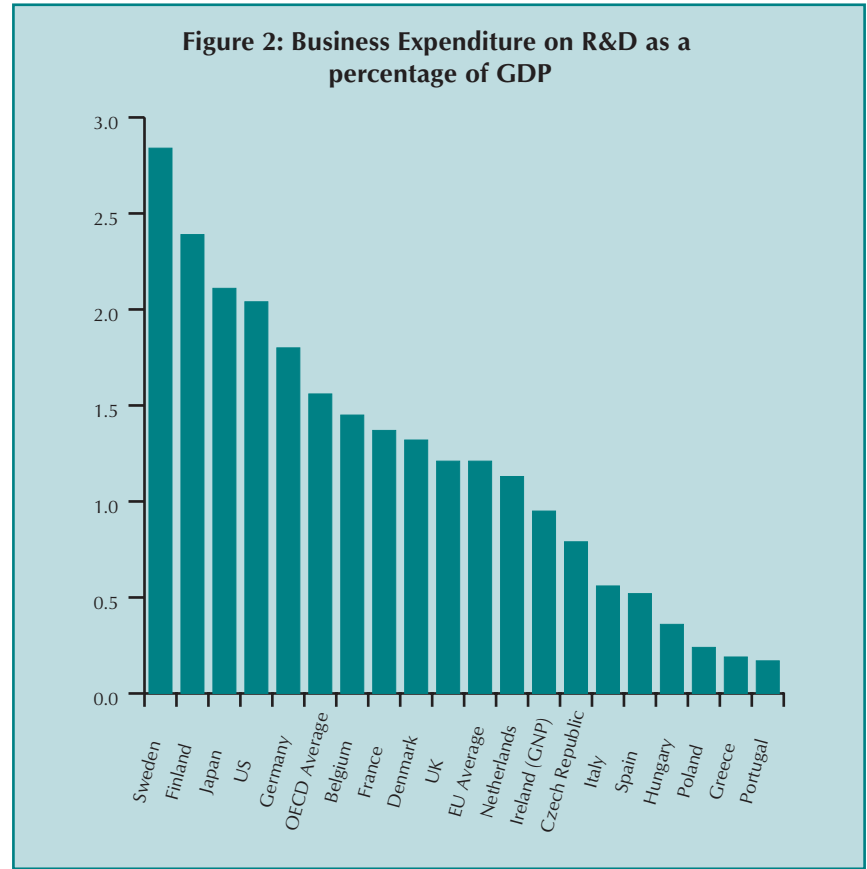
Source: OECD, “Education at a Glance”, as referenced in Sapir Report (2003) p31.

Innovation/Research and Development

As an economy matures, the extra benefits from macroeconomic and structural reforms can diminish and innovation and technological change become increasingly important as a

determinant of productivity growth. While the Irish economy already has a relatively skilled and well-educated work force and a high concentration of output and employment in high-technology sectors, available evidence suggests that the amount of innovative activity carried out in this country is relatively low. In the past the economy has benefited through international technology transfers from, in particular, the US which is the main source of foreign direct investment into Ireland. While the economy will continue to benefit in this way, domestic innovation and diffusion of new technologies will also become more important.

Business expenditure on R&D in 2001 was just below 1 per cent of GNP which leaves the economy closer to the Mediterranean economies, which are in general characterised by low-technology output, than the Northern European economies which have higher R&D expenditures (Figure 2.). Moreover, this figure declined slightly, from just above 1 per cent of GNP in 1995, although this must be assessed in the context of very strong GNP growth over the same period. Ireland also ranks quite low in terms of the number of researchers (12th out of 16 countries) and patent registrations but ranks quite highly in terms of university/research collaboration.



Source: Forfás, Business Expenditure on Research and Development 2001.

In Ireland, business expenditure on R&D is dominated by a small number of sectors, in particular the ICT sectors, pharmaceuticals and food and drink.²⁰ However, even within the high-tech

20 Forfás: “Business Expenditure on Research and Development, 2001”.

sectors, R&D intensity is low by international standards which suggests that foreign multinationals do not carry out a significant share of their R&D activity in Ireland. Despite this, foreign owned enterprises accounted for 65 per cent of business R&D in 2001. This clearly indicates a low R&D intensity for indigenous firms. In a recent survey of Irish firms, lack of financing and relatively high innovation costs were ranked as the greatest barriers to innovation in both manufacturing and services sectors.²¹

Innovation is not necessarily wholly dependent upon domestic R&D activities in small open economies which are not quite at the technological frontier. Such economies can also benefit from international spillovers and technology transfers, and an important channel for this is the presence of high-technology, R&D intensive multinational firms.²² However, productivity growth in countries close to the technology frontier is largely driven by their capacity to innovate. As technology levels in Ireland improve, innovation rather than imitation will assume a greater role in ensuring faster productivity growth rates which underlines the importance of increasing domestic R&D activity. It is now generally accepted that policy can have an important role in supporting R&D activity. Tax credits have been introduced in many countries as a fiscal incentive preferable to direct grants.²³ In Budget 2004, a tax credit for incremental R&D expenditure, above a baseline of €50,000, was announced, which was generally well received by the business community. However, such is the importance of innovation and technology in the modern enterprise environment that efforts to create an environment that encourages enterprise, risk taking and productive R&D activity ought to be intensified.

Section 5. Concluding Remarks

As the Irish economy develops, traditional factors behind strong growth will remain important. In particular, these include the efficient utilisation of labour and capital in order to keep the economy operating at close to its potential.

In the longer term, however, the key to economic growth will be productivity. Aggregate productivity growth depends upon the productivity of individual firms in the economy which, in the long run, is largely beyond the *direct* control of policy makers. From a policy perspective, the key is to ensure institutional structures and policy settings that are supportive of investment, entrepreneurship and risk taking, innovation and efficient working and managerial practices. Five important considerations were discussed in this paper, namely: sound macroeconomic

21 Community Innovation Survey (2000).

22 See, for example, World Economic Forum (2003).

23 Among the advantages of tax credits over direct grants are that they require less administration, they reward success because only profitable companies can use the credit, they are less liable to capture by lobbying on behalf of special interests and they do not rely on bureaucrats to pick winners (Sapir Report, 2003, p.33.)

fundamentals, a regulatory environment favourable to business and entrepreneurship, good access to risk capital, educational attainment of the workforce and conditions favourable to R&D activity. More specific measures for the Irish economy, relating to these priorities, include:

- Maintaining a prudent fiscal stance in order to limit the economy's vulnerability to asymmetric shocks and, more generally, to maintain macroeconomic stability;
- Improving the quantity and quality of public investment in the economic infrastructure, including roads, public transportation, telecommunications and energy;
- Increasing standards of competition in certain non-traded sectors of the economy;
- Improving the skills base of the economy through a commitment to increase participation in formal education and encourage lifelong learning among the workforce;
- Other measures to promote enterprise including fostering a culture supportive of entrepreneurship and risk taking, reducing red tape and other administrative and regulatory barriers to doing business and ensuring the availability of operational support and finance to new and developing enterprises;
- Ensuring an environment favourable to R&D activity. This might include increased incentives for R&D activity, creating an environment supportive of innovation and risk taking, promoting research collaborations between industry and third level institutions and measures aimed at increasing the effectiveness and productivity of R&D.

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