2003

# Annual Competitiveness Report 2003

Forfás

National Competitiveness Council

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November 2003

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**Secretariat:**
Forfás
Wilton Park House
Wilton Place
Dublin 2

Tel: 01 607 3000
Fax: 01 607 3030
Email: ncc@forfas.ie
Web: www.forfas.ie/ncc

# Foreword by An Taoiseach

Ireland's international competitiveness, and in particular our highly educated workforce and our favourable business environment, have played a significant role in building the foundations for our recent economic success. Competitiveness is an underlying concern and a guiding principle of economic and social policy. It is fundamentally important in improving the living standards of all citizens.

At present Ireland faces challenges to our competitiveness on several fronts. We must build our future prosperity against the backdrop of slower international growth and increased competition, both in Europe and globally. In addition, the recent appreciation of the euro has undermined our competitive position. Against this difficult global backdrop, it is important to look carefully at the domestic policy environment, where Irish policy makers can exert a positive influence.

It is in this context that the National Competitiveness Council presents its advice to Government on the priority issues relating to competitiveness.

Enhancing the ability of Irish firms to compete in the future for investment and new markets in an ever evolving and increasingly competitive environment will be essential if we are to emulate our past success. The Government is determined to meet the challenges of the new competitiveness agenda to ensure the stability of Ireland's business environment now and into the future. In the short term, we are working to address the cost competitiveness environment by developing our business and work environment while in the medium term we will continue to develop our economic and technological infrastructure, our education system and our ability to innovate to allow business to compete in an innovation-led economy.

We do not under-estimate the challenges and we recognise that we cannot meet all our objectives immediately. In some cases, the benefits of the decisions we take and the work we do today may not be felt for some time. However, we have a framework for action and we are taking concrete steps across a wide range of areas to meet those challenges.

The Council's recommendations, drawing on the expertise of its members, provide the Government with a valuable input into policy formulation and implementation. I am therefore very pleased to introduce both the Annual Competitiveness Report 2003 and the Competitiveness Challenge 2003. The Government will give careful consideration to all of its recommendations.

**Mr Bertie Ahern, TD**
*Taoiseach*

November 2003

# Chairman's Preface

Business conditions in most industries are tougher now than they have been in over a decade. While this partly reflects the weak international economic climate and the recent strengthening of the euro, we cannot lay the blame for the current economic slowdown entirely at the door of the global economy. Domestically-generated problems such as rising costs, congested infrastructure and limited domestic broadband availability are clearly exacerbating an already difficult trading environment.

This year, the National Competitiveness Council is publishing its sixth Annual Competitiveness Report and Competitiveness Challenge. Using a wide range of key "input" and "output" indicators, sourced from bodies such as the OECD and Eurostat, the Annual Competitiveness Report 2003 (ACR) analyses Ireland's competitiveness and compares it to that of Ireland's trading partners and main competitors. Drawing from this analysis, the Competitiveness Challenge 2003 makes recommendations on the actions needed to improve Ireland's international competitiveness.

What is clear from both reports is that our immediate priority must be to slow the growth of prices and costs. Irish inflation has fallen in recent months, but it is absolutely vital that we avoid complacency. Average prices in Ireland still remain well above those of our main competitors, and we must do everything in our power to reduce the cost of doing business in Ireland relative to other countries. Greater consumer awareness and competition and improved physical infrastructure are important parts of the solution. But Government should also play a more immediate role, in particular by avoiding further inflation-fuelling increases in customs and excise duties, VAT and publicly-administered prices until inflation falls back to a more acceptable rate.

Looking to the future, while Ireland continues to offer an attractive business environment, in terms of taxation, regulation and general education, this will not be enough to sustain economic growth in the future. We must address a new competitiveness agenda of raising productivity by enhancing education and industry-specific skills, promoting innovation, research and creativity and supporting entrepreneurship, all of which will underpin the development of a more knowledge-driven economy. Competitiveness Challenge 2003 makes recommendations on the policies required to progress all of the above areas.

This is not an agenda that divides business and wider society. Economic dynamism and social progress go hand in hand. An innovative, enterprising economy offers the best opportunity to construct a fair and inclusive society in which all can contribute to and benefit from rising prosperity. During this period of global economic and political uncertainty it is vital that policy-makers maintain a clear focus on the determinants of long-term economic and social progress and improvements in Irish living standards and prosperity.

Ireland has a lot on which to build. The low level of public indebtedness, the strong base of modern manufacturing and internationally-traded service industries (including tourism), the competitive corporate taxation system, growing public investment in research and our traditional ability, because of our small size, to adapt quickly to changing circumstances all constitute a strong foundation for the economy going forward. But there is no automatic link between eventual global economic recovery and a resumption in strong Irish economic growth. Unless national competitiveness is kept at the top of the political agenda, we could find that the inevitable global economic up-turn leaves Ireland behind.

**William Burgess**
*Chairman, National Competitiveness Council*

November 2003

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# Introduction 1

# 1 Introduction

## 1.1 Economic Overview

Irish economic conditions have remained challenging in 2003 in line with weak global activity. Economic growth figures finally started to descend at the start of 2003, following a weakening in export growth – a previous strong driver of activity in the highly open economy. That descent was further re-enforced by the consequent deterioration in domestic economic activity as consumption and investment growth slowed.

*Table 1*
% yr change

| | 2001 Q1 | 2001 Q2 | 2001 Q3 | 2001 Q4 | 2002 Q1 | 2002 Q2 | 2002 Q3 | 2002 Q4 | 2003 Q1 | 2003 Q2 | 2003 Q3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP | 12.1 | 6.7 | 5.0 | 1.6 | 5.4 | 7.5 | 7.2 | 7.5 | 0.7 | 2.1 | |
| Real GNP | 11.1 | 1.6 | 2.9 | 0.3 | -1.7 | 2.2 | -0.4 | 0.2 | 1.0 | 3.1 | |
| Real Domestic Demand | 8.9 | 1.2 | 3.8 | 4.0 | 0.1 | 5.7 | 3.1 | 2.8 | 1.2 | 1.0 | |
| Real Exports | 21.7 | 10.9 | 4.7 | -1.4 | 7.8 | 8.5 | 9.1 | -0.4 | -12.6 | -8.1 | |
| Productivity (GDP/labour) | 8.2 | 3.9 | 2.1 | -0.9 | 3.2 | 5.5 | 6.8 | 6.5 | -0.8 | 0.5 | |
| Employment | 3.6 | 2.7 | 2.8 | 2.5 | 2.1 | 1.9 | 0.5 | 1.0 | 1.5 | 1.6 | |
| Consumer Prices | 5.3 | 5.4 | 4.6 | 4.1 | 4.8 | 4.6 | 4.4 | 4.8 | 4.9 | 3.8 | 3.1 |

Sectoral performance across the economy has been mixed. Strong growth in merchandise exports from the pharmaceutical and medicine sectors far outpaced the performance of other sectors involved in goods exports. Continued strength across most service sector exporting firms is continuing to limit some of the trade losses from the weak exporting performance of some manufacturing firms.

The varying sectoral performance of differing areas of the Irish economy is also confirmed by employment data from the Forfás Employment Survey. Total employment in agency-supported companies fell by 3 per cent in 2002. This is confirmed by CSO industrial employment data which show a seasonally adjusted fall of 4.1 per cent in the year to June 2003. In sectoral terms most of the net decrease in employment has been concentrated in electrical and electronic equipment firms (including computers), and internationally-traded services (including software) reflecting the slowdown in global ICT markets. That said there was a net increase in employment numbers recorded in international financial services firms in 2002.

With exports weakening, consumer spending is now the primary driver of overall growth. Consumer spending gains, although easing, are being underpinned by gains in disposable incomes from strong employment and wage growth, and by positive wealth effects mainly from the resilient performance of the housing market. Labour market conditions are also positive with employment growth continuing to post strong gains in line with labour force growth, and keeping unemployment around 4.5 per cent. Finally consumer price inflation continued on a downward path throughout the year, falling to 2.9 per cent in September.

Ireland's vulnerability as a small open economy has been fully exposed. The timing of any recovery will be heavily dependent on a recovery in global trade and investment, and by a rapid restoration of cost competitiveness. Global conditions look set to remain fragile for the remainder of 2003 and most of 2004, with downside risks staying high. This makes it all the more important that we continue to focus on restoring competitiveness across the economy, to enable firms to be ready to reap maximum benefit from the global economic recovery when it materialises.

## 1.2 Competitiveness Summary

It is clear that firm level activity is being hampered by a three-pronged threat. Firstly, weak and fragile global economic conditions are continuing to dampen export growth. Secondly, the continuing recovery of the euro vis-à-vis the US dollar and UK sterling is putting upward pressure on Irish export prices. Thirdly, the cost competitiveness position of firms has deteriorated further as domestic price pressures continue to escalate, placing pressure on margins which, in many sectors, are already thin.

It is this final threat to firms, namely from competitiveness issues including costs and other factors, that this report addresses.

In attempting to quantify this competitiveness threat, this report benchmarks Ireland's competitiveness performance for 128 indicators on the international stage, against 15 other countries. An overall summary of the findings from each section of the report, with Ireland ranking performance (1=most competitive) is outlined in the box below.

*Table 2* Summary of Findings of ACR2003

**Business Environment – Positive**
The tax and regulatory environment is still attractive compared to international competitors, but firm level competitiveness is being undermined by weak levels of competition and high costs.

**Rankings:** Levels of corporation tax – 1/16; FDI net inflows – 1/16; Intensity of local competition – 13/16

**Economic and Technological Infrastructure – Very Weak**
All round performance is poor and progress on broadband and transport remains slow.

**Rankings:** Overall infrastructure quality – 15/16; Broadband access – 13/16; Efficiency of distribution infrastructure – 15/16

**Education and Skills – Mixed**
Although current results are strong, relatively low levels of investment may hamper future performance.

**Rankings:** Expenditure on education – 7/16 (GNP); % of population that has at least 3rd level education – 8/16; % of 25-64 year olds in continuing education – 9/12

**Entrepreneurship and Enterprise Development – Mixed**
Ireland performs well on the international stage regarding entrepreneurship. Competitiveness performance for enterprise development is mixed, reflecting the diverse structure of the Irish economy and the associated varying needs and performances for firms.

**Rankings:** Entrepreneurial Activity – 4/16; Cluster Development – 8/16; Value chain presence – 11/16

**Innovation and Creativity – Weak**
The foundations for transition to an innovation-driven knowledge economy remain weak. Competitiveness performance will need to improve in this key area if future growth potential is to be realised.

**Rankings:** Business expenditure on R&D – 11/16; Total researchers per 1,000 people in employment – 12/16; US patent applications – 10/12

**Intermediates – Mixed**
Productivity performance on the international stage is strong, though this performance is being exaggerated by the performance of multinational firms. More importantly the rising cost burden, and high inflation is severely hampering firm level competitiveness and overall growth prospects.

**Rankings:** Labour productivity per person employed per hour – 2/16; Cost of broadband – 12/13; Growth in nominal compensation per employee – 15/16

**Outputs – Positive**
Current outputs are strong reflecting previously supportive competitiveness policy, and associated economic progress.

**Rankings:** GDP per capita – 2/16; Unemployment rate – 3/16; General government debt as a % GDP – 3/16

## 1.3 NCC Competitiveness Framework

### Definition

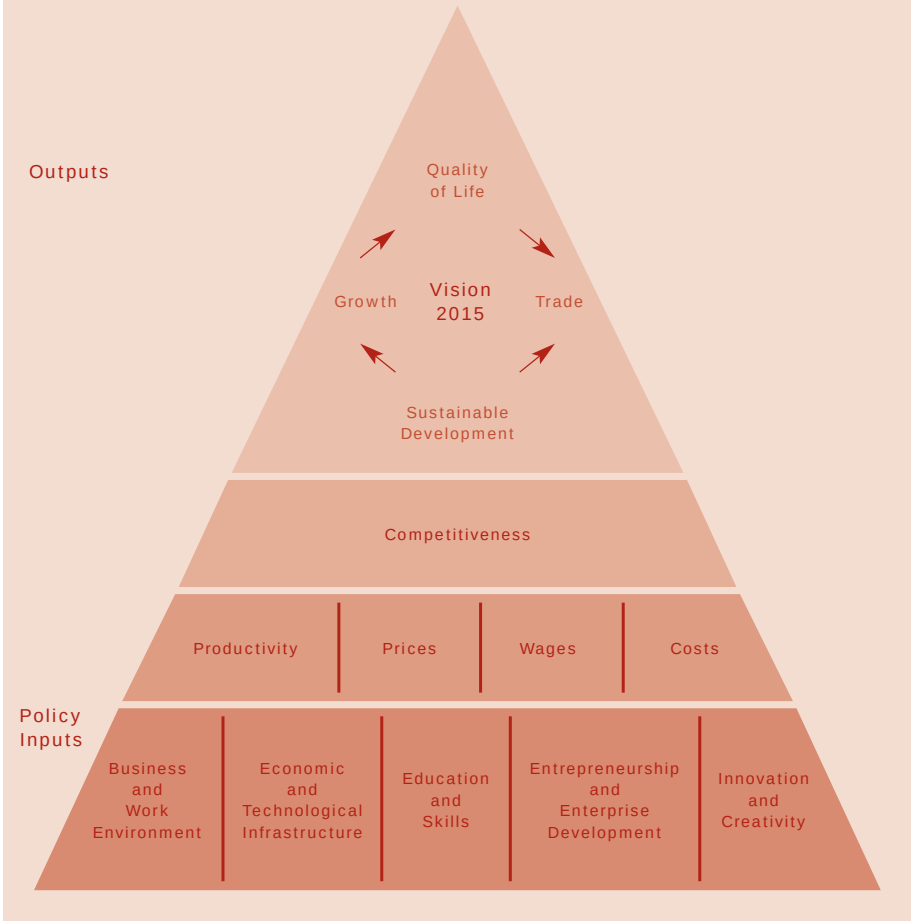
The literature on competitiveness supplies a wide variety of definitions of the term. The National Competitiveness Council has chosen a definition that is at once simple to understand, while simultaneously incorporating those key elements which combine to produce a competitive economy:

*"Competitiveness is the ability to achieve success in markets leading to better standards of living for all. It stems from a number of factors, notably firm level competitiveness and a supportive business environment that encourages innovation and investment, which combined lead to strong productivity growth, real income gains and sustainable development".*

### Approach

The "competitiveness pyramid" shown below provides a framework for understanding the drivers of national competitiveness. It distinguishes between the "inputs" into competitiveness and "outputs" of competitiveness. The structure of this year's ACR is based around this framework.

*Figure 1* National Competitiveness Framework Model



The **inputs** (in the bottom row of the competitiveness pyramid) represent the foundation stones of the economy and are the primary drivers of competitiveness. The Council believe that it is within these particular areas that policymakers can have the greatest impact on competitiveness. The input areas identified in the pyramid are:

- Business and Work Environment
- Economic and Technological Infrastructure
- Education and Skills
- Entrepreneurship and Enterprise Development
- Innovation and Creativity

Therefore it is crucially important to measure Ireland's competitiveness at the input level and then benchmark it vis-à-vis best international practise. This allows policy makers to identify policy weaknesses and thus design specific policies to address these concerns. This process of measurement and analysis is brought to the next stage in the Competitiveness Challenge 2003 which contains 10 key recommendations, each of which addresses an area of concern as identified in this document.

The second stage of the competitiveness pyramid is the **"intermediate"** stage, lying between the input and output stages. Building competitiveness in the intermediate area (moving up the pyramid) allows for strong economic stability, as productivity is maximised in parallel with increases in real wages. This area, whilst measurable, is neither a complete input nor output area.

Following on from the intermediate stage, a range of national performance indicators are then examined to provide an overall macroeconomic view of Irish competitiveness. These indicators are defined as **output** indicators and are not directly within the control of policymakers. Ireland's performance in these areas is directly related to the quality of previous policies instituted at the input level and the ability to build a strong intermediate stage of competitiveness. Competitive gains at the lower levels of the pyramid allow growth potential to be maximised at the apex, whilst providing suitable conditions for sustainable development.

Separation of input and output indicators means that indicators are no longer grouped entirely around policy areas. In the area of housing, for example, indicators are listed in both input and output sections. Input indicators for the supply and demand for housing are covered in the housing and environmental section of the infrastructural input area to competitiveness. House price data is featured in the intermediates area, whilst house price affordability is covered in the sustainability section of the outputs from competitiveness.

## National Competitiveness Framework – Sub-categories

Within each main category a sub-set of further headings is constructed to categorise indicators, as follows.

### Inputs

#### *Business and Work Environment*

- Competition and Regulation
- Labour Market
- Macroeconomic Policy
- Investment and Trade

#### *Economic and Technological Infrastructure*

- Transport
- Information and Communications Technologies (ICT)
- Energy
- Housing and Environment

#### *Educations and Skills*

- Investment
- Participation
- Attainment
- Life-long Learning and Up-skilling

#### *Entrepreneurship and Enterprise Development*

- Entrepreneurship and Financing
- Business Formation
- Firm Level Management Skills
- Clustering, Networks and Long-term Planning

#### *Innovation*

- Research and Development
- Inventiveness and Creativity
- Patents, Commercialisation and New products

### Outputs

#### *Intermediates*

- Prices and Wages
- Productivity and Business Costs

#### *Results*

- Macroeconomic Performance and Trade
- Sustainability, Social Capital and Long-term Vision 2015

## 1.4 Methodology

A total of 128 indicators relating to competitiveness have been analysed in this report. These indicators have been divided into the following areas:

(1) Inputs – 96 indicators grouped in the five input areas identified in the framework.

(2) Outputs – 32 indicators grouped in the two output areas of the framework.

### Comparator Counties

The following list of 16 countries (including Ireland) has been chosen to benchmark Ireland's international competitiveness position. The list of comparator countries remains the same as those analysed in the 2002 report. The list is made up of seven Eurozone countries, three European Union countries which are outside of the Eurozone, two EU accession countries, and four non-European economies which were chosen for either their global importance (e.g. the US) or for their similarity to Ireland in terms of size and/or stage of economic development (e.g. New Zealand).

*Table 3* Selected Comparator Countries

**Eurozone**
(1) France
(2) Finland
(3) Germany
(4) Ireland
(5) Italy
(6) Netherlands
(7) Spain

**Non-Eurozone**
(8) Denmark
(9) Sweden
(10) United Kingdom

**EU Accession**
(11) Hungary
(12) Poland

**Other**
(13) Japan
(14) New Zealand
(15) South Korea
(16) United States

In interpreting the ranking for each indicator, a score of '1' is given to the country that is deemed most competitive, while a score of '16' (or the lowest sample number) is given to the least competitive country (assuming values for that particular indicator are available for all countries). Hence, in general, a low ranking implies a healthy competitiveness position, while a high ranking implies an uncompetitive position. Of the 128 indicators considered, a sub-set of 35 input indicators has been chosen as key indicators for more detailed analysis. A sub-set of 12 output indicators which measure current performance have also been chosen for additional analysis.

## 1.5 Competitiveness Benchmarking and Measures of Economic Activity

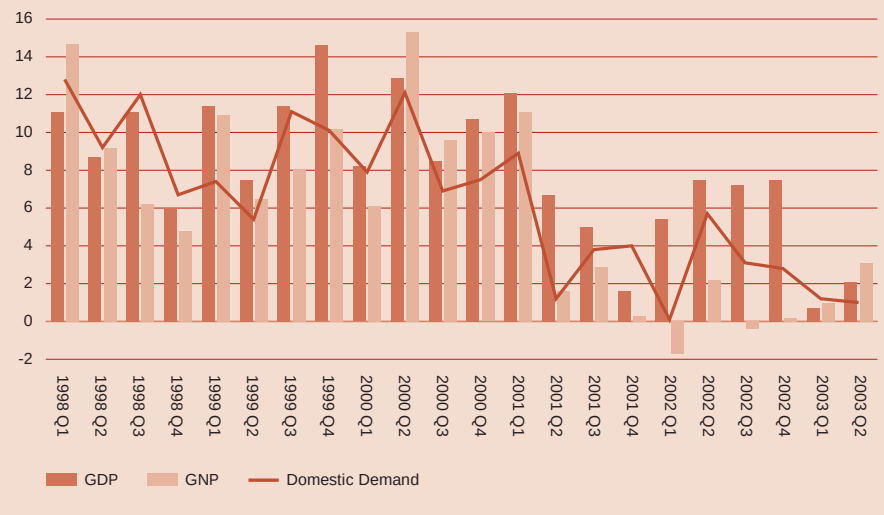
Benchmarking exercises are a useful tool for policymakers. However, it is important to draw attention to the limitations of competitiveness benchmarking. Much of the data that we would wish to use to measure competitiveness is not available. Moreover, when we wish to use internationally comparable data, availability becomes even more limited. Apart from not having internationally comparable data for matters which are essentially measurable, there is also the problem that certain matters we wish to cover – quality of life and social capital being a prime example – are difficult to measure by conventional methods and so have to be approached through proxy measures. Data timeliness is another crucial element of benchmarking. Efforts have been made to provide the most up-to-date data. However, due to timing differences, internationally comparable data often tends to lag the most current national data.

Where appropriate, indicators which are measured and benchmarked as a percentage of gross output in Ireland, are quoted using two methods of output calculation. Firstly, the traditional **Gross Domestic Product (GDP)** measurement of output is used to assist efforts in benchmarking Irish performance on the international stage. This is defined as the sum of the gross value added through the production of goods and services within the economy. It represents the total expenditure on the output of goods and services produced in the country accruing to both permanent residents and non-residents.

Secondly, the **Gross National Product (GNP)** measurement of output is also used for some indicators. This is defined as gross value added accruing to the permanent residents of the country, and is calculated by adding the net factor income from abroad to the estimate of GDP. Net factor income abroad includes on the credit side the incomes earned as a result of the economic activity of Irish residents abroad – profits or property. On the debit side, it also includes incomes arising in the Irish state to non-residents – including the profits of foreign owned multinational corporations.

Using the GNP measurement allows for better comparison in some instances as it removes the distortions to output measurement caused by large financial flows through the economy as a result of the large presence of multi-national firms in Ireland. As a result of these effects, large negative net income flows have been recorded across the Irish economy over recent years. In fact, estimates show that the GNP estimate of output is 25 per cent lower than the GDP estimate of output, well ahead of the average European deviation between the two growth estimates of around 0.3 per cent.

*Figure 2* Economic Activity



# Inputs to Competitiveness 2

# 2 Inputs to Competitiveness

## 2.1 Business and Work Environment

The first input to competitiveness examined is the Business and Work Environment. This refers to the impact of government policies in areas such as business and labour market regulation, competition, international trade and investment, taxation and macro economic management.

Ireland's geographic peripherality and the high degree of openness of our economy make it essential that Ireland offers a competitive business and work environment. Strong macro-economic and micro-economic conditions maximise the competitive opportunities for firms to hire labour, improve cost and production efficiency, and sell products.

A strong business environment has also strong links to other competitiveness inputs, as it builds the foundations on which other key areas can prosper and improve productivity. This includes infrastructure development, improving skills, and fostering entrepreneurship and innovation.

The indicators examined under this heading cover 4 main areas:

- Competition and Regulation
- Labour Market
- Macroeconomic Policy
- Investment and Trade

**Nine key indicators** have been chosen for further analysis from the overall list of 24 indicators in the Business and Work Environment tables (see Annex):

(1) Intensity of local competition

(2) Burden of regulation

(3) Employment growth

(4) Labour market regulation

(5) Corporation tax

(6) Tax revenue as a percentage of GDP/GNP

(7) Business investment as a percentage of GDP/GNP

(8) Stock of inward foreign direct investment (FDI) as a percentage of GDP

(9) Trade openness as a percentage of GDP

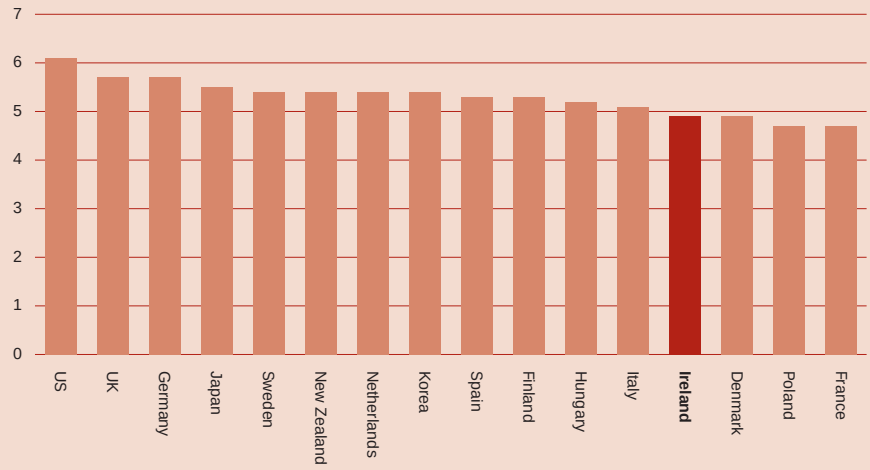
### 2.1.1 Competition and Regulation

The first area identified as a key element of promoting a strong and stable business and work environment is "Competition and Regulation". Facilitating markets to operate efficiently by ensuring adequate competition is vital to driving down the cost of doing business in Ireland. Market entry by new firms and a high degree of rivalry between existing firms pushes other companies to lower costs, improve quality and service, and create new products and processes. Intense competition in domestic markets is a powerful stimulus to the creation and persistence of international competitive advantage. Policies that undermine competition, innovation and dynamism among companies represent the most common and most profound error in government policy towards industry.

#### Intensity of Local Competition

The World Economic Forum (WEF) regularly surveys international firms in relation to the intensity of local competition. Firms are asked to benchmark the level of competition across their own local markets with a maximum score of 7 indicating intense levels of competition with changing market leadership, and a minimum score of 1 indicating limited competition where price-cutting is rare. Survey results show that of the 16 countries benchmarked, Ireland performs relatively poorly, ranking in 13th place with a score of 4.9.

*Figure 3* Intensity of Local Competition (7=Intense)




*Source: World Economic Forum*

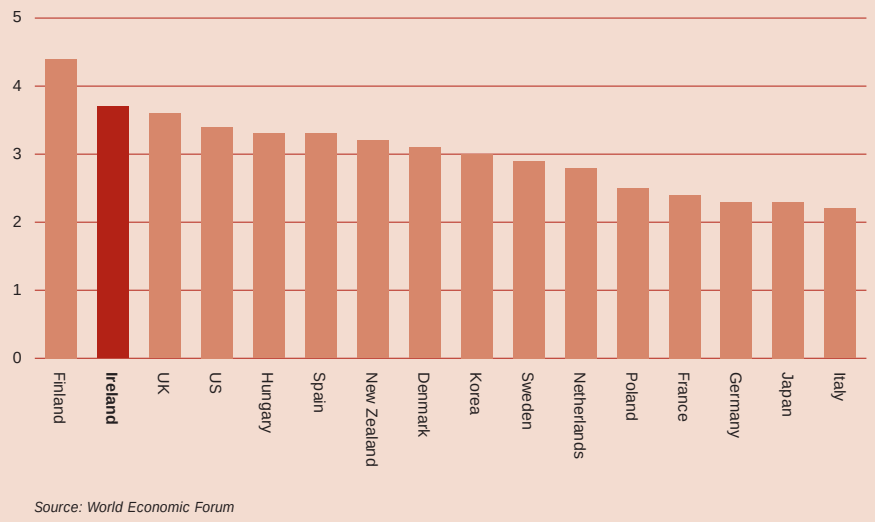
This score is also reflected in another WEF indicator which examines the extent of locally based competitors. Ireland ranks just 11th out of 16. One of the reasons for the weak performance may be deficient competition legislation to prevent unfair competition. According to an Institute for Management Development (IMD) survey, Ireland ranks just 10th out of 12 under this heading. Other factors might be related to the small size of the local market.

### Burden of Regulation

Better regulation is increasingly being used across the developed world as a means of developing a competitive edge in the race for investment and jobs. Improving regulation allows for lower business costs, lower consumer prices, and higher levels of efficiency. The elimination of other burdensome, dated and in some cases, impractical regulations will also support the business environment. In many cases, the same objectives can often be achieved by other non-regulatory means with fewer negative implications for efficiency and costs.

The World Economic Forum surveys the burden of regulation falling on international firms. Businesses are asked to benchmark the level of regulation in their country from a scale of 1 to 7, with a maximum score of 7 indicating a regulatory environment which is not burdensome and a minimum score of 1 indicating a highly burdensome regulatory environment. Ireland's score of 3.7 places it in 2nd place amongst the 16 countries observed, behind only Finland's strong performance.

*Figure 4* Burden of Regulation (7=Low)




*Source: World Economic Forum*

An IMD survey looking at the levels of bureaucracy which impinge on business activity also found that Ireland performs reasonably well, ranked 6th out of 16 countries.

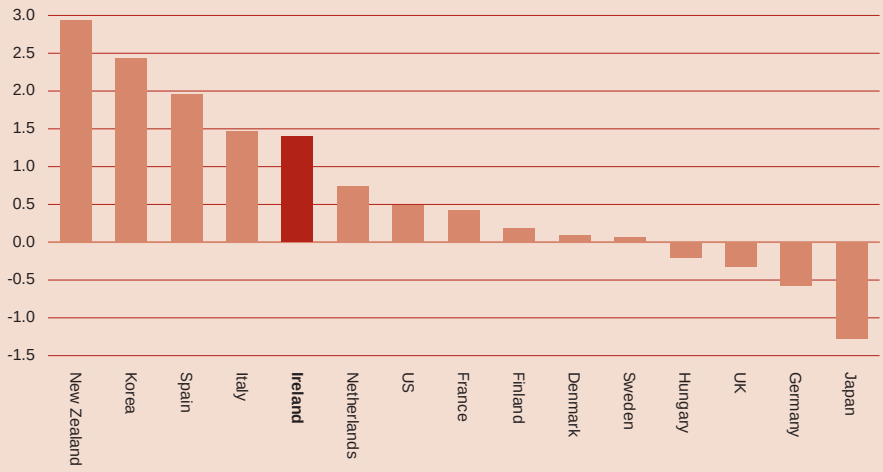
## 2.1.2 Labour Market

The second area identified as a key element of promoting a strong and stable business and work environment is the labour market. Improving competitiveness and productivity depends heavily on the input of workers. An efficient labour market is one where supply and demand conditions are able to adjust quickly to changing economic conditions, allowing the market to clear and keep unemployment low, with wage gains reflecting the productivity gains of firms and sectors. An efficient labour market also facilitates a reallocation of human resources from declining areas of the economy to strong growth areas. In the NCC's model of competitiveness, the inputs to competitiveness identified from the labour market are the supply and demand for labour (i.e. the total labour force compared with total employment), levels of regulation and industrial relations. The outputs from these market conditions (wage levels and unemployment rate) are examined in Section 3.

## Employment Growth

Ireland's employment record over recent years has been impressive with strong levels of employment growth outpacing increases in the labour force, allowing for a rapid and sustained fall in unemployment. The overall rate of job creation growth remains impressive compared to most major competitors and was estimated to be an annual 1.5 per cent in the first half of 2003 (although public sector job creation boosted this number). The OECD estimated in 2002 that Irish employment growth was 1.4 per cent, well ahead of the estimated 0.75 per cent EU rise. Ireland was ranked 5th out of 16. Over recent months though, the rate of private sector job creation has slowed. It should also be noted that labour market conditions in areas of the economy more exposed to international trade have weakened. Industrial employment fell 4.1 per cent in the second quarter of 2003 compared to a year earlier.

*Figure 5* Employment Growth 2002 (% change)




*Source: OECD Economic Outlook*

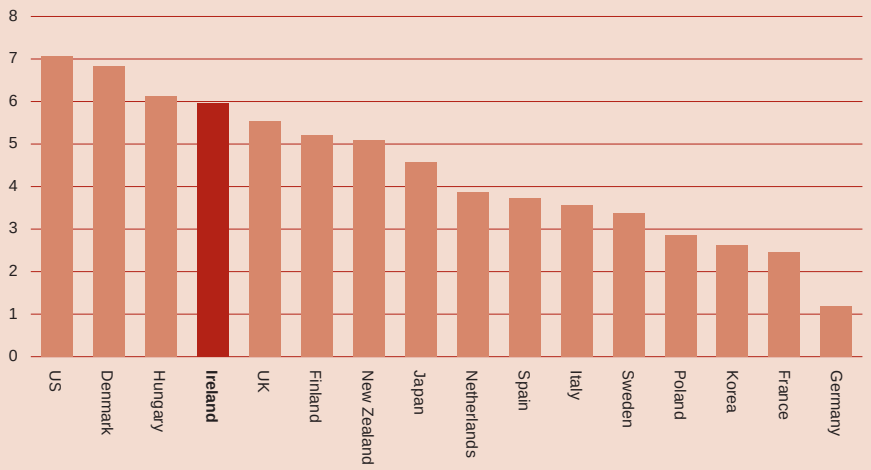
Continued growth in overall employment is vital to maintain the current low levels of unemployment given the projected continuation of high labour force growth. OECD data suggests that the Irish labour force will expand by 1.5 per cent over 2003 and 2004, corresponding to a rank of 2nd under this measure. This in part reflects Ireland's young population and the subsequent large numbers of school leavers as well as the continuing year-on-year increase in labour force participation rates which for 2003/4 are expected to reach 70.1 per cent. That said, female participation and employment rates continue to lag behind the performance achieved by other European nations.

## Labour Market Regulation

The extent of regulation across the labour market is another key provision to ensure a strong and stable business environment which supports competitiveness and productivity. Effective employment regulation plays a key part if facilitating improved labour market mobility, which in turn is critical in allowing new business opportunities to be seized.

The IMD surveyed a broad sample of international firms concerning their perception of the extent of regulation across the labour market (defined as regulations relating to hiring and firing practises, minimum wages, etc.). The result shows that Ireland ranked 4th out of the 16 countries benchmarked.

*Figure 6* Labour Market Regulation (10=Flexible)




*Source: IMD World Competitiveness Yearbook 2003*

The continued success of the Social Partnership process has played a key role in the economic and labour market success story over recent years. In more recent times, the signing of the Sustaining Progress agreement has put in a place a set of conditions which should ensure a moderation of pay growth more in line with key competitors and in line with productivity increases. The agreement also sets ambitious targets for the economy and the labour market allowing workers and firms to continue to benefit from strong economic performance.

It is also hoped that the Sustaining Progress agreement can deliver a positive industrial relations climate. The IMD measurement of working days lost per 1,000 inhabitants per year in industrial disputes shows an average from the years 1999-2001. Ireland performs poorly, being ranked just 15th out of 16. However, this score was distorted somewhat by the large number of days lost in a small number of public sector disputes. This situation has since improved. Data for 2002 estimates that the number of working days lost as a result of disputes fell 81.5 per cent, pushing down the number of days lost per 1,000 population as a result of industrial unrest down from 37.5 days to 5.45 days.

### 2.1.3 Macroeconomic Policy

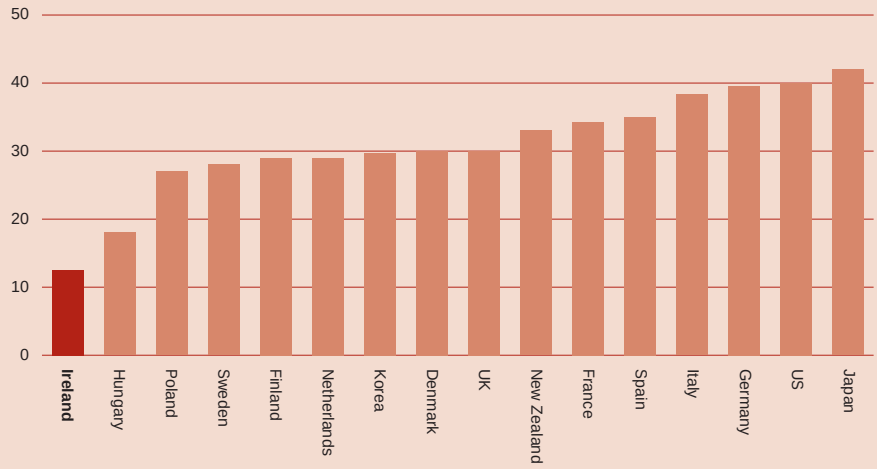
Macroeconomic stability is the third element needed for a healthy business and work environment. The implementation of a consistent macroeconomic policy framework will be deemed successful if it promotes business confidence, supports investment decisions by firms in the short and medium term, and boosts productivity and growth conditions over the longer-term. In contrast, a volatile macroeconomic environment deters private investment and limits economic growth. This can happen as a result of policies which cause unstable output or price conditions (i.e. volatile growth and inflation).

Following Ireland's decision to join the European Monetary Union (EMU), the main macroeconomic policy tool available to domestic policymakers has been fiscal policy. The central plank of government fiscal policy continues to be based around adherence to the conditions laid out in the Stability and Growth Pact. The government has also been committed to keeping the corporation tax level low to encourage firm level investment and development, and also keeping the rate of personal income taxation low to encourage worker participation in the labour force.

## Standard Rate of Corporate Taxation

The first indicator examined in this area is the standard rate of corporation tax. The introduction of a 12.5 per cent corporate tax rate in Ireland marked the completion of a process aimed at instituting a single low level of corporate taxation as outlined in recent budgets. The KPMG Business Taxation Survey shows that on 1 January 2003, Ireland was considered to have the most competitive rate of corporate taxation amongst the 16 countries surveyed. Japan continued to have the highest standard rate of corporate taxation of the 16 countries surveyed at 42 per cent.

*Figure 7* Standard Rate of Corporate Taxation (%)



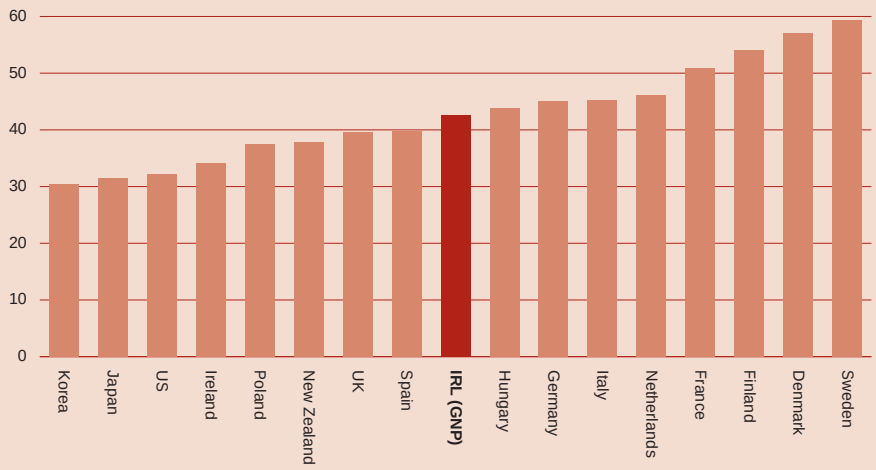

*Source: KPMG Corporate Tax Rate Survey*

## Total Tax Revenue as a Percentage of GDP

The second key competitiveness indicator examined in this section looks at the total tax and non-tax revenues collected by the state. Around the globe there are various models of taxation and expenditure; these range from low tax-low spend models, to high tax-high spend models.

In the following graph (Figure 8) countries which have a low level of tax incidence (i.e. a low ratio of total tax revenues and non-tax revenues accruing to the government compared with total GDP) are ranked as being most competitive. According to OECD estimates for 2002, Ireland is ranked 4th out of 16 using Gross Domestic Product as a measure of national income. The rate of 34.1 per cent is well below the EU average tax revenue/GDP ratio of 46.1 per cent. However, if Gross National Product is used instead as a measure of economic activity (which excludes net income outflows from the economy), the tax ratio for Ireland rises to an estimated 42.6 per cent, though this is still below the average EU ratio. (See Section 1.5 for discussion on the use of GDP and GNP in indicators).

*Figure 8* General Government Total Tax and Non-tax Receipts (% GDP/GNP)




*Source: OECD Economic Outlook*

The OECD also calculates the total outlays of governments as a percentage of national income. Total outlays by the Irish government were estimated to be around 34.2 per cent of GDP, the 2nd lowest among the 16 countries surveyed. However, when the GNP estimate of economic activity is used, the government outlay ratio rises to 43 per cent, though this is still below the EU average of 47.7 per cent of GDP. In 2002 a small Irish exchequer surplus of €95 million was returned (0.1 per cent of GDP) and this was amongst the strongest performances across the EU. Using the General Government Balance measure (which is submitted to the EU Stability and Growth Pact forecasts), a small deficit of €109 million was posted in 2002. This indicator is discussed further in the outputs section of competitiveness in Section 3.

OECD statistics show that the tax take from salaries in the form of income tax and social security contributions is low. Ireland is ranked 2nd out of 16 countries surveyed for a married two income family earning 1.67 times the average income, indicating a low taxation burden. The burden of social security contributions falling on business is also benchmarked. On this measure, Ireland is ranked 6th of the 16 countries surveyed, with employers paying roughly 10 per cent of gross labour costs in the form of social security contributions.

Finally, the comparatively high level of government investment spending is worth highlighting. The European Commission estimate that the level of investment undertaken by the Irish government in 2002 was around 5.1 per cent of GNP (falling to 4.1 per cent if the GDP measure of activity is used). Either measure placed Ireland in 2nd place across all the countries benchmarked, and well above the EU average government investment level of 2.2 per cent of GDP. This high rate of investment growth is welcome given the urgent need to address infrastructural deficits across the economy, as will be discussed in the next chapter. The current high rate of investment reflects our current stage of economic development, comparatively fast growth, and previous under-investment in infrastructure compared with other advanced economies.

### 2.1.4 Investment and Trade

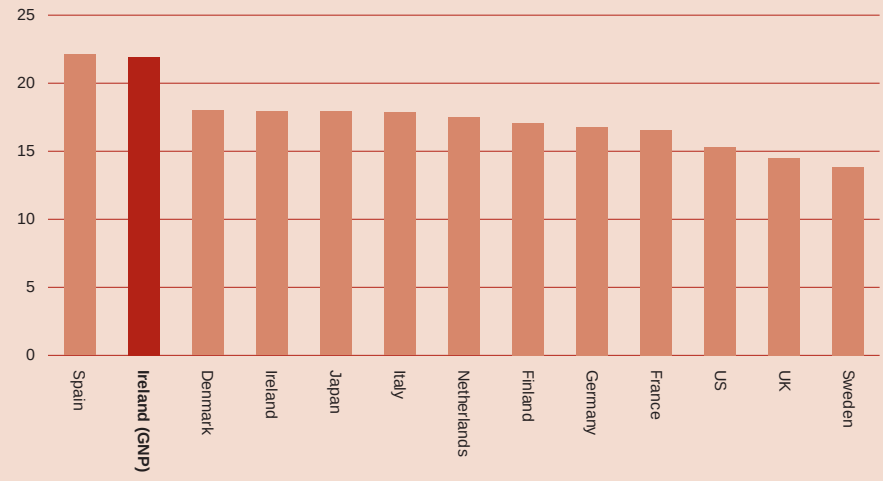
Investment and Trade is the final area identified as a key element of promoting a strong and stable business and work environment. Investment (in machinery, labour, human capital and technology) helps raise productivity and promotes competitiveness by facilitating more efficient production processes and putting in place a strong platform for innovation and creativity. The ability of firms to trade goods and services on foreign markets is also a key driver of overall economic growth. A high degree of openness for an economy increases sales opportunities for exporting firms. It also promotes other benefits from increased globalisation, including promoting best practise amongst firms, providing access to alternative sources of inputs, facilitating technology transfer and increasing access to global knowledge pools.

#### Private Investment as a Percentage of GDP

This section focuses on private investment as an input to the business environment, since investment at the firm-level is an important driver of competitiveness, productivity and growth in the medium-term. While recognising that, firm-level investment, including inward FDI, is also an output indicator that is influenced significantly by other measures to improve the business environment.

The European Union (EU) carries out regular analysis and provides forecasts of the macro-economic performance of member states. This analysis includes the main drivers of growth within the macro-economy, including private investment. In spring 2003, the EU estimated the level of private investment in Ireland as a proportion of GDP to be around 17.9 per cent. Ireland is therefore ranked 4th of the 12 EU countries surveyed, with the investment rate slightly above the 17.1 per cent EU average for 2002. Using GNP, Ireland's rank improves to 2nd out of 12, as the investment ratio rises to 21.9 per cent. (See Section 1.5 for discussion on the use of GDP and GNP in indicators).

*Figure 9* Private Investment as a % GDP/GNP



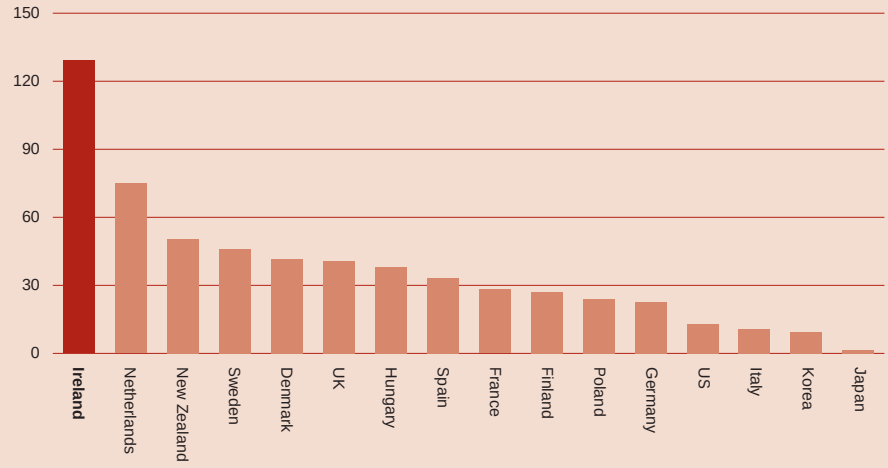

*Source: EU – AMECO Database*

## Stock of Inward Foreign Direct Investment (FDI)

Another key investment indicator for competitiveness in the Irish small open economy is the ability to attract foreign direct investment. While this can also be viewed as an output measure, it also provides a strong indication of the openness of the Irish economy to foreign investors – an important source of the capital and know-how needed for economic growth.

The United Nations World Investment Report benchmarks the foreign direct investment performance of nations. Data for the total stock of inward foreign direct investment stock measured as a percentage of GDP shows that Ireland is ranked top of the 16 countries benchmarked. The total stock of inward FDI was estimated to be 129.1 per cent of GDP in 2002, well ahead of other major competitors.

*Figure 10* Inward Foreign Direct Investment Stock (% GDP)

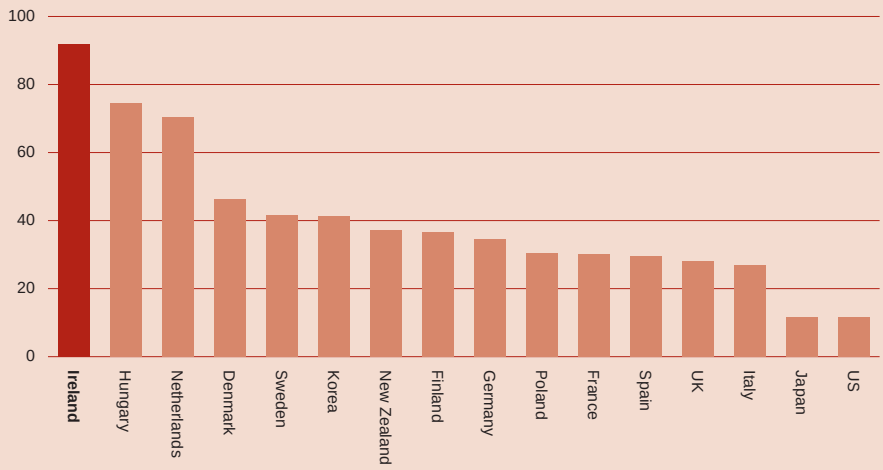



Ireland also performed well in terms of FDI net inflows in the period 1993-2002. OECD estimates for the period show that Ireland was able to attract a net inflow of US$70.8 billion in that period, placing it in first place of the countries surveyed. Data for 2002 shows that FDI inflows rose by 21 per cent to US$19 billion.

## Trade Openness

The final key indicator examined in the Investment and Trade section is the degree of openness to international trade. Not surprisingly, Ireland ranks 1st under this measure, reflecting the extremely open nature of the Irish economy. While undoubtedly this high degree of openness is a major factor in Ireland's economic success, it also leaves the Irish economy vulnerable to global economic downturns.

*Figure 11* Trade Openness (trade to GDP ratio)




*Source: IMD World Competitiveness Yearbook 2003*

Other indicators examined in this section detail a mixed performance. Firstly, the effective exchange rate data – a key element of an open economy such as Ireland – shows that Ireland is estimated to be ranked 15th out of 16 countries examined when growth rates are considered from 2002-3. The strengthening of the euro against the dollar and sterling at the end of 2002 and into 2003 continued to place pressure on the effective exchange rate for Irish exporters. Although Ireland has little control over the effective exchange rate, foreign exchange rate movements are clearly putting pressure on export prices, making export sales more difficult in an already weak global trading environment. It should also be noted that the euro weakness from 2000 towards the middle of 2002 boosted competitiveness as the euro stayed weak against the dollar and sterling, giving a price-boost to exports. All in all the evidence shows that for a small open economy, changes in the effective exchange rate have stronger effects on prices for the traded sector of the economy, meaning that efforts to improve competitiveness must be re-doubled to shield exporters from exchange rate related price movements.

The final indicator of note in this section is the interest rate spread. This is defined as the difference between the lending rate and deposit rates of money across banking institutions. Ireland is ranked 9th of the 16 countries surveyed. These figures show that borrowing conditions for Irish firms could be improved, providing a catalyst for future investment.

## 2.2 Economic and Technological Infrastructure

The second input to competitiveness examined is Economic and Technological Infrastructure. Physical infrastructure is a facilitator, and not a driver, of industrial upgrading, which depends primarily on improvements in human and organisational capabilities as a result of education, training, competition and firm-level investment in capital and innovation.

Inadequacies in Ireland's infrastructure could undermine competitiveness in several ways. Ireland's attractiveness as an investment location could be affected as companies will only locate or expand into areas that are served by adequate transport and communications links, which allow for the efficient and cost-effective movement of goods, people and information. Inadequate infrastructure and resulting congestion lead to higher inflation, increased costs and lower productivity. Ireland's ambition to be at the forefront of the knowledge economy is hampered due to the high cost and limited availability of broadband communications. Although much progress has been made with increasing infrastructural investment in Ireland, further progress will be necessary over the coming years, to narrow the infrastructural deficit with major competitors.

This chapter examines the quantity and quality of infrastructure in Ireland vis-à-vis 15 comparator countries under **4 main headings**:

- Transport
- Information and Communications Technology
- Energy
- Housing and Environment

Eight **key indicators** have been chosen for further analysis from the overall list of 22 indicators in the Economic and Technological Infrastructure tables (see Annex):

(1) Overall infrastructure

(2) Efficiency of distribution infrastructure

(3) Total ICT expenditure (percentage GDP)

(4) Overall broadband take-up

(5) Percentage of companies using broadband

(6) Energy efficiency

(7) Total housing stock

(8) Paper and cardboard recycling

### 2.2.1 Transport

Looking firstly at transport infrastructure, it is generally recognised that Ireland's overall transport network is well below international standards and this diminishes Ireland's attractiveness as an investment location. Adequate transport links, which allow for the efficient and cost-effective movement of goods and people, are a prerequisite to encourage continuing inward investment. Although some progress has been made in this area under the National Development Plan (NDP), a significant transport infrastructure deficit remains across the economy leading to a competitive disadvantage at international level. The Council welcomes the continued high levels of Government capital expenditure (discussed in Section 2.1.3) and recognises that it will take times to reap the benefits of this investment. However, while some improvements have been made, the government must continue to simultaneously pursue strategies to reduce and reverse those disadvantages in the longer term.

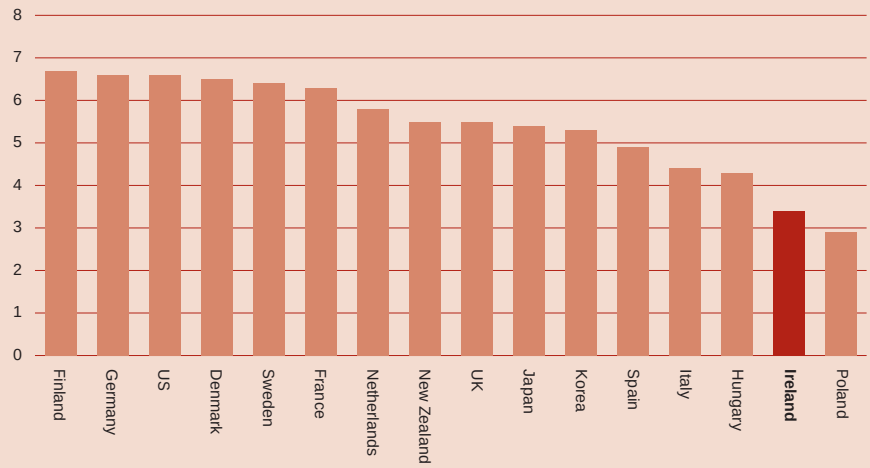
A high quality road network (including elements of motorway) is a standard feature of the infrastructure available for business in a majority of modern economies as it facilitates modern logistics techniques, and its absence country-wide in Ireland results in unfavourable comparisons when companies are selecting investment locations, and also hampers the activities of indigenous industry.

At a general level, it should be noted that internationally comparable transport data is difficult to attain. Furthermore, the published data in relation to Ireland poses further problems due to Ireland's peripherality and island status. The low population density of the island also dictates that forms of transport deemed appropriate for many of the comparator countries may not be viable options for Ireland, e.g. railways.

#### Overall Infrastructure Quality

This indicator confirms the general perception that Irish infrastructure is well below acceptable international standards. A World Economic Forum survey found that the general consensus was that Irish infrastructure was 'poorly developed and inefficient' relative to most other developed countries and ranked Ireland 15th out of 16.

*Figure 12* Overall Infrastructure Quality (7=World Best)




*Source: World Economic Forum*

### Efficiency of Distribution Infrastructure

The second key indicator examined in our analysis of transport infrastructure is the efficiency of the distribution infrastructure. This indicator uses the most recent IMD survey to measure the perceived efficiency of the distribution of goods and services across international economies by road, rail, air, sea and others. A score of 10 indicates a highly efficient distribution infrastructure, whilst a score of 0 indicates perceived inefficiency in this area. Again Ireland is ranked 15th out of 16 countries. Ireland also scores poorly on the indicators examining port infrastructure quality and quality of air transportation.

*Figure 13* Efficiency of Distribution Infrastructure (10=Efficient)


*Source: IMD World Competitiveness Yearbook 2003*

Finally on transport infrastructure, a survey carried out by the Small Firms Association in 2001 examining average speed of business deliveries in capital/principal cities found that Irish businesses are faced with the longest delivery times of the 8 countries surveyed. While this indicator is of somewhat limited coverage, the 58 minutes it takes for deliveries in Dublin is over 4 times as long as it takes in the UK, the best performing country.

## 2.2.2 Information and Communications Technology (ICT)

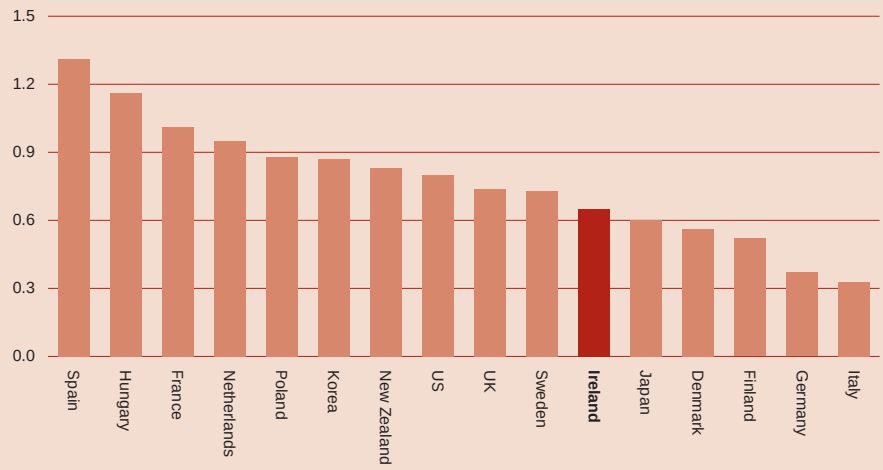
Despite being a leading producer of ICT products and services in the 1990s, Ireland has recently fallen behind in deploying ICT infrastructure across the domestic market. Being a broadband leader is important to Ireland's future. ICT industries are vitally important to Ireland's economy, accounting for over 33 per cent of total exports every year since the late 1990s. In terms of job growth, well over half of all new jobs created in Ireland are in the services sector and the reality for Ireland is that many of the jobs supported by the development agencies in the high tech and international services sectors are becoming more dependent on the provision of advance telecommunications services to enhance the value of their activities in Ireland.

On a more general level there exists a consensus among economists that much of the productivity differential between the US and Europe throughout the 1990s was a result of faster technical progress in ICT production and usage. Broadband is necessary to facilitate the full adoption and usage of such technology, thus accelerating technical progress and productivity growth.

### Investment in Telecommunications (as a percentage of GDP)

The IMD has found that in terms of the total investment in telecommunications (as a percentage of GDP) Ireland performs quite poorly and is consequently ranked 11th out of 16 countries in 2000. Considering that Ireland was viewed as a world leader in telecommunications in the early 1990s, the fact that levels of infrastructural investment across the domestic economy have now slipped below those of Poland and Hungary should be a cause for concern.

*Figure 14* Investment in Telecommunications (% GDP)



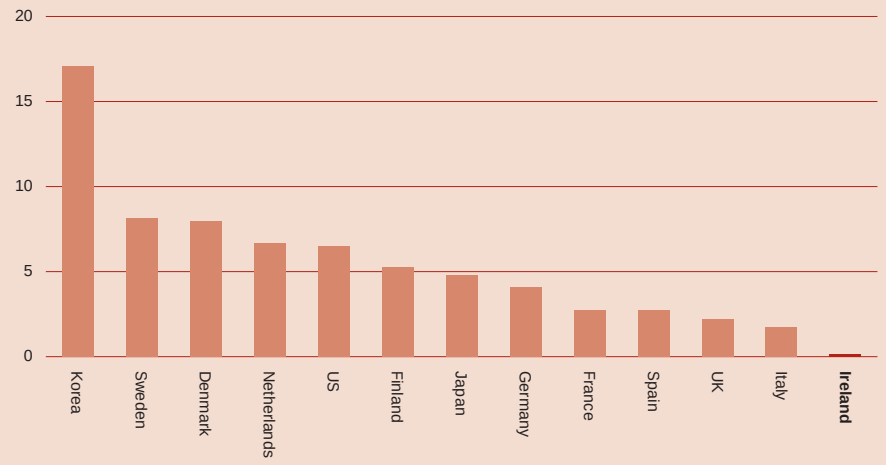

*Source: IMD World Competitiveness Yearbook 2003*

However, despite recent difficulties in the global ICT market, it appears that Irish companies have maintained their commitment to investment in technologies designed to improve processes and productivity. The PWC Technology Investment Report looks at the change in e-Commerce investments (percentage change in share of total invested) in the period 2001-2002. Despite a marginal fall-off in e-commerce investment of 1.7 per cent in Ireland during this period, this is still a robust performance given the substantial global contraction in ICT investment. However, it should be noted that much of this investment was concentrated in one or two projects and that the level of risk in terms of employment in the sector remains high.

### Overall Broadband Take-up

This statistic measures the usage of all types of broadband services in the benchmark group, based on three delivery platforms: DSL (digital subscriber lines), cable modem and fibre cable, and include residential users, SMEs and large organisations. Ireland is disappointingly ranked 13th of 13 countries by this measure. Although some progress is being made in this key area, overall take-up levels in Ireland remain well behind key competitors. Evidence shows that the cost and lack of availability of broadband are major impediments to broadband take-up.

*Figure 15* Overall Broadband Take-up (%)

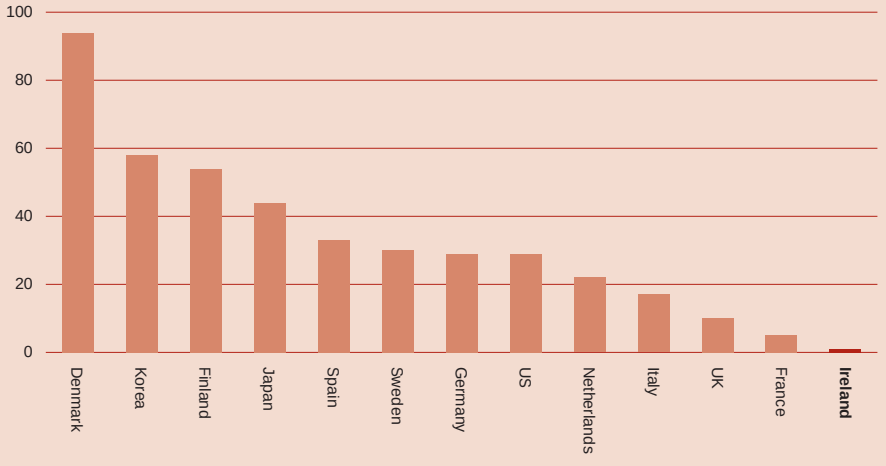



*Source: Forfás Broadband Benchmarking Study 2003*

## Percentage of Companies Using Broadband

While many large businesses already have broadband services, until the advent of DSL small and medium enterprises (SMEs) generally did not use broadband to a significant degree. A key measure of the impact of information society policies is the use of broadband services by companies; since most companies are small and since small companies mostly use DSL as a broadband delivery method, the take-up of DSL by SMEs is effectively the same as the take-up of broadband by all companies. On this measure, Ireland is ranked 13th out of 13.

*Figure 16* Companies Using Broadband (%)




*Source: Forfás Broadband Benchmarking Study 2003*

This poor performance may in part be a reflection that access to and the cost of Irish communications infrastructure is poor. Access refers to the ability of firms and consumers to have the physical capability to connect to a broadband delivery mechanism. The OECD Communications Outlook 2003 ranks Ireland 13th of 14 countries (just ahead of Poland) in terms of broadband access. The issue of broadband costs is dealt with in the intermediates section, under the heading of business costs.

In terms of the number of ISDN subscribers (Integrated Services Digital Network), Ireland ranks last out of eight countries. There are indications that demand for ISDN usage in Ireland is increasing. However, this is an outdated technology and is only being used due to the absence of a viable broadband alternative.

### 2.2.3 Energy

Years of under-investment in energy infrastructure, allied to a rapid increase in demand, have resulted in the emergence of capacity constraints in the Irish electricity market of late. This is a particular concern for the development agencies who are attempting to maintain and indeed enhance the level of Foreign Direct Investment (FDI) coming into the country. Surety of energy supply is a vital component for high-tech and indigenous industries which rely on a continuous and guaranteed energy supply in the production process. The issue of energy costs is addressed in the intermediates section featured later in this report.

#### Energy Infrastructure

An IMD survey examining the adequacy and efficiency of the energy infrastructure ranked Ireland 12th out of 16 comparator countries, behind the likes of Germany, Finland and France.

*Figure 17* Energy Infrastructure (10=World Best)


*Source: IMD World Competitiveness Yearbook 2003*

As regards energy consumption per capita, estimates show that Ireland is ranked 7th of 16 using 2.93 million tonnes of "oil equivalent" energy per head. Business demand for energy has grown strongly in line with the rapid economic expansion, placing pressure on the supply-side capacity.

However, on a more positive note, the UN Human Development Report 2002 ranked Ireland 2nd out of 16 in relation to energy efficiency of firms and households (measured as GDP per unit of energy consumed; PPP US$ per kg of oil equivalent). In this case, Ireland's performance was bettered only by Italy, although the performance may be explained somewhat as a result of the differing make-up of the Irish industrial base (relatively low energy users), and also by climate effects.

## 2.2.4 Housing and Environment

This section examines a number of socioeconomic indicators which, although a somewhat eclectic grouping, do have a significant impact on the competitiveness of the economy. They are grouped under the infrastructure section to reflect the linkage with other areas of construction and building including transport and energy. Well developed housing and environmental infrastructure supports not only the business environment, but also quality of life more generally.

A well functioning housing market is essential to ensuring wage growth stability. An adequate supply of housing, which matches demand, allows for house prices and affordability measures to stay in line with economic fundamentals, particularly sustainable income and wealth levels. A lack of supply of housing, or excess demand for private property, can result in sharp rises in prices, which in turn drive up wage demands in excess of major competitors. Housing infrastructure is also inextricably linked with the provision of a well functioning transport network and geographic mobility in the labour market.

### Total Housing Stock

According to Euromonitor data, Ireland significantly trails the leading countries in terms of total housing stock per 1,000 population. Ireland is estimated to be ranked 15th out of 16 using data for 2002. Only Korea fared worse, implying a weak supply-side foundation across the Irish housing market. This statistic is somewhat surprising given the traditional attachment to home ownership in Ireland. In part, this may be a reflection of larger family sizes and other demographic and social factors unique to Ireland.

*Figure 18* Total Housing Stock – Dwellings per 000 of Population


*Source: Ecowin/Euromonitor*

In fact, the percentage of home-owners in population statistic, published by the European Mortgage Federation, ranks Ireland 2nd out of 12 countries surveyed.

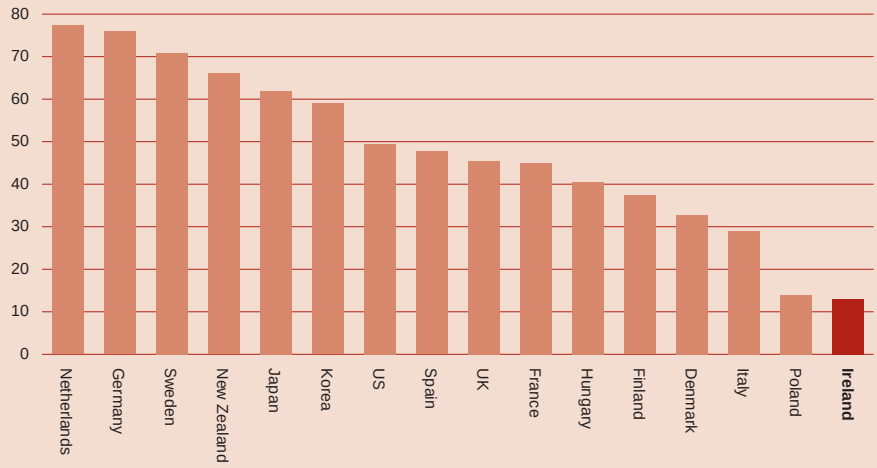
Some progress has been achieved in recent years to improve the supply-side shortage across the Irish housing market. House-building has continued to grow at a strong rate; in 2002 a record 57,695 house completions were recorded – the eighth successive record year for home building. This strong growth is allowing some stabilisation in the gap between the supply and demand for housing. The cost of housing is dealt with in greater detail in Sections 3.1.3 and 3.2.2.

## Paper and Cardboard Recycling

Environmental protection is also a key element to competitiveness for a number of reasons. Firstly, having efficient waste infrastructure it is critical to the businesses environment in servicing the needs of businesses both large and small. Secondly, a strong environment promotes a higher quality of life, improving the attractiveness of Ireland as a location to live and to do business in. Thirdly, it is a critical part of the competitiveness of the important tourism sector. Finally, protecting the environment ensures that the competitive and economic progress being made is sustainable.

The IMD World Competitiveness Yearbook 2003 presents data for 2001 in relation to paper and cardboard recycling (Figure 19). Ireland is 16th of the 16 countries considered, well behind the Netherlands and Germany. Although paper and cardboard recycling is only one element of creating a sustainable environment, this performance appears to support other evidence which shows that Ireland performs poorly with regard to environmental policy more generally. Recycling is one of the vehicles for improving the cost competitiveness of firms, as a result of rising waste disposal costs caused by the lack of additional land-fill sites.

*Figure 19* Paper and Cardboard Recycling (as a % of Apparent Consumption)




*Source: IMD World Competitiveness Yearbook 2003*

The other environmental indicators examined also portray Ireland in a relatively poor light; in terms of the amount of municipal waste generated per capita, the OECD rank Ireland 11th out of 16, while for the level of $CO_2$ emissions per unit of GDP the International Energy Agency rankings place Ireland 9th out of 16 countries. These findings are worrying, in particular the former, given the declining available space in landfill sites. Other cost issues are examined later in Section 3.1.2.

## 2.3 Education and Skills

The third input to competitiveness is Education and Skills. The importance of an education system which meets the needs of the enterprise sector has long been appreciated by policy makers. It is not an over-simplification to state that much of the credit for Ireland's economic boom in the 1990s was directly attributable to long term investment in the education system. Radical changes in education policy in the 1960s allied to significant investment in primary, secondary and more recently third and fourth level education, resulted in a system which produced a large pool of well qualified potential employees.

Over the coming decades, as the role of knowledge intensive industries increases, the education system will assume an even greater role in driving the economy. The Irish education system must be all-encompassing, focussing simultaneously on basic skills such as literacy and numeracy, as well as third and fourth level education, while all the time providing the necessary scope and capacity to cater for life-long learning and the upskilling requirements of the enterprise sector.

The indicators examined under this heading cover **4 main areas**:

- Investment
- Participation
- Attainment
- Life-long learning

Six **key indicators** have been chosen for further analysis from the overall table of 15 indicators in the Education and Skills tables (see Annex).

(1) Public and private expenditure on educational institutions

(2) Change in total tertiary enrolment

(3) Mean performance on the PISA reading literacy scale (age 15)

(4) Number of science graduates at university level per 1,000 in labour force, aged 20-34

(5) Percentage of 25-64 year olds participating in continuing education and training

(6) Extent of staff training

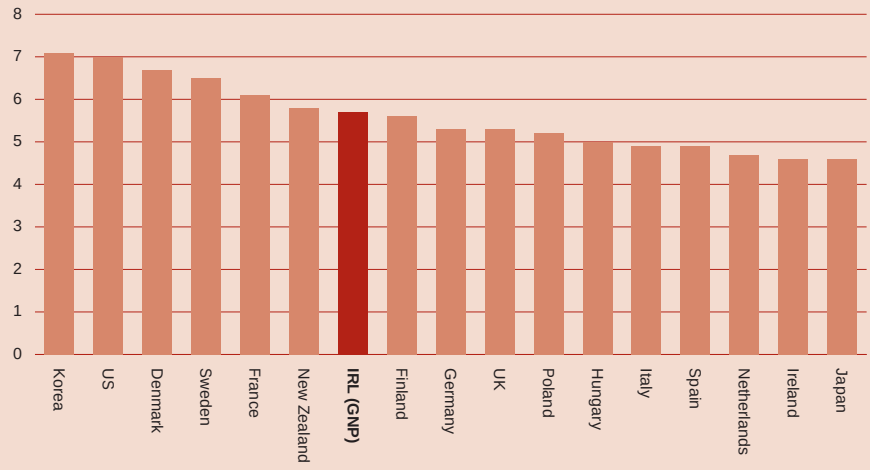
### 2.3.1 Investment

Looking firstly at investment in education, it is important to note that large expenditures alone do not guarantee a satisfactory educational system. An equally important determinant of the quality of the system as a whole is the manner in which this investment is spent; efficient investment in the right areas of relatively small amounts may provide a more appropriate system than large amounts of misallocated funds.

#### Public and Private Expenditure on Educational Institutions (percentage of GNP)

In terms of the amount invested in education as a percentage of the GNP measure of economic activity, Ireland performs reasonably well, ranking 7th out of 16 for the year 2000. Approximately 5.7 per cent of GNP was spent on educational expenditure at that time. However, even using the GNP figure, Irish investment in education continues to lag the OECD average of 5.9 per cent. The education spending ranking falls to 15th of 16 when using the GDP measure of economic activity. In Ireland, just 4.6 per cent of GDP is invested in education; this is a significant contrast with the top ranking country (Korea) which invests 7.1 per cent. See Section 1.5 for further discussions on the use of GDP and GNP in cross-country benchmarking.

*Figure 20* Public and Private Expenditure on Educational Institutions (% GDP/GNP)




*Source: OECD Education at a Glance 2003*

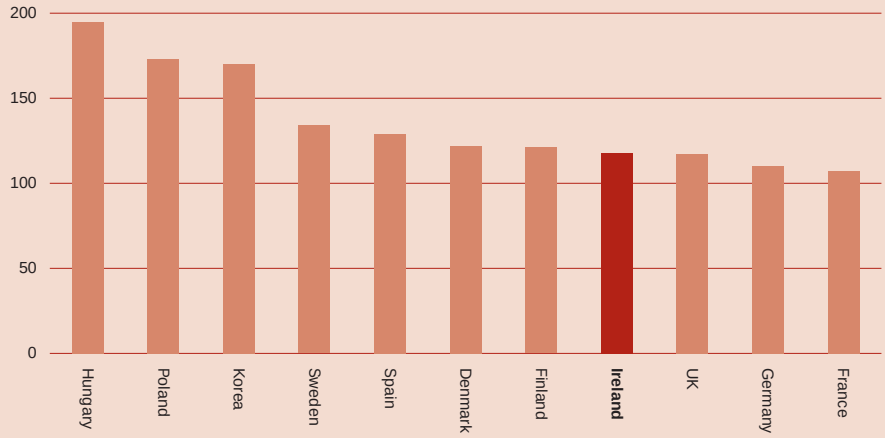
Elsewhere, the relatively low levels of spending on education are reflected in annual expenditure on educational institutions per student (secondary education) where Ireland ranks 12th out of 15. Surprisingly therefore, when average class size (secondary education) is examined, Ireland's performance is somewhat better, reflected in a ranking of 5th out of 11 countries.

## 2.3.2 Participation

### Change in Total Tertiary Enrolment

This statistic measures the rate of increase in enrolment in third level institutions that is not explained by demographic changes, i.e. it reflects the increases (or decreases) in enrolment that have occurred since 1995 in excess of the change which would occur naturally as a result of population changes. Ireland is ranked 8th out of 11 countries by this indicator, reflecting an 18 per cent increase in tertiary enrolment between 1995 and 2000 (demographically adjusted). Generally speaking, the rate of increase is somewhat slower in western European countries than some of the developing eastern European economies. This perhaps reflects a higher historical level of tertiary enrolment in western Europe.

*Figure 21* Change in Total Tertiary Enrolment (1995=100)




*Source: OECD Education at a Glance 2003*

However, OECD analysis of the percentage of full and part-time students aged 15-19 in public and private educational institutions does not improve Ireland's performance. In fact, by this measure, Ireland is ranked 8th out of 15, significantly behind the best performing countries such as Germany and France. This large drop-out rate in Ireland could reflect social issues, and the lower age limit for compulsory attendance compared to some other countries.

Finally in this section, Ireland's poor performance in terms of the percentage of the population aged 25-64 that has at least upper secondary level education (ranked 13th out of 16) can primarily be explained by the relatively late introduction of free secondary education and hence is probably a problem that will diminish over time, particularly as participation rates increase among younger age cohorts.

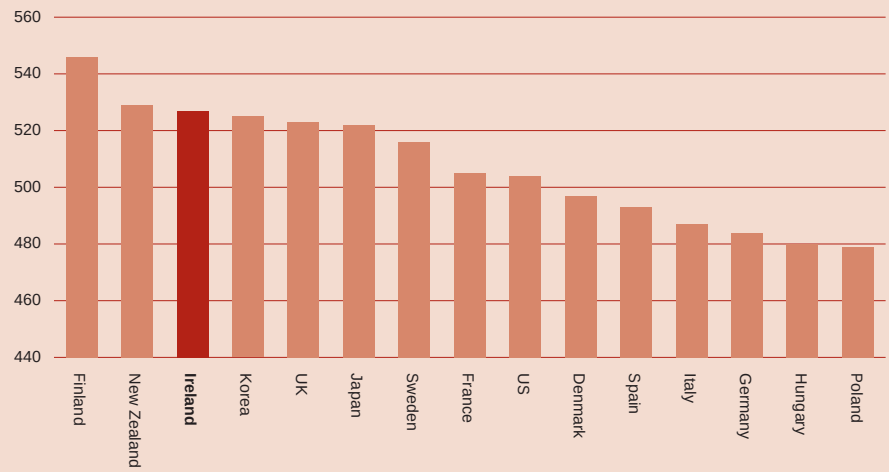
## 2.3.3 Attainment

As well as examining the level of investment and the numbers participating in the educational system, it is also necessary to measure the impact and quality of such investment. This is done by analysing the average levels of attainment achieved. It is evident that Irish performance in this area is strong, a reflection of previous policy actions in this key area, such as the introduction of free second level education and the decision to pursue a wider and more internationally-regarded curriculum.

## Mean Performance on the PISA Reading Literacy Scale (age 15)

Looking at the attainment levels of 15 year olds as a reflection of the quality of the secondary school system, Irish students perform very well in terms of reading literacy. The OECD's Programme for International Student Assessment (PISA) ranks Irish students 3rd out of 15 under this measure, behind only New Zealand and Finland.

*Figure 22* Mean Performance on PISA Literacy Scale (age 15)



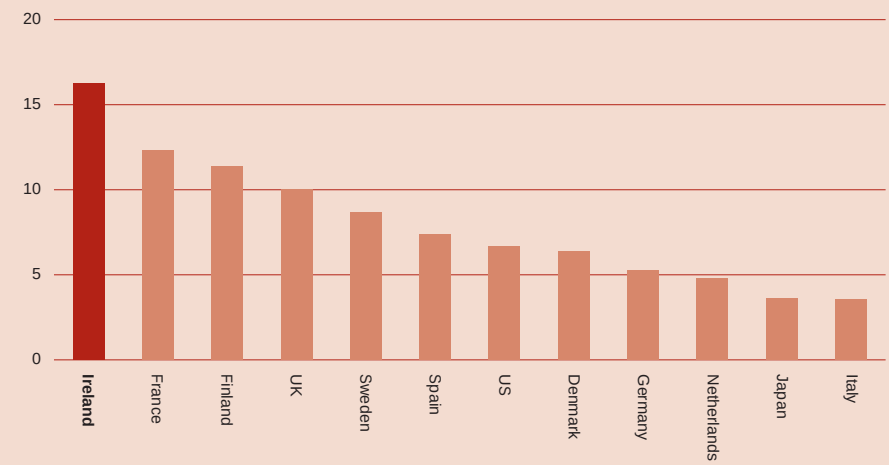

*Source: OECD*

Other PISA measures examined reveal mixed results: Irish 15 year olds scored quite well in terms of scientific literacy (6th) but somewhat poorly in terms of mathematical literacy (9th). In both cases Japan and Korea are the top performing nations. All of these rankings are out of 15 countries.

## Science and Engineering Graduates per 1,000 Population Aged 20-34

Ireland's international reputation for producing large numbers of science and engineering graduates appears to be well founded. According to European Commission data (Figure 23) Ireland is ranked 1st out of 12 countries by this measure. It should be noted though that these statistics include all tertiary qualifications, including certificates and diplomas, which may distort some of the results depending on the system of education adopted by each benchmarked country.

*Figure 23* Science and Engineering Graduates per 1,000 Population aged 20-34




*Source: European Commission: Science and Technology Report 2003*

Finally, the percentage of population aged 25-34 that has at least third level education is benchmarked. Due to methodological and definitional changes, the published OECD figure for Ireland may be unreliable and instead CSO data is used. With 32 per cent of the population in the age bracket having attained third level education in 2001, Ireland is ranked 8th of 16 benchmarked nations, significantly behind the leading nations, Japan and Korea. However, this performance exceeds the OECD area average of 28 per cent.

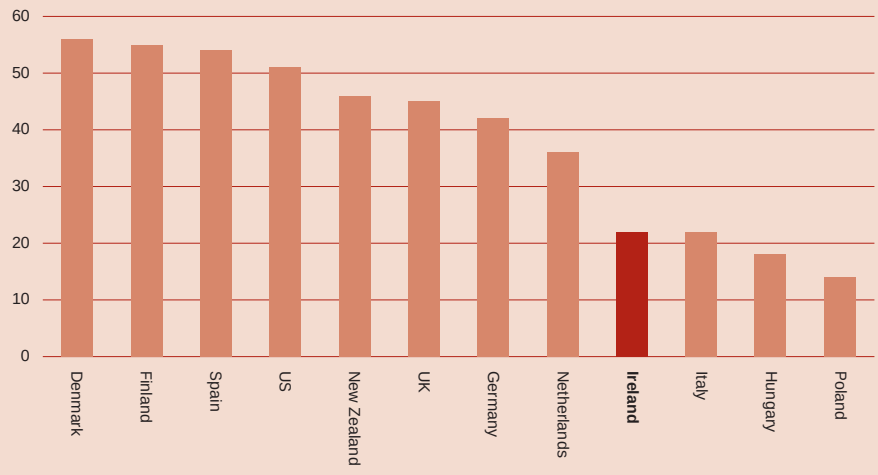
### 2.3.4 Life-long Learning

Demographic changes in Ireland allied to constant changes and improvements in technologies call for an evolving skills base, comprising both a higher level of education as well as the development of new kinds of skills. However, skills cannot be equated solely with formal education – this is a necessary but not sufficient condition for creating competitive capabilities. Formal education needs to be enhanced by a commitment to life-long learning in the workplace, incorporating informal on-the-job experience, as well as a formalised framework which encourages both a return to schooling and the constant up-skilling of the workforce.

#### Percentage of 25-64 Year Olds Participating in Continuing Education and Training

Ireland currently performs quite poorly in terms of the percentage of 25-64 year olds participating in continuing education and training, being ranked 9th out of 12 comparator countries as can be seen from Figure 24 below (1995). This indicator measures both continuing formal education as well as vocational or on-the-job training. However, of the 22 per cent who are engaged in continuing education and training in Ireland, only 70 per cent are involved in training activities that are related to their employment[1].

*Figure 24* % of 25-64 Year Olds Participating in Continuing Education and Training




*Source: OECD Education at a Glance 2002*

1 Forfás/Expert Group on Future Skills Needs; Benchmarking Education and Training For Economic Development in Ireland; Pg 51.

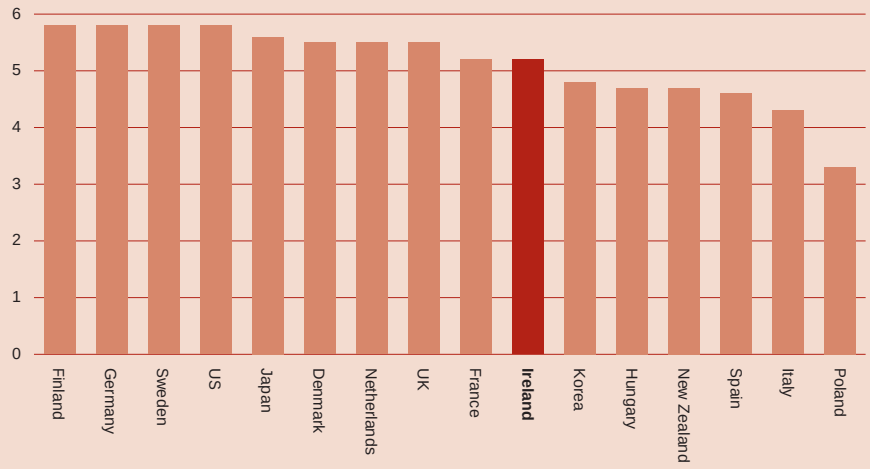
## Extent of Staff Training

Ireland's performance in terms of on-going staff training is relatively mediocre compared to the leading countries such as those in Scandinavia and Germany. Ireland is ranked 10th out of 16.

This trend is also reflected in the Eurostat study European Survey of Continuing Vocational Training in Enterprises which shows Ireland to be ranked 5th out of 9 countries for the course hours taken by employees per 1,000 working hours.

Finally, the IMD surveyed a range of Irish and other international companies, and asked them how they perceived knowledge transfer between companies and universities. A score of 0 indicated a lack of perceived knowledge transfer between companies and universities, and a score of 10 indicated highly developed knowledge transfer between the two bodies. Ireland is ranked 4th out of 16 on this measure.

*Figure 25* Extent of Staff Training (10=High)




*Source: WEF Global Competitiveness Report 2002-2003*

## 2.4 Entrepreneurship and Enterprise Development

The fourth input to competitiveness focuses on the enterprise level and is titled Entrepreneurship and Enterprise Development. Enterprise is defined by the OECD as "The ability to identify and exploit new business opportunities". Developing new and supporting existing firms is therefore a key component of the goal of increasing productivity and enhancing competitiveness. Overall productivity gains are realised at the firm level and not at the overall macroeconomic level. It is therefore vital that efforts to increase productivity are concentrated on improving efficiency across existing firms, whilst also creating a strong environment which will support the development of new firms that will form the next generation of industry.

The setting up of new firms and businesses, if successful, can bring new products and services to markets allowing for increased investment, productivity, growth and employment opportunities to be maximised. Entrepreneurs are a key part of this process at the very-early stage. They choose to take risks and seize opportunities by entering new markets for goods and services, developing and making new products or introducing new processes. Increasing entrepreneurship is therefore a key component of another input to competitiveness discussed in the next chapter concerning innovation and creativity.

Another key element of ensuring success for enterprise is creating a supportive environment which will underpin the development of existing enterprises. Improving competitiveness and productivity in this area means increasing firm-level capabilities and putting in place mechanisms which allow firms to reduce costs and risks whilst entering new markets. It should be noted though that the results analysed in this section of the report should be interpreted with caution due to the unique make up of the Irish industrial base between multinational and indigenous firms. Enterprise policy will therefore have to be carefully tailored to meet the differing needs of both these sectors. Although there are many policy overlaps, there are also some differing needs and priorities for smaller indigenous firms compared to larger multinationals.

The indicators examined under this heading cover **4 main areas**:

- Entrepreneurship and Financing
- Business Formation
- Firm Level Management Skills
- Clustering, Networking and Long-term planning

**6 key indicators** have been chosen for further analysis from the overall list of 20 indicators in the Entrepreneurship and Enterprise Development tables (see Annex).

(1) Total entrepreneurial activity

(2) Cost to register a business (as a percentage of GDP per capita)

(3) Administrative burden for start-ups

(4) Value chain presence

(5) State of cluster development

(6) Extent of collaboration among clusters

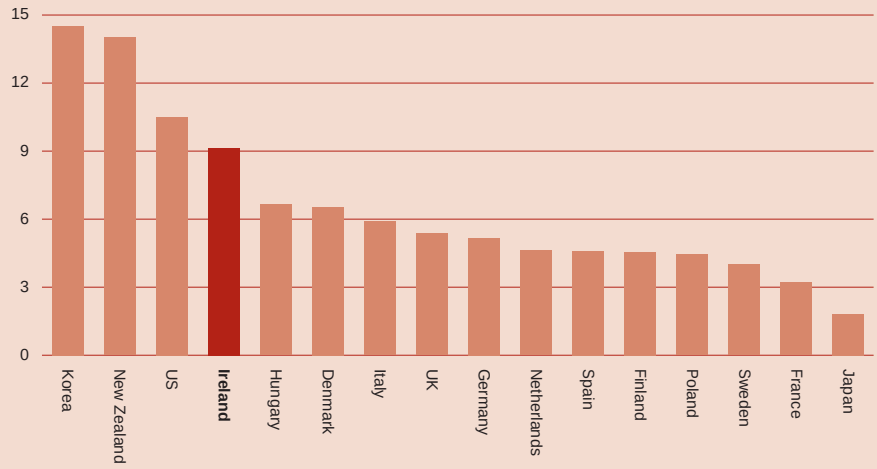
### 2.4.1 Entrepreneurship and Financing

In order to encourage entrepreneurship, it is important to put in place a supportive business environment free of large regulatory burden, to have a financial system which supports risk takers and finally to have a right risk-reward balance for those wishing to set up new businesses. It is also vital to ensure that potential entrepreneurs have both the necessary knowledge about the variety of supports which are available, as well as the ability to access these supports and infrastructure within a culture that supports risk-takers.

#### Total Entrepreneurial Activity

The first key competitiveness indicator examined in this area is total entrepreneurial activity. The Global Entrepreneurship Monitor (GEM) attempts to measure entrepreneurial activity by calculating on an international basis the proportion of individuals in the process of starting a new business or who are owner-managers of new businesses less than 42 months old. Using this measure of activity for 2002, Ireland is ranked 4th of the 16 countries surveyed who were most likely to form a new business[2]. Ireland is grouped in a 2nd tier of countries (USA and Ireland) on this measure, behind New Zealand and Korea though ahead of most European countries.

*Figure 26* Total Entrepreneurial Activity (TEA) %




*Source: Global Entrepreneurship Monitor 2002*

Another entrepreneurial activity indicator examined was the level of participation of female entrepreneurs. The ratio of male to female entrepreneurs was estimated to be 2.25 by the Gem Study in 2002, placing Ireland 13th out of 16 countries benchmarked.

Other indicators were also examined concerning the availability of finance to entrepreneurs. Crucial to competitiveness is the ability of entrepreneurs to access the necessary finance and risk capital to either start or grow their businesses. Risk capital can be divided into two areas – formal finance and informal finance. Formal financing of risk capital comes from venture capital funds, banks and other lending institutions. Informal investment is defined as "non-institutional" funding sources, including funding from business angels and from family and friends.

2 Some caution should be used in interpreting this data with the absence of confidence intervals between countries (GEM study).

GEM calculated the level of total informal investment for 37 countries, and then calculated that figure as a percentage of GDP for all the surveyed countries. Under this measure Ireland is ranked 5th of 9, with informal investment amounting to 0.72 per cent of GDP. This is a long way behind the top ranking countries such as Korea and the Netherlands who invest 3.66 per cent and 3.54 per cent respectively. The US$298 billion total amount of informal investment calculated across the 37 countries compared with just US$59 billion from traditional venture capital funds.

Other indicators revealed that Ireland performed well for venture capital, and for high-tech investment (both ranked in first place).

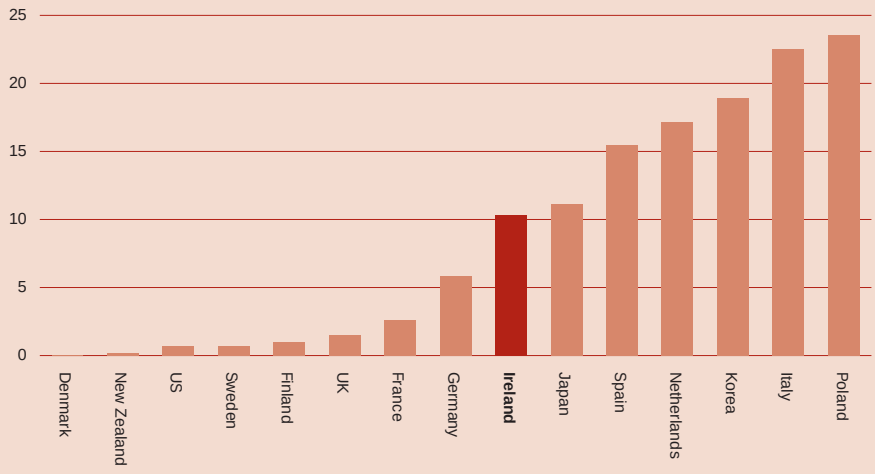
### 2.4.2 Business Formation

The second key area examined is business formation, which covers the costs to register a business and the administrative burden for start-ups. Being able to successfully set up a firm once funding and premises have been found is a key part of the process which allows new businesses to be developed. Low costs to register a business and a small level of administration, regulation and legislation all help to attract risk-taking entrepreneurs. The speedy completion of set-up maximises profitability opportunities at this early stage of development.

#### Cost to Register a Business

The second key indicator studied is the cost to register a business (as a percentage of GDP). The following World Economic Forum (WEF) figure estimates that the cost of registering a business was 10.4 per cent of GDP per capita in Ireland in 2002, corresponding to a rank of 9th out of the 16 countries surveyed. (Note: for reasons of scale, Hungary (66.72 per cent) has been removed from the graph below).

*Figure 27* Cost as a % of GDP per Capita to Register a Business




*Source: World Economic Forum*

#### Administrative Burden for Start-up Companies

The third key indicator examined regarding entrepreneurship and enterprise development is the administrative burden for start-up companies within the overall business environment. Individuals who are starting up companies in countries where the administrative burden is low have increased chances of achieving set up more quickly, more efficiently and at lower costs.

The World Economic Forum regularly surveys an international sample of start-up firms with regard to the administrative burden they face. Figure 28 below shows that Ireland is ranked as the 6th most competitive country among the sample of 16 countries in terms of burden of administration for start-up ventures. A scale of 1-7 is used to measure the administrative burden, with a measure of seven indicating firms find it easy to start a business, with relatively low administrative burdens, while a score of one indicates difficult conditions to set up a business, with a heavy administrative burden for start-up firms.

*Figure 28* Administrative Burden for Start-ups (7=Low Burden)


*Source: World Economic Forum*

Ireland also performs quite well in relation to the number of days required to start a business, and is ranked 5th out of 16 by the WEF on this measure. An IMD survey examining the extent to which the creation of firms is hindered/supported by legislation found that Irish legislation is extremely supportive for start-ups, and ranked Ireland 1st out of 16. More recent evidence suggests some deterioration in this ranking, with some problems being encountered, particularly as a result of increased legislation coming from EU directives.

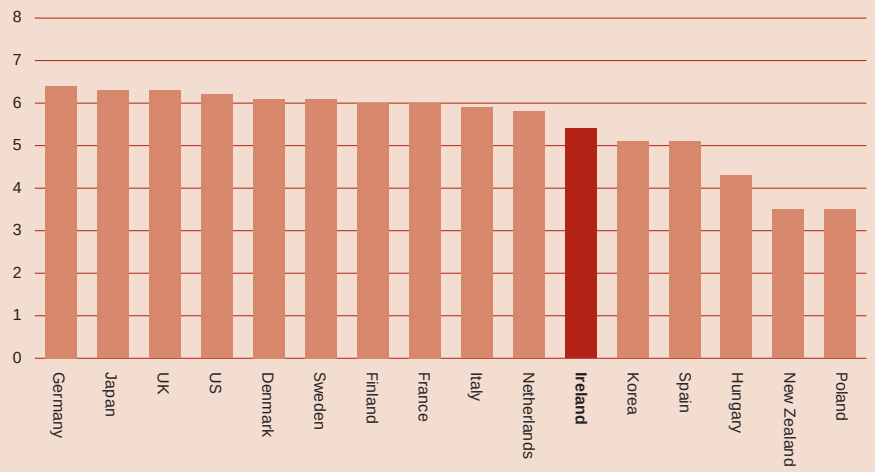
### 2.4.3 Firm Level Management Skills

Enterprise policy is not focussed solely on start-ups and entrepreneurs; policy is also concerned with the development of existing firms. This area benchmarks firm level management skills and encompasses a range of indicators measuring the competency of management as well as the efficiency and effectiveness of production processes, service processes, marketing and customer service. Achieving success in these areas is a major component of improving firm level competitiveness, which can enable firms to improve sales of goods and services whilst minimising costs and increasing productivity. This may include improving management competency and adaptability, encouraging higher levels of marketing and branding, smoothing production processes and logistics, ensuring better design and quality, and improving customer care and after-sales services. The statistics do not reflect the differing performance of the multinational and indigenous sectors in Ireland.

### Value Chain Presence

A key indicator examined in this area is value chain presence. The WEF defines value chain presence as those activities carried out by exporting firms outside of the production process, which can increase value to products. A score of one indicates that exporting firms are primarily involved in resource extraction or production, whilst a score of seven indicates a prevalence of exporting firms which not only produce but also perform product design, marketing, sales, logistics and after-sales service activities. As can be seen from Figure 29, Ireland is ranked 11th of the 16 countries surveyed with a score of 5.4 in this survey. In assessing this score though it is important to bear in mind the large number of multinational corporations in Ireland covered by this survey that are primarily involved in production activities.

*Figure 29* Value Chain Presence (7=High)




*Source: IMD World Competitiveness Yearbook 2003*

The IMD also surveys the competency of senior managers as well as the adaptability to market changes. In both cases Ireland performs well, with a rank of 4th out of 16, reflecting a relatively high level of management skills. However, in several other areas, Irish firms perform somewhat poorly, and are ranked just 11th and 8th out of 16 respectively for extent of marketing and customer satisfaction. Again though it should be noted that survey data collected from Ireland mostly covers the multinational sector and may not be reflective of performance across the indigenous sector.

## 2.4.4 Clustering, Networks and Long-term Planning

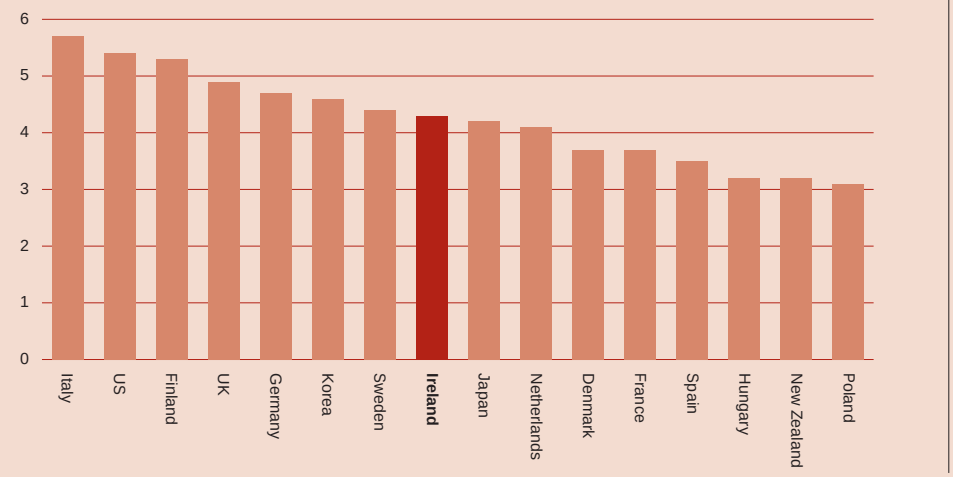
The final input area examined under Entrepreneurship and Enterprise Development is Clustering, Networks and Long Term Planning. In this regard, it is important to draw attention to the important role of "social capital". Social Capital is defined by the OECD as "networks together with shared norms, values and understandings that facilitate co-operation within or among groups". While a high level of social capital has important non-economic benefits for society, it also offers a number of significant advantages to the attractiveness of the business environment and national competitiveness. Firstly, it facilitates dispute resolution without the costs normally associated with adversarial litigation, thereby reducing contracting costs. Secondly, it drives down the social costs of global competition and technological innovation by facilitating mediation between winners and losers of economic re-structuring.

Thirdly, and most significantly in the context of this particular section of the ACR, a high level of social capital facilitates collaboration between firms, their buyers, suppliers and related industries through the development of networks. This is an increasingly important source of firm-level competitive advantage; the ability of firms to develop networks, thus benefiting from "virtual" economies of scale, location benefits, information transfer, cross-border ventures, and technological and innovation alliances. The level of entrepreneurship is also enhanced by the infrastructure that usually supports networks and clusters, such as business parks, technology parks and incubation spaces, all of which allow entrepreneurs to benefit from lower costs and economies of scale at the high-risk start-up stage.

### Cluster Development

Although there is not one specific international indicator of social capital, both the state of cluster development and the extent of collaboration among clusters, the 5th and final key indicators respectively, are dependent on the presence of social capital. Clusters can be defined as "geographical proximate groups of interconnected companies, suppliers, services providers and associated institutions in a particular field, linked by commonalities and complementarities". Three clear benefits have been identified as a result of cluster development and interaction. Clusters can increase efficiency and smooth production processes; they can promote innovation and centres of excellence in key economic fields; and they can stimulate new business formation, re-enforcing the cluster development.

*Figure 30* State of Cluster Development (7=Deep)




Source: World Economic Forum

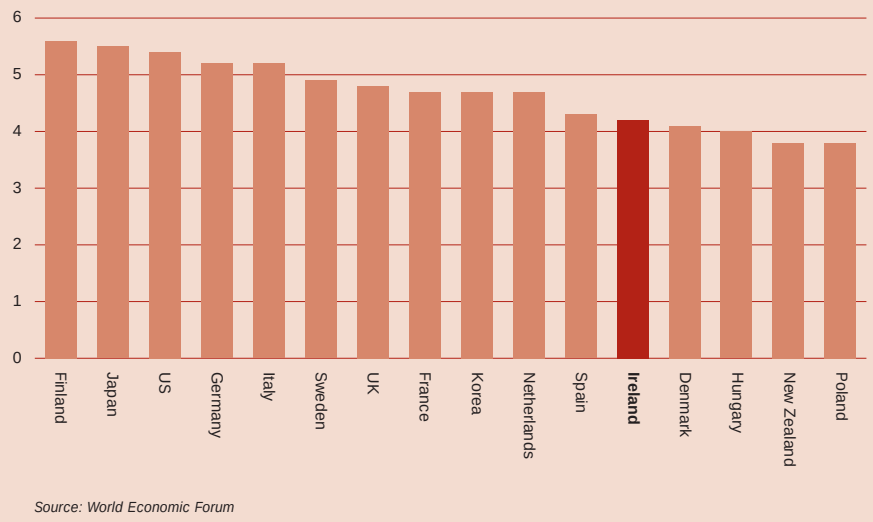
According to recent data, however, Ireland is ranked only 8th out of the 16 countries surveyed regarding the state of cluster development. The 2002 data are based on a survey by the World Economic Forum, which asked a sample of international firms to assess the state of cluster development in their own countries. A score of 7 indicates the presence of common and deep clusters, while a score of 1 indicates limited and shallow clusters.

## Extent of Collaboration Among Clusters

The final key indicator reviewed in the Entrepreneurship and Enterprise Development section is the extent of collaboration among clusters. Improved collaboration among clusters could take the form of technological alliances, sharing knowledge, sharing key suppliers, attracting high-quality labour pools to specific areas, shared research and development, and joint product development ventures.

The WEF estimates that Ireland is ranked 12th out of 16 countries benchmarked by the NCC concerning the extent of collaboration among clusters. Firms were asked to rank the extent of collaboration among clusters with a rank of one signifying non-existent collaboration and a rank of seven indicating extensive collaboration including suppliers. Ireland's score of 4.2 indicates a relatively weak performance in this area. This may reflect several issues including Ireland's small market size, and also the relatively limited emphasis on clusters in enterprise policy, at least until recently.

*Figure 31* Extent of Collaboration Among Clusters (7=High)




*Source: World Economic Forum*

Ireland's poor performance in terms of local availability of specialised research and training is also an indication of the weak state of clusters and networks; the WEF ranks Ireland 13th out of 16 on this measure. The picture is a little brighter with regard to cross-border ventures where Ireland is ranked 2nd best out of 16 by the IMD, perhaps reflecting the small size of the island economy as well as Ireland's growing economic links with the European Union.

## 2.5 Innovation and Creativity

The fifth input to competitiveness examined is Innovation and Creativity. The ability for individuals and firms to be innovative and creative is a key area of competitiveness and economic growth. Innovation involves the creation of new products and services valued by customers, as well as finding ways to lower the cost and improve the quality of existing products and services. Success in this area means maximising the opportunities of transferring creative thinking into commercially successful goods or services.

Improving innovation and creativity will support the goal of increasing productivity and efficiency and the transition to a more knowledge driven economy. These opportunities can be maximised by creating the infrastructure and linkages to support new ideas and products (including education and other resources), encouraging an innovative culture, removing the regulatory burden on entrepreneurs, increasing competition and promoting funding for research and development. The innovation and creativity input is therefore is closely linked with other competitiveness areas including the regulatory and competitive environment, education and skills (particularly for science and technology), and entrepreneurship and enterprise development.

The indicators examined under this heading cover **3 main areas**:

- Research and Development
- Inventiveness and Creativity
- Patents, Commercialisation and New products

Six **key indicators** have been chosen for analysis from the overall list of 15 indicators in the Innovation and Creativity tables (see Annex).

(1) Total researchers (per 1,000 total employment)

(2) Business Expenditure on Research and Development (percentage GDP/percentage GNP)

(3) Patent applications to European Patent Office per million population

(4) Total new science and engineering PhDs per 1,000

(5) Production process sophistication

(6) USPTO patents granted per million population (issued in United States Patent and Trademark Office)

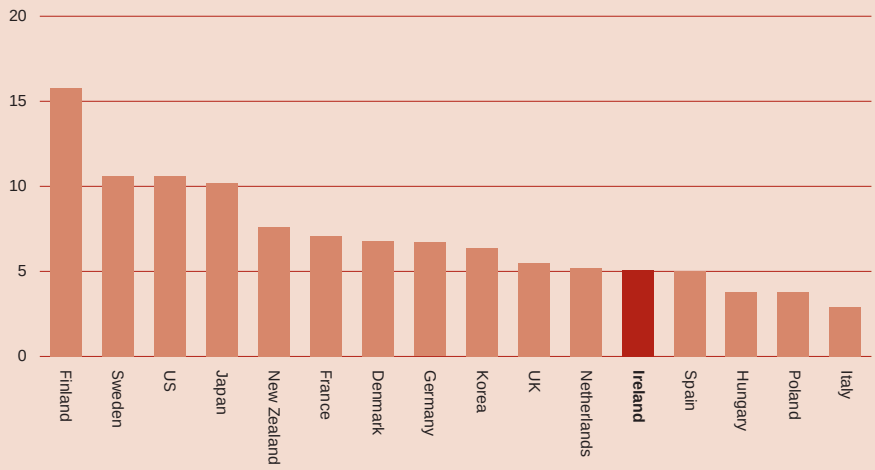
### 2.5.1 Research and Development

Research and Development (R&D) is now seen by economists, business analysts and national policy-makers as an important determinant of a country's competitiveness and economic performance. It is particularly relevant for an economy, such as Ireland, which has a strong reliance on high-technology sectors. Measuring and monitoring R&D performance is therefore an important activity in assessing national competitiveness and in evaluating the ability of the economy to perform well in the future.

#### Total Researchers per 1,000 Total Employed

The first key indicator in the R&D analysis of competitiveness examined is total researchers per 1,000 total employed. Figure 32 shows that the OECD estimates the total number of researchers per thousand people in employment in Ireland to be 5.1. Ireland is therefore ranked 12th highest out of the 16 countries benchmarked. The number of researchers is below the EU average of 5.8 researchers per 1,000 in total employment. Finland, Sweden, USA and Japan top the table with the number of researchers ranging from 10-15 per thousand employed.

*Figure 32* Total Researchers per 1,000 Total Employed




*Source: OECD Science and Technology Indicators*

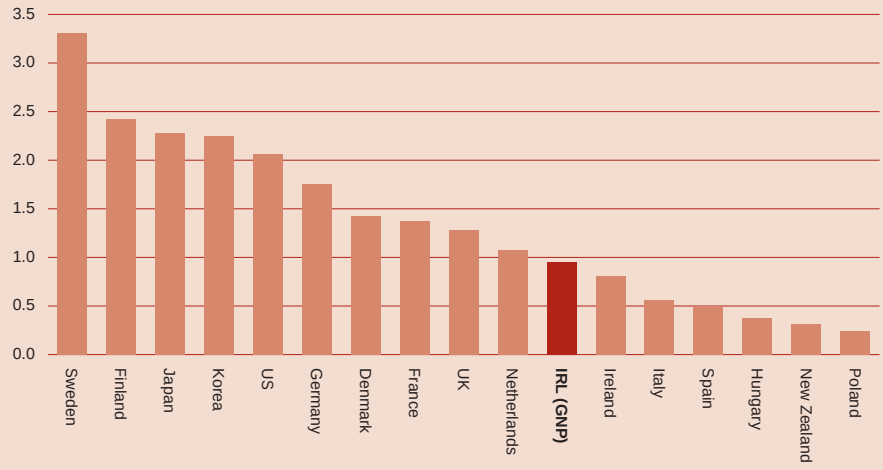
#### Business Expenditure on Research and Development (BERD)

The second key indicator analysed in this section is Business Expenditure on Research and Development (BERD). The business sector is the major source of R&D investment in Ireland, contributing an estimated 68 per cent of total R&D expenditure. This is above the EU average contribution of BERD to total R&D spending, which was estimated to be around 63 per cent in 1999.

Irish R&D activity in aggregate terms in the business sector continued to grow between 1999 and 2001. Total BERD amounted to €917 million in 2001, up from €784 million in 1999. The average annual growth rate of BERD in the two year period was 8.2 per cent, compared to a rate of 11 per cent between 1997 and 1999. In real terms (allowing for inflation) the average annual growth rate was 4 per cent. These growth rates indicate a slowdown in expansion of R&D activity in recent years. In 2001, the Electronics and Computing sectors alone accounted for 65 per cent of total Irish business expenditure on R&D reflecting the importance of these sectors.

Regarding the level of BERD as a percentage of GDP, Ireland is ranked 11th of the 16 countries surveyed, with BERD estimated at 0.81 per cent of GDP in 2001. When we use the GNP measure of economic activity this ratio rises to 0.95 per cent, but the ranking remains at 11th out of 16. Both measures were behind the EU average level of BERD, which was estimated to be 1.24 per cent of GDP. This underlines the need to advance policies to promote R&D activity in Ireland in the business sector.

*Figure 33* Business Expenditure on R&D (% GDP/GNP)




*Source: Forfás/OECD Science and Technology Indicators*

The relatively low levels of R&D expenditure by business is also mirrored in Ireland's performance for R&D performed in the public sector as a percentage of GDP. Ireland ranked 16th of the 16 countries surveyed for 2000 (this indicator includes spending on R&D by higher education and by government). Even when GNP is used, Ireland's rank does not alter.

That said, the government is committed to improving performance in this key area. Allocations for investment in science, technology and innovation under the National Development Plan will total €2.48 billion from 2000-2006 compared to an allocation of just €0.5 billion from 1994-1999. This commitment is also reflected in the announcement of increased research funding for Science Foundation Ireland in budget 2003. These funds are being used to support over 90 outstanding researchers from Ireland and overseas. This investment sends a strong signal that Ireland is committing to quickly re-addressing the deficit in spending on R&D and Science, Technology and Innovation in its efforts top become a top global attraction for technology driven and innovation-led enterprises.

Another indicator benchmarked the international performance in terms of the degree of perceived collaboration between universities and industry. Despite the apparent shortage of financial aids, Irish universities and industries perform at a surprisingly high level in terms of university/industry research collaboration according to the WEF, which ranks Ireland 4th best on this measure. However, a degree of caution should be used when interpreting this survey-based statistic. Other anecdotal evidence for Ireland suggests that industry-university research collaboration remains hampered by confusion over intellectual property ownership, differing goals and a lack of proper incentives for collaboration with universities themselves.

### 2.5.2 Inventiveness and Creativity

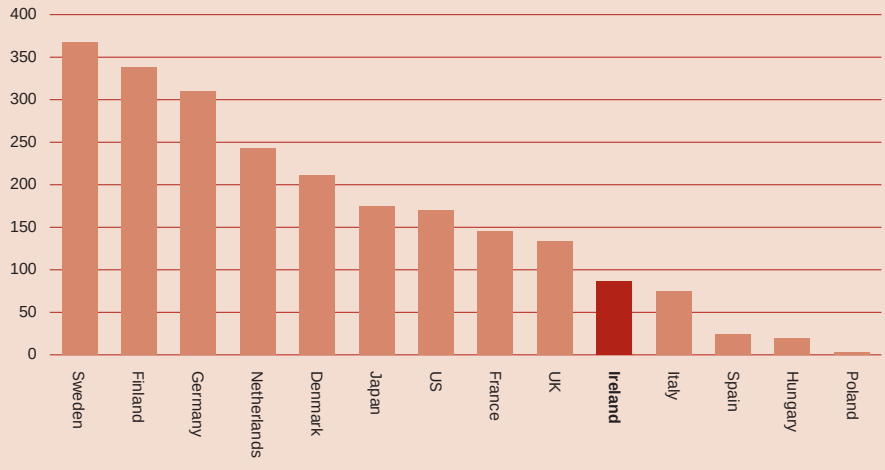
R&D is only one element of the broad innovative process. Technological innovation is also an essential component and is also vital for economic growth. In the past, economists traditionally considered the accumulation of conventional inputs such as labour and capital to be the primary force behind economic growth. Now, however, many economists place technological progress at the centre of the growth process. For growth to occur it is necessary to establish and maintain favourable conditions for technological innovation. In other words, to build the economy, it is necessary to address the more complicated issue of creating a culture in which the introduction of new technologies can thrive, alongside other key factors such as a competitive cost base for R&D, an effective regulatory environment, solid infrastructure, and a well-educated skills base.

#### Inventiveness Coefficient – Patent Applications to EPO (per Million Population)

A key indicator of inventiveness and creativity is calculated using data from the European Patent Office (EPO) for patent applications. Patent applications are used rather than the numbers of patents approved as this better reflects attempts to innovate. The number is then divided by population per million to adjust for country-size among the countries surveyed.

Using this proxy, Ireland was found to have 86 patent applications to the EPO per million of population in 2001, placing it in 10th out of the 14 countries surveyed. The EU average for EPO patent applications per million of population was estimated to be 161 in 2001. Patent applications to the United States patent office (USPTO) and the Japanese patent office (JPO) are not included in the proxy for inventiveness co-efficient due to data limitations, though analysis of data shows that Irish performance in this area compared to international competitors is also weak. It should be noted that there are other ways to protect intellectual property beside patents, such as trade secrets. Small and medium sized enterprises in particular are often reluctant to use patents due to the significant financial resources needed for enforcement.

*Figure 34* Patent Applications to EPO per Million Population




*Source: European Commission: Statistics in Focus 4/2003*

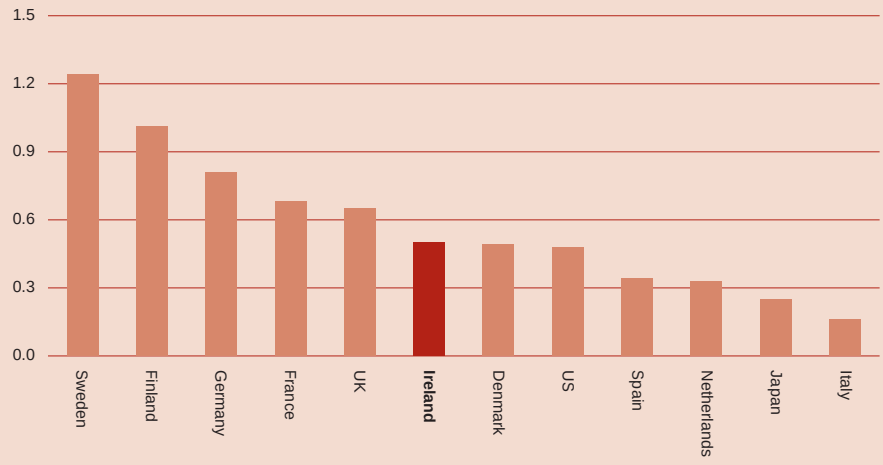
The UN Human Development Report publishes a technology achievement index which measures four dimensions of technological capacity; (i) creation of technology; (ii) diffusion of recent innovations; (iii) diffusion of old innovations; (iv) human skills. Of the 15 countries surveyed, Ireland performs poorly and is ranked 9th. Similarly, Ireland scores badly in relation to the nature of competitive advantage, a WEF statistic which examines whether a country's competitiveness is based primarily on low costs or natural resources (indicating a low level of technological sophistication) or on unique products and process (indicating a high degree of innovation). Ireland is ranked 13th out of 16 according to this indicator. This indicator highlights the need for Irish enterprise to evolve from focussing purely on cost competitiveness, to accommodate the new agenda of innovation and knowledge based activities.

### Total Science and Engineering PhDs per Thousand of Population Aged 25-34

The fourth key indicator examined in the innovation and creativity section is the total science and engineering PhDs per thousand of population aged 25-34. A key aspect of encouraging innovation is to ensure a strong, well qualified supply of workers in the engineering and science areas, thus creating a strong platform to promote creativity and maximise the benefits from R&D spending.

International evidence gathered by the European Commission and OECD show that Ireland is ranked 6th out of 12 countries surveyed concerning total science and engineering PhDs in the 25-34 year old age group when adjusted for population size. The Irish measure of 0.5 is above the European average of 0.42, though behind that of Sweden and Denmark, which have more than one science or engineering PhD per one thousand of the population aged 25-34.

*Figure 35* Total New Science PhDs per 000 Population Aged 25-34




*Source: European Commission: European Research Area Scoreboard*

Ireland's mid-table position is a solid performance in this area for now. More recent evidence points to a drop off in the numbers of students taking science and engineering degrees. More worryingly, interest in science and technology as measured by the IMD appears to be declining as Ireland is ranked 8th out of 16 in this measure. This reflects recent falls in CAO applications for science based courses. Improved awareness campaigns and further encouragement to take up science and engineering subjects will be necessary over the coming years if Ireland is to maintain or improve its performance in this key area.

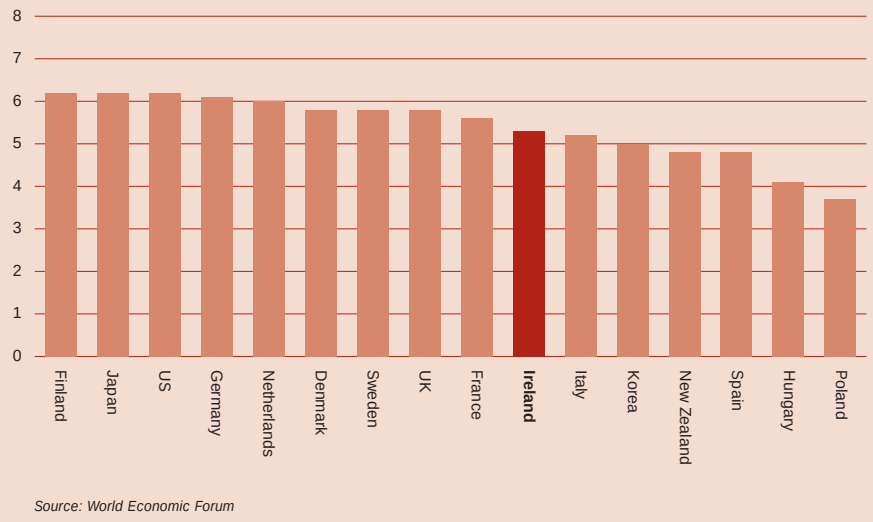
### 2.5.3 Patents, Commercialisation and New Products

The ability to develop new products or processes, successfully patent goods and services and then to bring them to market is a key final part of the innovation and creativity process. The definition of competitiveness used by the NCC emphasises the ability of firms based in Ireland to be competitive and sell goods and services in international markets. Innovation can only contribute to the competitiveness of a nation if firms are not only able to invest and develop new products, but also are able to bring them to the market place, putting them in a position to increase revenues, reduce costs and be more profitable.

#### Production Process Sophistication

The fifth key innovation and creativity indicator studied is production process sophistication. The WEF asked a sample of international firms to assess production process sophistication, with a score of one indicating labour intensive and old technology usage, and a score of 7 indicating that production uses the world best and most efficient processes. Figure 36 shows that Ireland is ranked 10th out of 16 surveyed nations regarding this measure. The score of 5.3 places it in a mid-table position in this key innovation and competitiveness input.

*Figure 36* Production Process Sophistication (7=World's Best)



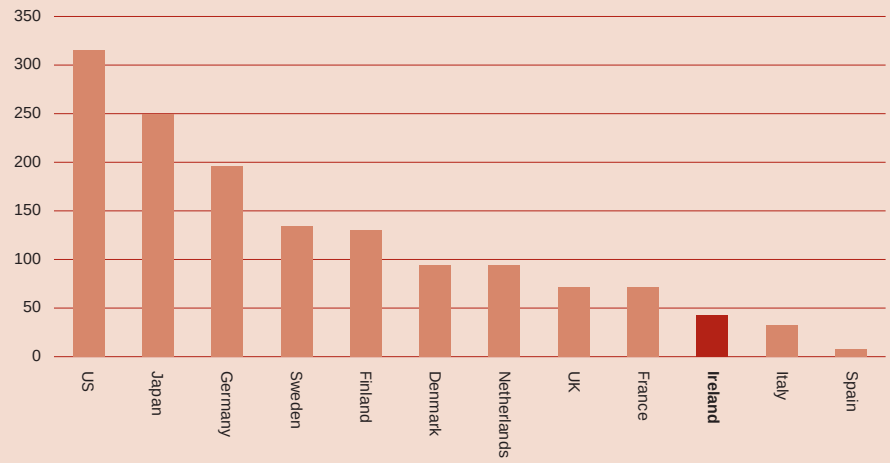

*Source: World Economic Forum*

#### USPTO Patents Granted per Million Population

The final key indicator studied in the innovation and creativity area is the number of patents granted per million population. The following data uses statistics from the United States Patent and Trademark Office, which make up about 28 per cent of all patents granted by R&D active Irish firms (data from the European Patent Office is also examined, although data from the Japanese Patent Office and other sources is limited).

Figure 37 reveals that Ireland is ranked 10th out of 12 countries examined, concerning patents granted by the USPTO in 2001, with data adjusted per million of population. The number of patents granted per population was 43, well below the EU average number of patents granted estimated at 74.

*Figure 37* USPTO Patents (per Million Population)




*Source: European Commission: Science and Technology Report 2003*

Other indicators paint a mixed picture. Looking at new-to-market products (as a percentage of sales by manufacturing firms) Ireland is ranked 3rd out of 8 countries according to data released by the European Commission, although this international data is based on 1996 responses. More recent evidence will be produced in the Third European Community Innovation Survey, although this data examines both new and improved products introduced to markets. Preliminary estimates show that Ireland, on par with the EU average, saw half of all firms surveyed introduce new or improved products during the period 1998-2000.

This represents a decline from the 62 per cent of firms introducing new or improved products reported for the 1994 to 1996 period. Forty percent of Irish firms had introduced or developed at least one new or improved process in the 1998 to 2000 period. This is lower than the EU average which shows that 53 per cent of firms introduced new or improved processes. (It is important to note that these products and processes are not necessarily new to the market).

Finally, Ireland ranks mid table in terms of employment in high-tech industries as percentage of total employment reflecting the large number of indigenous and multinational firms engaged in ICT, biotechnology, etc.

# Outputs from Competitiveness 3

# 3 Outputs from Competitiveness

## 3.1 Intermediates

The previous chapter benchmarked Irish performance in five key input areas. These areas are key to policymakers in shaping **current** competitiveness policy decisions; the decisions which will be critical in supporting future economic performance. Outputs largely measure **current** economic performance, and are the result of **previous** years' changes to competitiveness policy inputs. Success now as measured by current outputs does not guarantee economic success in the future. As such the assessment of policy inputs is the more forward looking indicator in trying to assess what the future performance and growth potential of the economy might be.

However, there is another stage in between the input and output stage stages of building competitiveness and growth. This "intermediate" stage concerns improving productivity alongside price and wage growth stability, and is a critical stage in the overall goal to improve competitiveness and allow it to be strong catalyst for future and sustained economic expansion and investment.

The Intermediates section of the competitiveness framework comprises three areas:

- Productivity
- Business Costs
- Prices and Wages

**The goal of competitiveness policy is to:**

(1) Deliver strong and sustainable productivity growth over the medium and long term. Strong productivity gains will be the key driver of future economic success.

(2) Make Ireland an attractive place in which to do business by minimising the cost burden on firms. An attractive cost environment lays the foundation for firms to sell goods, make profits, reward workers, whilst promoting future employment and investment growth.

(3) Ensure price stability and wage growth which allows real wage gains to run in line with productivity gains over the economic cycle. Price stability also allows for better long-term planning and investment decisions.

In total 18 indicators are covered by the tables in this area (see Annex), with 7 key indicators selected from that total for further analysis in this section.

(1) Productivity per employee

(2) Composite basket of business telephone calls

(3) Auto diesel oil prices

(4) Insurance premiums

(5) Industrial electricity

(6) Consumer price inflation

(7) Nominal compensation per employee

### 3.1.1 Productivity

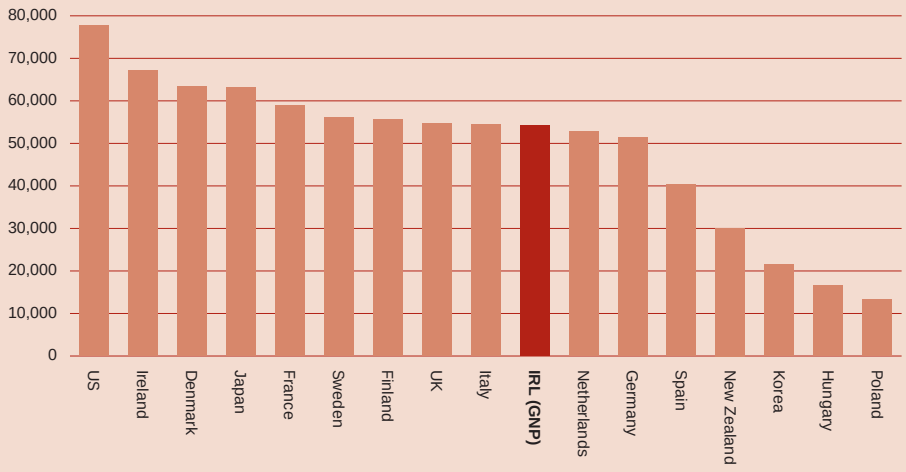
The first intermediate area examined is the key area of productivity. Productivity or value-added is defined as "the ratio of output to some measure of the inputs used in production". Increasing productivity is one of the areas which policy can influence to improve macroeconomic competitiveness and raise the medium and long term economic growth potential of the country. At the firm and microeconomic level it is a key part of ensuring firms are able to stay profitable and workers are able to realise sustainable gains in above inflation wages.

Improved productivity is the result of not only more efficient production as technology improves, but also of better management, better training, improved branding and marketing, etc. Higher productivity is therefore achieved when more outputs can be realised from the existing or a lower level of inputs.

#### Labour Productivity

A good international productivity benchmark perspective is gained when examining the IMD measure of labour productivity – output per employee per annum measured in US dollars. Using the GNP measure of productivity (which excludes multinational income flow effects), Ireland ranks 9th out of 16 countries surveyed, with GNP productivity an estimated 24 per cent lower than the GDP measure. Using the GDP measure of productivity, it can be seen from Figure 38 that Ireland is ranked 2nd out of the 16 countries surveyed, with productivity lagging only the performance of the United States.

*Figure 38* Output per Employee per Annum (US$)




*Source: IMD World Competitiveness Yearbook 2003*

Ireland also performs well in terms of output per person employed per hour although the ranking falls marginally to third behind the US and Denmark. The final indicator examined is productivity growth in 2002. Productivity gains of 3.9 per cent were estimated in 2002, ranking Ireland 2nd out of countries. However, GNP-based productivity fell by an estimated 1.3 per cent in 2002.

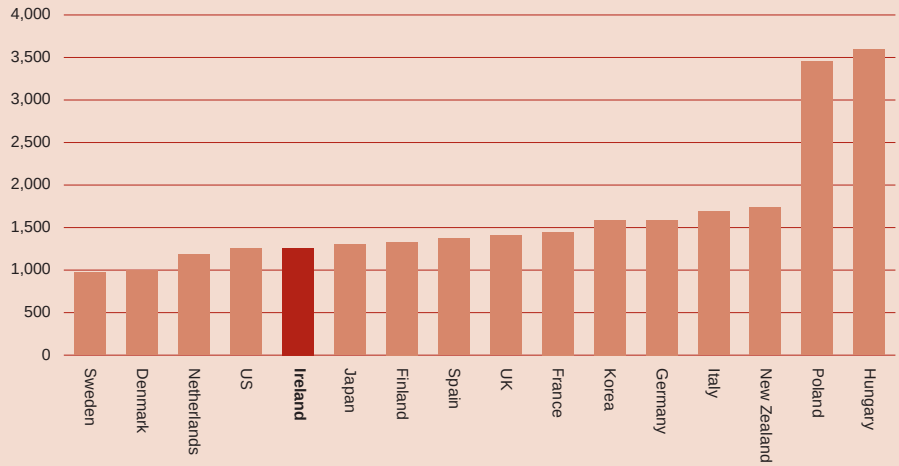
### 3.1.2 Business Costs

The second intermediate area to be examined is business costs. Demand and supply factors outlined as inputs to the competitiveness framework critically affect the level of costs that businesses incur, which in turn partly determine the competitiveness of firms. High cost levels place pressure on firm's profit margins, increasing risks of higher prices for end-products. This is particularly damaging to exporting firms that are marketing goods and services on price sensitive global markets. Higher costs and prices also create other problems, particularly as workers respond to higher prices and attempt to protect their living standards by demanding parallel increases in wage demands. In this area nine indicators are benchmarked on an international basis, with four key business cost indicators identified.

#### Composite Business Basket Cost of Calls

Telecommunications costs are a key intermediate factor affecting business competitiveness. These cannot be determined directly by policymakers, but are influenced by choices made in other input areas, such as regulation, competition and infrastructure. Ireland is ranked 5th of the 16 countries benchmarked (1st being the most competitive) concerning a composite basket of calls made by business, indicating a relatively cheap cost structure for telephone charges as measured by the OECD and Teligen.

*Figure 39* OECD Composite Business Basket Cost of Calls (National and International) US$ PPP



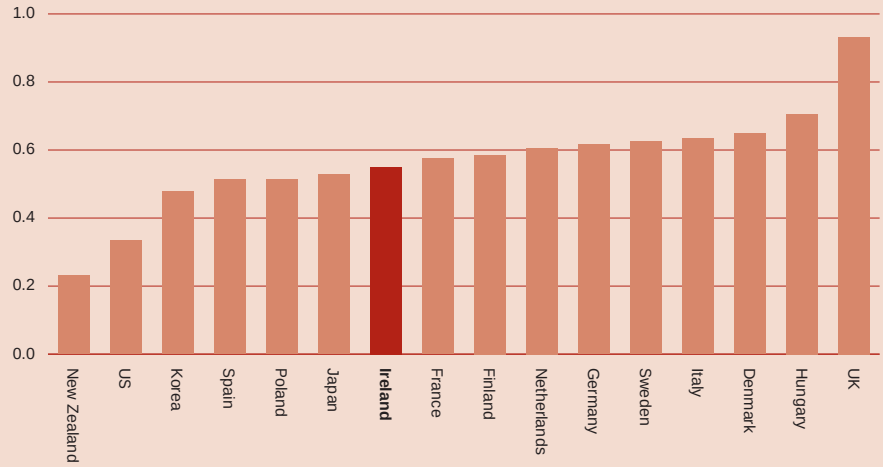

*Source: Teligen*

Data provided by Teligen examining business (high user) mobile basket costs reveals that Ireland performs quite poorly, being ranked 10th out of 16. This trend is mirrored in data measuring the cost of broadband with Ireland ranked just 12th out of 13 countries surveyed. These statistics look at the cost of telecoms from the perspective of the individual consumer. In many instances, telecoms providers are also faced with comparably high costs. In particular, broadband providers face high charges for national leased lines and this has a knock-on effect in terms of both the prices charged to consumers and the overall level of competition in the broadband market. Examining the tariffs charged for 34 Mbit/s (national leased lines, city to city, 200km) Ireland performs worst of 8 countries, indicating an expensive environment for national leased lines.

## Automotive Diesel Oil Prices for Commercial Use

Statistics provided by the International Energy Agency show Ireland to be relatively expensive for automotive diesel oil for commercial use. Ireland is ranked 7th out of 16 surveyed nations despite favourable VAT rates on diesel in comparison with alternative sorts of fuel.

*Figure 40* Auto Diesel Oil Prices (Commercial US$/lt)

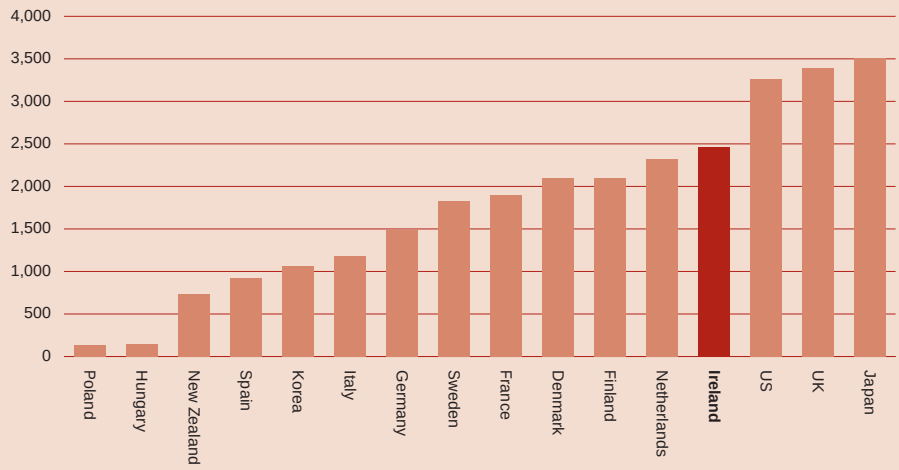



*Source: International Energy Agency*

## Insurance Premiums per Capita

Insurance costs are another key component of business costs. Figure 41 shows that estimates produced by Swiss Re and the International Insurance Federation reveal Ireland was ranked 13th of the 16 countries benchmarked (1st being the most competitive) for levels of insurance premiums per capita for life and non-life business measured in US dollars in 2001. Per capita premiums in Ireland were estimated to be 39 per cent higher in Ireland compared to the EU average, and were only behind the UK, USA and Japan.

*Figure 41* Insurance Premiums (Total Business per Head US$)

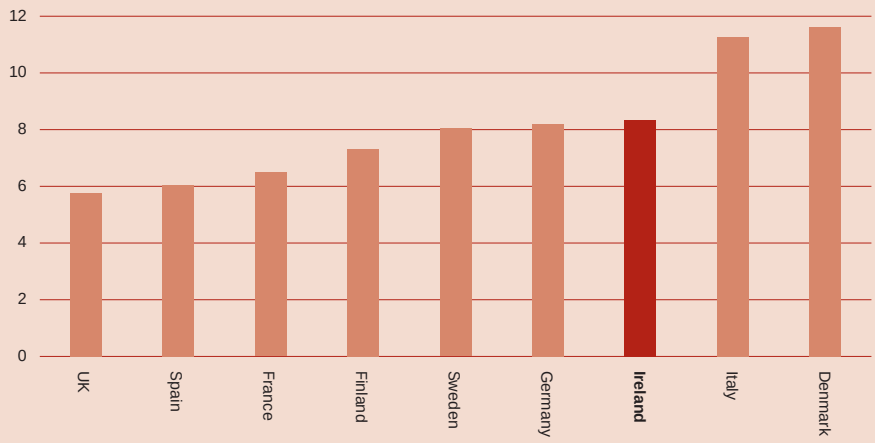



*Source: Swiss Re*

## Industrial Electricity Costs

The final key indicator of business costs examined is electricity costs. Eurostat, the European Commission Statistical agency, regularly collects data on industrial electricity prices. Figure 42 shows business electricity costs for medium users (10 GWh) including tax and VAT. Ireland is ranked 7th out of 9 countries benchmarked (1st being the most competitive). However, it should be noted that other data for electricity prices for households shows a better performance.

*Figure 42* Industrial Electricity Prices (10 GWh – Tax and VAT inc €)




*Source: Eurostat*

Ireland performed significantly better in relation to industrial gas prices, according to Eurostat. Ireland was ranked 2nd out of 8 countries at the 4,186 GJ per annum rate (small-medium user), behind only Sweden. However, this figure is not necessarily indicative of the situation as a whole. While such a measure is a reflection of the cost of gas for the majority of domestic users and small businesses, it does not reflect the cost paid by the ten very large consumers of gas, who use approximately 90 per cent of the total volume of natural gas consumed in the country. The cost paid by such large users (including independent power producers) appears to be higher than is the case in many other countries. This has knock on effects for the cost of electricity for all consumers in society, as gas is a production input to the generation of electricity in the Irish market.

In other cost indicators, Ireland performed badly, particularly for office rents: total occupation costs where IMD data places Ireland in 13th place of 16 countries. In addition, statistics published by Eunomia Research & Consulting show Ireland to be the 3rd most expensive out of 10 for landfill costs (excluding tax). It is clear that waste management and other environmental costs are taking a stronger role in firms cost structures particularly as a result of an increasing legislative burden, and a lack of available infrastructure and other methods to meet rising demand.

### 3.1.3 Prices and Wages

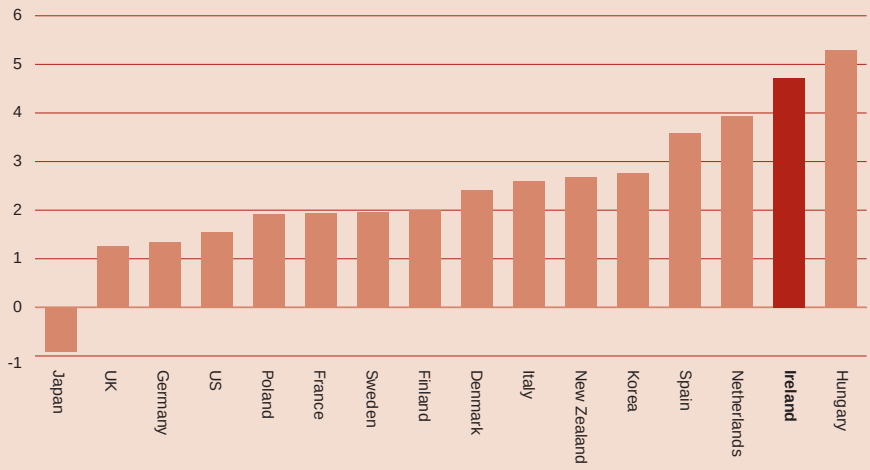
The final intermediate area to be examined is prices and wages. A low rate of price inflation means that workers and firms can factor in realistic wage demands which reflect increased productivity and profitability, and which do not threaten long term economic stability. Price stability creates a stronger platform for long term investment decisions, whilst also putting in place conditions which maximise the distribution of the rewards resulting from increased competitiveness.

A total of 5 indicators are examined in the price and wage stability intermediate stage of competitiveness. Two key indicators are analysed in the rest of this chapter.

#### Consumer Price Inflation

The first key price and wage stability competitiveness indicator benchmarked is consumer price inflation. In 2002, Ireland was ranked 15th of 16 countries surveyed according to the rate of increase in consumer prices. Ireland's inflationary problems were exceeded only by Hungary. Sharp rises in inflation over the past four years have pushed Irish price levels 12 per cent above the EU average resulting in a deterioration in competitiveness. Although consumer price inflation has slowed in 2003 and is expected to continue to fall in 2004, the rate of inflation is only expected to converge slowly with the EU average rate, resulting in a further widening in price levels between Ireland and the EU in 2003 and some of 2004.

*Figure 43* Consumer Price Inflation 2002



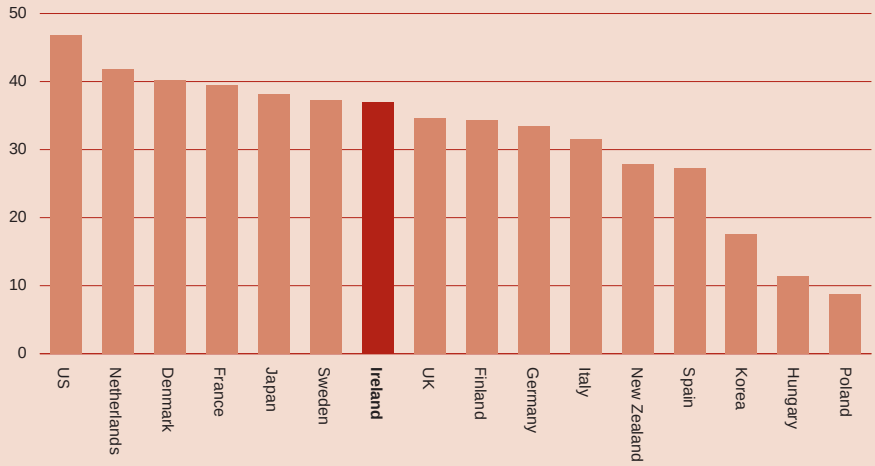

*Source: OECD Main Economic Indicators*

#### Nominal Wage Compensation per Employee

Wages are also an important intermediate factor in the competitiveness framework. Firstly, they are a key element in promoting improved competitiveness and productivity, with the end goal of increasing living standards for all. Secondly, they reflect labour market demand and supply conditions, impacting on price levels and economic activity. It is critical to macro-economic stability that wage gains reflect productivity gains.

Figure 44 benchmarks international labour market costs using nominal compensation per employee. Data from the European Commission AMECO database shows that Ireland is ranked 7th out of 16 countries for 2003. Average compensation levels in 2002 were estimated to be 8.7 per cent above the EU average. The recent rapid assent through the international rankings looks set to continue. Forecast data, also from AMECO, suggests that next year, Irish nominal compensations per employee will increase by 5.2 per cent, the 2nd largest increase amongst the 16 countries surveyed, corresponding to a rank of 15th. Wage growth is expected to be therefore well ahead of the average 2.1 per cent increase in EU wages in 2003, resulting in further divergence between Irish and European average compensation levels to around 11 per cent.

*Figure 44* Nominal Compensations per Employee €000 2003




*Source: AMECO Database DG ECFin*

Other indicators in this area paint a mixed picture. Despite the strong rise in wage growth of recent years, unit labour cost growth (which takes account of productivity growth) remains modest. The European Commission estimates of unit labour cost growth in 2004 which is weighted double for exports, places Ireland in 4th place of 10 countries benchmarked. Unit labour cost growth of 2.2 per cent in Ireland implies that strong overall productivity gains continued to compensate some of the effects of rising labour costs in that period. However, it should be noted that the impressive productivity performance of multinational firms across the Irish economy could mask some of the weaker productivity performances across other firms, resulting in sharper rises in unit labour costs in these industries. These effects may have been exaggerated further by weakening economic conditions across 2003.

According to the EIU, rising house price growth in recent years also continues to place pressure on wage demands. House prices in Ireland rose by an estimated 219 per cent in nominal terms in the 1995 to 2002 period, the strongest property price increases across the ten countries surveyed.

## 3.2 Results

Measuring current economic performance and the levels of sustainability is useful in assessing how successful previous competitiveness policies were, and from assessing the foundations on which future economic decisions can be based. One of the key goals of competitiveness policy as outlined in the National Competitiveness Council's definition of competitiveness is to achieve success in markets leading to better standards of living for all. The goal of achieving higher and sustainable standards of living is heavily dependent on increasing economic growth (via higher productivity and real income gains).

The results section of the competitiveness framework comprise two areas:

- Macroeconomic performance
- Sustainability, social capital and long term vision

In total 14 indicators are covered by the competitiveness tables, with 5 key indicators selected from that total for further analysis in this section of the report.

(1) Gross Domestic Product/Gross National Product per capita

(2) Unemployment

(3) Exports of goods and services

(4) Income inequality

(5) Quality of life

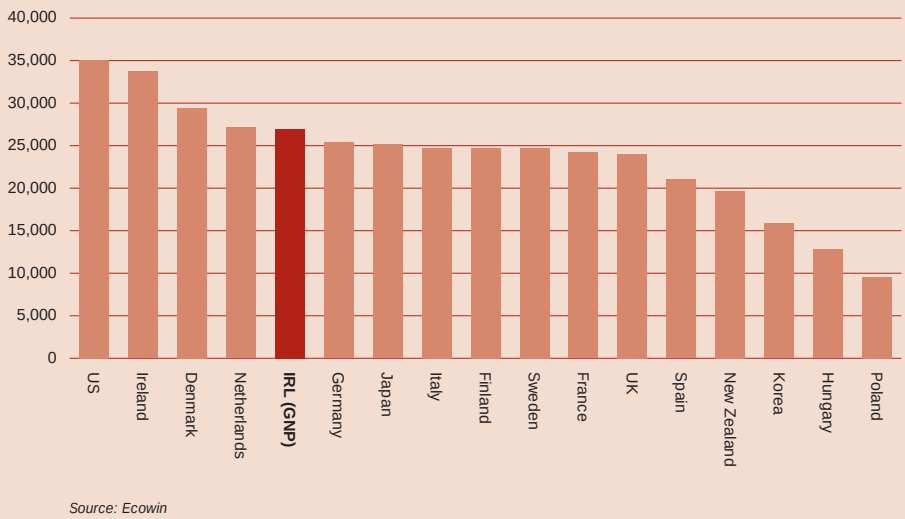
### 3.2.1 Macroeconomic Performance

The first aspect of international competitiveness which has been benchmarked is macroeconomic performance. The performance of the macro-economy is a key measurement of how successful policy changes in the five input areas have affected competitiveness and contributed to the performance of the economy as a whole, particularly with respect to economic growth, unemployment, government finances and returns on investment. In this section 9 indicators of macroeconomic performance are studied, with three key indicators identified in the following analysis.

#### Gross Domestic Product per Capita

The first key indicator identified is Gross Domestic Product per capita; this is regarded as the best internationally available indicator measuring the average economic well-being and performance of nations. The IMD World Competitiveness Yearbook regularly calculates the level of GDP per capita and adjusts the data to allow for purchasing power parity in US dollars. The following figure shows that Ireland is ranked 2nd of the 16 countries surveyed with an average GDP per capita of US$33,716 (PPP-adjusted), only behind the level of the United States. However, using Gross National Product as a measure of national income (which includes net income outflows from Ireland), the ranking falls to 4th highest of the 16 countries surveyed. In this case GNP per capita is estimated to be US$26,972 (PPP).

*Figure 45* GDP per Capita PPP US$




Source: Ecowin

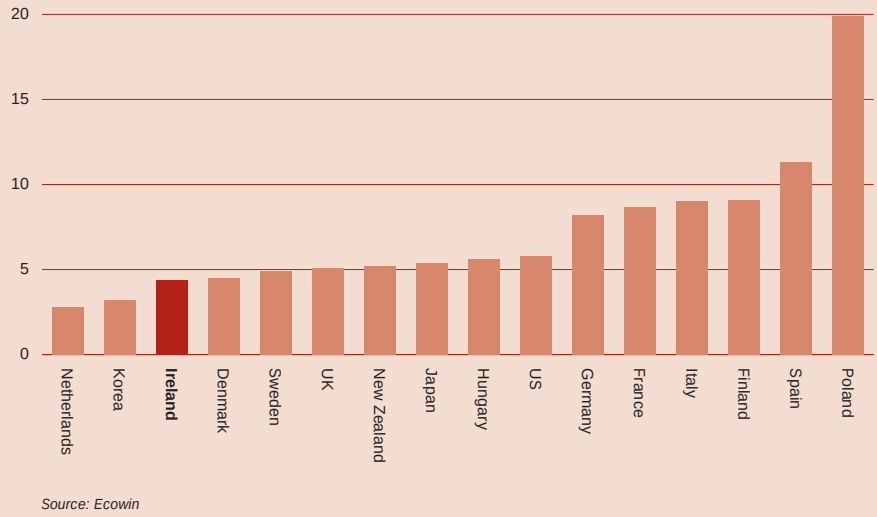
Ireland has performed consistently well over the last five years in terms of real GDP growth. According to AMECO figures, between 1998 and 2003 Ireland's GDP grew by 41.5 per cent – the highest growth performance of the 16 countries benchmarked. Looking at real GNP growth for the same period, Ireland was still a strong performer, registering growth of approximately 30.5 per cent, still amongst the best performers. Even in 2002, in the face of harsh global economic conditions the Irish economy performed robustly, registering real GDP growth of 6.9 per cent, giving a rank of 2nd. However, it was a poor year for GNP growth suggesting that the indigenous sector underperformed. Low GNP growth of just 0.1 per cent was masked somewhat by the continued strong performance of the multi-national sector.

### ILO Unemployment Rate

The second key indicator examined in this macroeconomic performance section is unemployment. The level of unemployment is a critical measure of how efficiently the labour market operates. The level of unemployment is therefore a result of how the demand for labour is matched to the supply of labour (both of which have been benchmarked as inputs to competitiveness in Section 2.1.2).

Ireland's labour market performance continued to be robust in 2002, despite weak global economic activity. The OECD measure of unemployment, consistent with rules prescribed by the International Labour Organisation, in Ireland in 2002 was 4.4 per cent (CSO measure was 4.5 per cent in 2002). Unemployment was the 3rd lowest of the 16 countries benchmarked. Strong employment growth of 1.5 per cent was only slightly outpaced by labour force growth, resulting in the small rise in the average rate of unemployment during the year.

*Figure 46* Unemployment 2002 (%)




*Source: Ecowin*

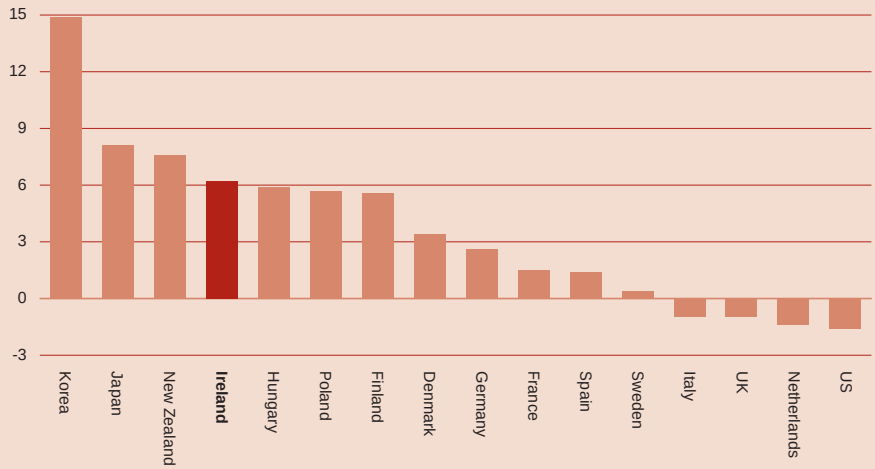
### Real Growth in Exports of Goods and Services

The final key indicator identified in the macroeconomic performance section is real growth in exports of goods and services. When Irish firms become more competitive, this allows them to sell more goods in domestic and foreign markets. The Irish economy is one of the most open economies in the world and is heavily dependent on trade. Growth in exports of goods and services is therefore a good proxy measurement of how successful Irish firms have been in improving overall competitiveness.

Irish trade performance in 2002 moderated somewhat in line with the weak global economic performance which was particularly evident among Ireland's key trade partners. Exports of goods and services rose by an estimated 6.2 per cent in real terms (eliminating price effects) in 2002. Figure 47 shows that this performance pushed Ireland to 4th place out of the 16 comparator countries benchmarked. Although the 6.2 per cent rise indicated a weakening of trade performance compared to other years, the increase was well ahead of the average 0.8 per cent European rise. That said, across 2002 there were varying results across the Irish traded sector. Firstly, exports of services continued perform strongly in 2002, with the 14 per cent nominal annual increase in 2002 outpacing the 5.2 per cent growth in merchandise exports. Secondly, much of the growth in merchandise exports was accounted for by the chemicals sector, while most other sectors performed weakly.

Other indicators examined in the macroeconomic performance area included the performance of the government finances and public debt. Ireland was ranked 5th best of 16 countries benchmarked concerning the position of the public finances across 2002. A small deficit of 0.1 per cent of GDP (and GNP) was recorded across 2002 in Ireland using the Maastricht definition of government finances (General Government Balance). Ireland was ranked 3rd out of 16 countries examined concerning the level of gross government debt. The recent strong performance of the public finances over recent years has allowed for a rapid reduction of government debt to be made and it is now estimated at 33.5 per cent of GDP.

*Figure 47* Exports of Goods and Services: Real % Change 2002




*Source: Ecowin*

### 3.2.2 Sustainability, Social Capital and Long-term Vision 2015

The second results section is the area of sustainability, social capital and 'long-term vision 2015'. The National Competitiveness Council's definition of competitiveness states that we target improving competitiveness to achieve success in markets which maximises the opportunities to improve the standards of living for all. In the previous section we benchmarked Ireland's ability to achieve success on the international stage. This section now focuses on the ability to share the successes among the population from improved competitiveness and growth, whilst balancing the needs for sustainable development and a high quality of life, which will not deplete the options of future generations.

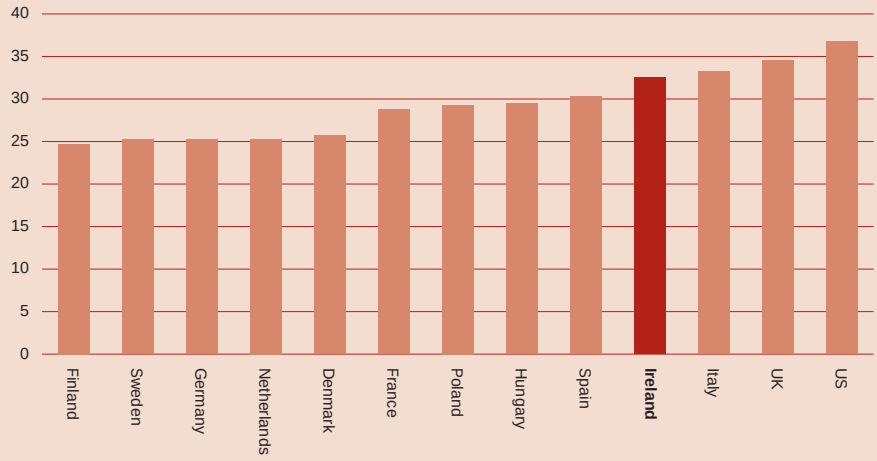
This process will require harnessing the complete skills-set from society, and will include improved linkages between a vast array of policy areas including education, labour markets, financial markets, and environment, innovation and competition policy. It also includes a political and social capital dimension, which although difficult to quantify and benchmark remain important nonetheless to this process.

In this section, 6 indicators of socio-economic success are examined, with two key indicators identified in the following analysis.

## Income Inequality

The first key indicator identified is income inequality, which measures the extent to which the successes from improved competitiveness are distributed to all members of society. The following figure shows that Ireland ranks 10th out of 13 countries for income distribution as calculated by the Luxembourg Income Study (LIS) measure of the Gini co-efficient. The Gini co-efficient is an international measure of income distribution which calculates the distribution of income across all sections of society, with a score of 0 indicating perfect equality and a score of 100 indicating perfect inequality. Ireland's score of 32.5 is only surpassed by scores for the US, UK and Italy. It should be noted however that a number of differing methodologies can be used to calculate the Gini, each of which give slightly different results. However, regardless of the source chosen, Ireland performs below average in relation to the rest of the developed world and the results are broadly comparable. The LIS was chosen as the source due to the timeliness of the data.

*Figure 48* Income Inequality: Gini Co-efficient



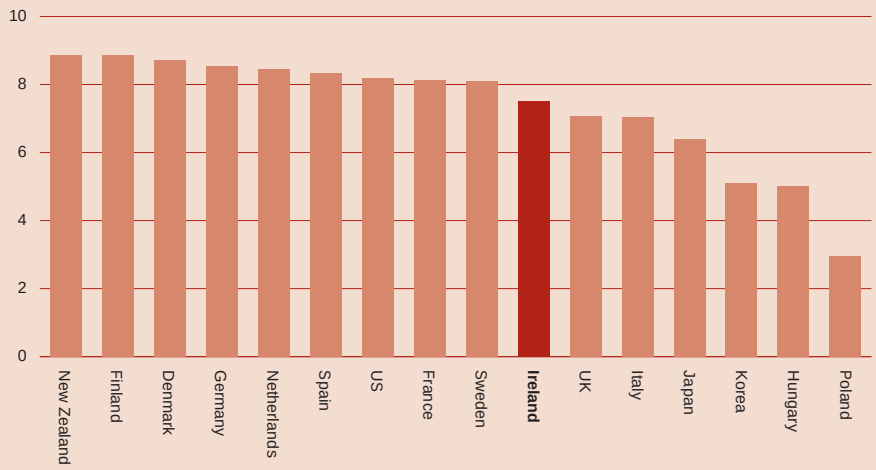

*Source: Luxembourg Income Study*

## Quality of Life

The second key indicator examined is a measure of quality of life. It should be noted that as well as being a key output from competitiveness, quality of life is also a key input determinant, particularly as regards retaining and attracting new workers to the labour force. Factors such as higher incomes, higher job security, better and more affordable housing, better community relations, improved healthcare, better and more available education, an improved environment, higher social capital and fuller participation in society can all contribute to a better standard of living.

The IMD regularly surveys a broad section of international populations concerning their perceptions of their own quality of life. Data from the World Competitiveness Yearbook shows that Ireland is ranked 10th of the 16 countries. Ireland's score of 7.5 (1 indicates a low quality of life, 10 indicates high living standards) places it in mid-table of the countries surveyed.

*Figure 49* Quality of Life (10=High)




*Source: IMD World Competitiveness Yearbook 2003*

Other data cover sustainability, life expectancy, house price affordability and the level of aging population. Again mixed results were achieved. On the negative side, life expectancy at birth as measured by the World Health Organisation was measured at 76.5 years, corresponding to a rank of 12th out of 16 benchmarked countries.

More worryingly, Ireland performed poorly in terms of house price affordability. This measure looks at the average urban house price in relation to average disposable income. Ireland was ranked just 9th out of 11 countries, indicating a low level of affordability (measured by the ratio of average urban house prices to average disposable income per head measured in 1999.

Assessment of the level of sustainable development as measured by its prioritisation yielded better results. Ireland was ranked 6th of the 16 countries surveyed achieving a score of 7.06. Lastly Ireland was ranked 2nd best of the NCC countries surveyed regarding the extent of an aging population in 2015. The estimated population aged over 65 at this time was projected to be 13.4 per cent, a performance that would place Ireland in a stronger demographic position that many of its international competitors.

# Annexes

# Annex 1 Detailed Tables

## Business and Work Environment – Competition and Regulation

| | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Intensity of local competition*** | | **Extent of locally based competitors**** | | **Competition legislation** | | **Burden of regulation***** | | **Levels of bureaucracy****** | | **Overall business environment rating projection 2004, 1=low, 10=high** | |
| Year | 2002 | | 2002 | | 2002 | | 2002 | | 2002 | | 2003 | |
| Source | World Economic Forum Global Competitiveness Report 2002-2003 | | World Economic Forum Global Competitiveness Report 2002-2003 | | IMD World Competitiveness Yearbook 2003 | | World Economic Forum Global Competitiveness Report 2002-2003 | | IMD World Competitiveness Yearbook 2003 | | Economic Intelligence Unit | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 4.90 | 13 | 4.60 | 11 | 7.485 | 2 | 3.10 | 8 | 5.46 | 2 | 8.31 | 5 |
| **Finland** | 5.30 | 9 | 4.40 | 14 | 8.595 | 1 | 4.40 | 1 | 6.89 | 1 | 8.49 | 4 |
| **France** | 4.70 | 15 | 5.00 | 9 | 6.357 | 9 | 2.40 | 13 | 2.76 | 13 | 7.99 | 10 |
| **Germany** | 5.70 | 2 | 5.30 | 5 | 7.333 | 3 | 2.30 | 14 | 1.96 | 15 | 8.02 | 9 |
| **Hungary** | 5.20 | 11 | 4.40 | 14 | 4.970 | 15 | 3.30 | 5 | 3.64 | 9 | 6.94 | 14 |
| **Ireland** | **4.90** | **13** | **4.60** | **11** | **6.296** | **10** | **3.70** | **2** | **3.96** | **6** | **8.31** | **5** |
| **Italy** | 5.10 | 12 | 5.10 | 8 | 5.290 | 12 | 2.20 | 16 | 2.30 | 14 | 7.19 | 12 |
| **Japan** | 5.50 | 4 | 5.80 | 1 | 5.774 | 11 | 2.30 | 14 | 2.80 | 12 | 6.92 | 15 |
| **Korea** | 5.40 | 5 | 5.20 | 7 | 5.184 | 13 | 3.00 | 9 | 3.00 | 11 | 7.02 | 13 |
| **Netherlands** | 5.40 | 5 | 5.30 | 5 | 6.839 | 5 | 2.80 | 11 | 3.74 | 7 | 8.63 | 1 |
| **New Zealand** | 5.40 | 5 | 4.50 | 13 | 7.283 | 4 | 3.20 | 7 | 4.00 | 5 | 8.09 | 8 |
| **Poland** | 4.70 | 15 | 4.40 | 14 | 3.402 | 16 | 2.50 | 12 | 1.62 | 16 | 6.78 | 16 |
| **Spain** | 5.30 | 9 | 5.40 | 4 | 5.143 | 14 | 3.30 | 5 | 3.69 | 8 | 7.76 | 11 |
| **Sweden** | 5.40 | 5 | 4.90 | 10 | 6.500 | 7 | 2.90 | 10 | 4.97 | 3 | 8.18 | 7 |
| **UK** | 5.70 | 2 | 5.50 | 3 | 6.458 | 8 | 3.60 | 3 | 3.25 | 10 | 8.57 | 2 |
| **US** | 6.10 | 1 | 5.60 | 2 | 6.725 | 6 | 3.40 | 4 | 4.33 | 4 | 8.53 | 3 |
| | | | | | | | | | | | | |
| **EU** | | | | | | | | | | | | |
| **OECD** | | | | | | | | | | | | |

** Note: 1=limited local competition; 7=intense local competition.*

*** Note: Firms face competition primarily from 1=imports; 7=local firms or local subsidiaries of multinationals.*

**** Note: Regulation is 1=burdensome; 7=not burdensome.*

***** Note: The level of bureaucracy 1=hinders activity; 7=does not hinder activity.*

## Business and Work Environment – Labour Market

| | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Employment growth (% chya)** | | **Labour force growth (% chya)** | | **Labour force participation rate (% pop 15-64)** | | **Employment rates – females** | | **Labour market regulations** | | **Working days lost per 1,000 inhabitants per year in industrial disputes** | |
| Year | 2002 | | 2002 | | 2002 | | Spring 2002/Latest Figures | | 2002 | | Average 1999-2001 | |
| Source | OECD Economic Outlook | | OECD Economic Outlook | | OECD Economic Outlook | | Eurostat/OECD | | IMD World Competitiveness Yearbook 2003 | | IMD World Competitiveness Yearbook 2003 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 0.09 | 10 | 0.20 | 10 | 79.89 | 1 | 72.6 | 1 | 6.831 | 2 | 17.265 | 11 |
| **Finland** | 0.18 | 9 | 0.13 | 11 | 74.78 | 8 | 67.3 | 4 | 5.205 | 6 | 17.557 | 12 |
| **France** | 0.42 | 8 | 0.71 | 9 | 69.91 | 10 | 56.4 | 10 | 2.469 | 15 | 3.977 | 6 |
| **Germany** | -0.58 | 14 | -0.12 | 14 | 75.81 | 6 | 58.8 | 9 | 1.192 | 16 | 0.364 | 2 |
| **Hungary** | -0.20 | 12 | -0.07 | 13 | 58.00 | 16 | 49.9 | 13 | 6.121 | 3 | 13.007 | 10 |
| **Ireland** | **1.40** | **5** | **1.70** | **4** | **70.14** | **9** | **55.2** | **11** | **5.962** | **4** | **37.648** | **15** |
| **Italy** | 1.47 | 4 | 0.88 | 7 | 61.43 | 15 | 41.9 | 16 | 3.560 | 11 | 10.359 | 9 |
| **Japan** | -1.27 | 15 | -0.93 | 15 | 77.51 | 2 | 60.1 | 8 | 4.583 | 8 | 0.321 | 1 |
| **Korea** | 2.44 | 2 | 1.71 | 3 | 65.88 | 13 | 52.6 | 12 | 2.612 | 14 | 30.695 | 14 |
| **Netherlands** | 0.74 | 6 | 1.20 | 5 | 66.94 | 12 | 65.9 | 5 | 3.871 | 9 | 2.733 | 4 |
| **New Zealand** | 2.93 | 1 | 2.79 | 2 | 76.40 | 3 | 63.2 | 7 | 5.094 | 7 | 7.173 | 8 |
| **Poland** | -2.99 | 16 | -0.94 | 16 | 64.16 | 14 | 46.7 | 14 | 2.867 | 13 | 1.599 | 3 |
| **Spain** | 1.96 | 3 | 2.95 | 1 | 67.59 | 11 | 44.0 | 15 | 3.731 | 10 | 59.192 | 16 |
| **Sweden** | 0.07 | 11 | 0.08 | 12 | 76.35 | 4 | 72.5 | 2 | 3.379 | 12 | 3.391 | 5 |
| **UK** | -0.33 | 13 | 0.76 | 8 | 75.73 | 7 | 65.3 | 6 | 5.542 | 5 | 7.066 | 7 |
| **US** | 0.49 | 7 | 1.20 | 5 | 76.00 | 5 | 71.0 | 3 | 7.060 | 1 | 28.515 | 13 |
| | | | | | | | | | | | | |
| **EU** | 0.75 | | 0.70 | | 70.9 | | 55.50 | | | | | |
| **OECD** | | | 0.70 | | 69.1 | | | | | | | |

## Business and Work Environment – Macroeconomic Policy

| | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Standard corporate tax rate** | | **General Government total tax and non-tax receipts (% GDP)** | | **General Government total outlays (% GDP)** | | **Employees' & employers' social security contributions plus personal income tax less transfer payments; married with 2 children (% gross labour costs)*** | | **Employers' social security contributions (% gross labour costs)** | | **Government investment (% GDP)** | |
| Year | 1 Jan 2003 | | 2002 | | 2002 | | 2002 | | 2002 | | 2002 | |
| Source | KPMG | | OECD Economic Outlook | | OECD Economic Outlook | | OECD Taxing Wages | | OECD Taxing Wages | | EU – AMECO database | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **12** | **Rank** |
| **Denmark** | 30.0% | 8 | 57.1 | 15 | 55.3 | 15 | 38.4 | 10 | 1 | 2 | 1.7 | 10 |
| **Finland** | 29.0% | 5 | 54.0 | 14 | 49.2 | 12 | 39.3 | 11 | 20 | 11 | 2.8 | 7 |
| **France** | 34.3% | 11 | 50.9 | 13 | 54.0 | 14 | 39.9 | 12 | 29 | 16 | 3.3 | 4 |
| **Germany** | 39.6% | 14 | 45.0 | 10 | 48.6 | 11 | 43.0 | 16 | 17 | 9 | 1.6 | 11 |
| **Hungary** | 18.0% | 2 | 43.8 | 9 | 52.2 | 13 | 34.9 | 9 | 24 | 13 | | |
| **Ireland** | **12.5%** | **1** | **34.1** | **4** | **34.4** | **2** | **16.9** | **2** | **10** | **6** | **4.1** | **2** |
| **Italy** | 38.3% | 13 | 45.2 | 11 | 47.7 | 10 | 41.8 | 13 | 25 | 14 | 1.8 | 9 |
| **Japan** | 42.0% | 16 | 31.4 | 2 | 38.6 | 5 | 22.6 | 5 | 10 | 6 | 6.2 | 1 |
| **Korea** | 29.7% | 7 | 30.5 | 1 | 24.6 | 1 | 15.3 | 1 | 8 | 4 | | |
| **Netherlands** | 29.0% | 5 | 46.2 | 12 | 47.3 | 9 | 32.6 | 7 | 10 | 6 | 3.5 | 3 |
| **New Zealand** | 33.0% | 10 | 37.8 | 6 | 36.5 | 4 | 19.5 | 3 | 0 | 1 | | |
| **Poland** | 27.0% | 3 | 37.5 | 5 | 43.2 | 8 | 42.2 | 14 | 17 | 9 | | |
| **Spain** | 35.0% | 12 | 39.8 | 8 | 39.8 | 6 | 34.7 | 8 | 23 | 12 | 3.3 | 4 |
| **Sweden** | 28.0% | 4 | 59.3 | 16 | 58.3 | 16 | 42.7 | 15 | 25 | 14 | 3.2 | 6 |
| **UK** | 30.0% | 8 | 39.6 | 7 | 40.9 | 7 | 22.4 | 4 | 8 | 4 | 1.3 | 12 |
| **US** | 40.0% | 15 | 32.2 | 3 | 35.6 | 3 | 25.0 | 6 | 7 | 3 | 2.8 | 7 |
| | | | | | | | | | | | | |
| **Ireland – GNP** | | | 42.6 | | 43.0 | | | | | | 5.1 | |
| **EU – GDP** | | | 46.1 | | 47.7 | | | | | | 2.2 | |
| **OECD – GDP** | | | 37.7 | | 40.7 | | | | | | | |

** Note: With one person earning 100% and and the second earning 67% of the average wage.*

## Business and Work Environment – Investment and Trade

| | 19 | | 20 | | 21 | | 22 | | 23 | | 24 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Private investment (% GDP)** | | **Foreign direct investment inward stock (% GDP)** | | **Cumulative foreign direct investment US$ billion (net flows)*** | | **Effective exchange rate – % annual change** | | **Trade openness (exports + imports of goods and services)/(2xGDP)** | | **Interest rate spread (%)** | |
| Year | 2002 | | 2002 (e) | | 1993-2002 | | 2003 (e) | | 2001 | | 2002 | |
| Source | EU – AMECO database | | UNCTAD/Forfás | | OECD | | OECD Economic Outlook | | IMD World Competitiveness Yearbook 2003 | | IMD World Competitiveness Yearbook 2003 | |
| **Country** | **12** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 18.0 | 2 | 41.7 | 5 | 9.50 | 7 | 3.47 | 9 | 46.39 | 4 | 4.68 | 14 |
| **Finland** | 17.1 | 7 | 27.0 | 10 | -38.30 | 10 | 4.07 | 12 | 36.53 | 8 | 3.33 | 8 |
| **France** | 16.6 | 9 | 28.2 | 9 | -312.00 | 15 | 3.75 | 10 | 30.11 | 11 | 3.98 | 11 |
| **Germany** | 16.8 | 8 | 22.7 | 12 | -95.80 | 13 | 4.79 | 13 | 34.42 | 9 | 7.05 | 15 |
| **Hungary** | | | 38.2 | 7 | 20.10 | 5 | 1.03 | 5 | 74.40 | 2 | 2.70 | 6 |
| **Ireland** | **17.9** | **3** | **129.1** | **1** | **70.80** | **1** | **7.03** | **15** | **91.91** | **1** | **3.73** | **9** |
| **Italy** | 17.9 | 5 | 10.6 | 14 | -37.20 | 9 | 4.03 | 11 | 26.87 | 14 | 4.24 | 12 |
| **Japan** | 17.9 | 3 | 1.5 | 16 | -208.80 | 14 | 1.86 | 6 | 11.06 | 16 | 1.83 | 4 |
| **Korea** | | | 9.5 | 15 | 0.56 | 8 | -1.93 | 4 | 41.43 | 6 | 1.60 | 2 |
| **Netherlands** | 17.5 | 6 | 74.9 | 2 | -74.40 | 12 | 4.93 | 14 | 70.48 | 3 | 1.18 | 1 |
| **New Zealand** | | | 50.3 | 3 | 19.20 | 6 | 12.04 | 16 | 37.09 | 7 | 4.48 | 13 |
| **Poland** | | | 23.9 | 11 | 48.60 | 3 | -8.27 | 1 | 30.45 | 10 | 7.55 | 16 |
| **Spain** | 22.1 | 1 | 33.2 | 8 | -44.20 | 11 | 3.02 | 7 | 29.42 | 12 | 1.75 | 3 |
| **Sweden** | 13.8 | 12 | 46.0 | 4 | 26.50 | 4 | 3.31 | 8 | 41.73 | 5 | 3.75 | 10 |
| **UK** | 14.5 | 11 | 40.8 | 6 | -407.00 | 16 | -2.67 | 2 | 28.18 | 13 | 2.55 | 5 |
| **US** | 15.3 | 10 | 12.9 | 13 | 63.80 | 2 | -2.58 | 3 | 11.71 | 15 | 2.95 | 7 |
| | | | | | | | | | | | | |
| **Ireland – GNP** | 21.9 | | | | | | | | | | | |
| **EU** | 17.1 | | 31.40 | | | | | | | | | |
| **OECD** | | | | | | | | | | | | |

** Note: Negative figure indicates a net outflow of FDI.*

## Economic and Technological Infrastructure – Transport

| | 25 | | 26 | | 27 | | 28 | | 29 | | 30 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Overall infrastructure quality*** | | **Efficiency of distribution infrastructure (roads, trains, planes etc)** | | **Motorway density (km of motorway per 1,000 sq km area)** | | **Average speed of business deliveries in capital/ principal cities** | | **Port infrastructure quality*** | | **Quality of air transportation** | |
| Year | 2002 | | 2003 | | 2000 | | 2001 | | 2002 | | 2000 | |
| Source | World Economic Forum Global Competitiveness Report 2002-2003 | | IMD World Competitiveness Yearbook 2003 | | OECD Communications Outlook | | Small Firms Association | | World Economic Forum Global Competitiveness Report 2002-2003 | | IMD World Competitiveness Yearbook 2003 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **10** | **Rank** | **8** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 6.50 | 4 | 8.769 | 1 | 23.00 | 3 | | | 6.20 | 5 | 8.215 | 3 |
| **Finland** | 6.70 | 1 | 8.630 | 2 | 1.60 | 9 | 15 | 3 | 6.30 | 3 | 8.575 | 1 |
| **France** | 6.30 | 6 | 8.238 | 5 | 18.00 | 5 | 15 | 3 | 5.70 | 8 | 7.690 | 5 |
| **Germany** | 6.60 | 2 | 8.476 | 3 | 32.80 | 2 | 53 | 7 | 6.40 | 2 | 8.343 | 2 |
| **Hungary** | 4.30 | 14 | 5.941 | 11 | | | | | 3.20 | 16 | 5.412 | 13 |
| **Ireland** | **3.40** | **15** | **4.741** | **15** | **1.50** | **10** | **57** | **8** | **3.60** | **14** | **5.396** | **14** |
| **Italy** | 4.40 | 13 | 4.667 | 16 | 21.50 | 4 | | | 3.90 | 13 | 4.796 | 16 |
| **Japan** | 5.40 | 10 | 7.301 | 9 | | | 16 | 5 | 5.70 | 8 | 6.462 | 11 |
| **Korea** | 5.30 | 11 | 5.388 | 13 | | | | | 5.20 | 11 | 5.833 | 12 |
| **Netherlands** | 5.80 | 7 | 7.607 | 7 | 55.20 | 1 | 14 | 2 | 6.50 | 1 | 7.774 | 4 |
| **New Zealand** | 5.50 | 8 | 7.547 | 8 | | | | | 5.80 | 7 | 6.604 | 10 |
| **Poland** | 2.90 | 16 | 5.289 | 14 | | | | | 3.30 | 15 | 5.089 | 15 |
| **Spain** | 4.90 | 12 | 6.743 | 10 | 17.90 | 6 | | | 4.90 | 12 | 6.725 | 8 |
| **Sweden** | 6.40 | 5 | 7.931 | 6 | 3.30 | 8 | | | 6.00 | 6 | 7.103 | 7 |
| **UK** | 5.50 | 8 | 5.585 | 12 | 14.50 | 7 | 13 | 1 | 5.40 | 10 | 6.675 | 9 |
| **US** | 6.60 | 2 | 8.337 | 4 | | | 19 | 6 | 6.30 | 3 | 7.640 | 6 |
| | | | | | | | | | | | | |
| **EU** | | | | | 15.90 | | | | | | | |
| **OECD** | | | | | | | | | | | | |

** Note: Scores ranked out of 7. 1=infrastructure is poorly developed, 7=infrastructure is among best in the world.*

## Economic and Technological Infrastructure – Information and Communication Technology

| | 31 | | 32 | | 33 | | 34 | | 35 | | 36 | | 37 | | 38 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Investment in tele-communications (% GDP)** | | **Broadband access (lines per 100 population)** | | **Overall broadband take-up (% homes and businesses)** | | **Percentage of companies using broadband** | | **ISDN subscribers (thousands)** | | **E-Commerce investments % change in share of total invested** | | **Adequacy of comm-unications (availability, cost and reliability)*** | | **Internet hosts per 10,000 inhabitants** | |
| Year | 2000 | | June 2002 | | Q1 2003 | | | | 1999 | | 2001-2 | | 2003 | | 2002 | |
| Source | IMD World Competitiveness Yearbook 2003 | | OECD Communications Outlook | | Forfás Broadband Benchmarking Study 2003 | | Forfás Broadband Benchmarking Study 2003 | | International Telecommunications Union | | PWC Technology Investment Report | | IMD World Competitiveness Yearbook 2003 | | International Telecommunications Union | |
| **Country** | **16** | **Rank** | **14** | **Rank** | **13** | **Rank** | **13** | **Rank** | **8** | **Rank** | **11** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 0.56 | 13 | 6.70 | 2 | 7.99 | 3 | 94 | 1 | 247.00 | 6 | -4.6 | 10 | 8.74 | 3 | 1556.74 | 4 |
| **Finland** | 0.52 | 14 | 3.30 | 6 | 5.28 | 6 | 54 | 3 | 156.90 | 7 | -0.3 | 4 | 9.32 | 1 | 2343.12 | 2 |
| **France** | 1.01 | 3 | 1.60 | 9 | 2.73 | 9 | 5 | 12 | | | -2.7 | 7 | 8.33 | 8 | 232.86 | 11 |
| **Germany** | 0.37 | 15 | 3.10 | 7 | 4.06 | 8 | 29 | 7 | 5636.95 | 1 | -3.7 | 9 | 8.57 | 6 | 314.08 | 10 |
| **Hungary** | 1.16 | 2 | | | | | | | | | -1.9 | 6 | 6.67 | 12 | 191.59 | 12 |
| **Ireland** | **0.65** | **11** | **0.10** | **13** | **0.16** | **13** | **1** | **13** | **28.98** | **8** | **-1.7** | **5** | **6.48** | **13** | **347.21** | **9** |
| **Italy** | 0.33 | 16 | 1.20 | 11 | 1.72 | 12 | 17 | 10 | 1259.45 | 2 | | | 5.78 | 15 | 119.13 | 16 |
| **Japan** | 0.60 | 12 | 3.90 | 4 | 4.77 | 7 | 44 | 4 | | | | | 7.61 | 10 | 559.22 | 7 |
| **Korea** | 0.87 | 6 | | | 17.06 | 1 | 58 | 2 | | | | | 7.76 | 9 | 148.37 | 14 |
| **Netherlands** | 0.95 | 4 | 3.90 | 4 | 6.66 | 4 | 22 | 9 | 862.36 | 3 | 23.4 | 1 | 8.68 | 4 | 1937.14 | 3 |
| **New Zealand** | 0.83 | 7 | 1.10 | 12 | | | | | | | | | 8.60 | 5 | 1099.13 | 5 |
| **Poland** | 0.88 | 5 | 0.04 | 14 | | | | | | | 6.3 | 2 | 5.24 | 16 | 170.30 | 13 |
| **Spain** | 1.31 | 1 | 2.10 | 8 | 2.73 | 9 | 33 | 5 | 364.42 | 5 | -3.2 | 8 | 6.31 | 14 | 145.02 | 15 |
| **Sweden** | 0.73 | 10 | 7.00 | 1 | 8.16 | 2 | 30 | 6 | | | 3.2 | 3 | 8.38 | 7 | 949.54 | 6 |
| **UK** | 0.74 | 9 | 1.30 | 10 | 2.22 | 11 | 10 | 11 | 655.00 | 4 | -14.7 | 11 | 7.35 | 11 | 485.03 | 8 |
| **US** | 0.80 | 8 | 5.60 | 3 | 6.51 | 5 | 29 | 7 | | | | | 8.97 | 2 | 3728.74 | 1 |
| | | | | | | | | | | | | | | | | |
| **Ireland (GNP)** | 0.81 | | | | | | | | | | | | | | | |
| **EU** | | | 2.30 | | | | | | | | | | | | | |
| **OECD** | | | 3.80 | | | | | | | | | | | | | |

** Note: A score of 1=low reliability.*

## Economic and Technological Infrastructure – Energy

| | 39 | | 40 | | 41 | |
|---|---|---|---|---|---|---|
| **Indicator** | **Total final energy consumption per capita (millions tons oil equivalent)** | | **Energy infrastructure*** | | **Energy efficiency (GDP per unit of energy consumed; PPP US$ per kg of oil equivalent)** | |
| Year | 2000 | | 2003 | | 1999 | |
| Source | IMD World Competitiveness Yearbook 2003 | | IMD World Competitiveness Yearbook 2003 | | UN Human Development Report 2002 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 2.81 | 9 | 8.862 | 4 | 6.9 | 3 |
| **Finland** | 4.78 | 2 | 8.889 | 2 | 3.6 | 15 |
| **France** | 2.86 | 8 | 8.881 | 3 | 5.3 | 8 |
| **Germany** | 2.98 | 6 | 9.048 | 1 | 5.8 | 6 |
| **Hungary** | 1.70 | 15 | 6.235 | 11 | 4.6 | 10 |
| **Ireland** | **2.93** | **7** | **6.111** | **12** | **7.00** | **2** |
| **Italy** | 2.27 | 13 | 4.860 | 16 | 7.7 | 1 |
| **Japan** | 2.73 | 10 | 7.038 | 9 | 6.3 | 4 |
| **Korea** | 2.73 | 10 | 5.469 | 15 | 4.1 | 11 |
| **Netherlands** | 3.80 | 4 | 7.774 | 5 | 5.2 | 9 |
| **New Zealand** | 3.60 | 5 | 7.434 | 6 | 4 | 12 |
| **Poland** | 1.52 | 16 | 6.045 | 14 | 3.5 | 16 |
| **Spain** | 2.26 | 14 | 6.057 | 13 | 6.1 | 5 |
| **Sweden** | 4.02 | 3 | 6.828 | 10 | 4 | 12 |
| **UK** | 2.70 | 12 | 7.098 | 8 | 5.8 | 6 |
| **US** | 5.45 | 1 | 7.366 | 7 | 3.9 | 14 |
| | | | | | | |
| **EU** | | | | | | |
| **OECD** | | | | | | |

** Note: Score 1-10; 10=Energy infrastructure is adequate and efficient.*

## Economic and Technological Infrastructure – Housing and Environmental

| | 42 | | 43 | | 44 | | 45 | | 46 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Total housing stock – dwellings per 000 of population** | | **% of home-owners in population** | | **Paper and cardboard recycling (as a % of apparent consumption)** | | **$CO_2$ emissions per unit of GDP** | | **Municipal waste (kg per capita)** | |
| Year | 2002 (e) | | Latest year | | 2001 | | 2000 | | 2002 | |
| Source | Euromonitor | | European Mortgage Federation/EIU | | IMD World Competitiveness Yearbook 2003 | | IEA Key world energy statistics | | OECD in Figures 2002 | |
| **Country** | **16** | **Rank** | **12** | **Rank** | **16** | **16** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 464.99 | 5 | 51.0 | 11 | 32.70 | 13 | 0.24 | 4 | 630 | 14 |
| **Finland** | 491.59 | 4 | 61.0 | 6 | 37.34 | 12 | 0.33 | 6 | 460 | 6 |
| **France** | 529.51 | 2 | 54.0 | 9 | 45.01 | 10 | 0.21 | 3 | 510 | 9 |
| **Germany** | 632.41 | 1 | 41.0 | 12 | 75.87 | 2 | 0.31 | 5 | 550 | 10 |
| **Hungary** | 411.20 | 10 | | | 40.58 | 11 | 1.01 | 15 | 490 | 7 |
| **Ireland** | **316.70** | **15** | **80.0** | **2** | **13.00** | **16** | **0.39** | **9** | **560** | **11** |
| **Italy** | 405.57 | 11 | 68.0 | 4 | 29.00 | 14 | 0.35 | 7 | 490 | 7 |
| **Japan** | 417.08 | 8 | 60.0 | 7 | 61.98 | 5 | 0.20 | 2 | 410 | 4 |
| **Korea** | 230.53 | 16 | | | 59.00 | 6 | 0.70 | 14 | 360 | 2 |
| **Netherlands** | 419.43 | 7 | 53.0 | 10 | 77.33 | 1 | 0.36 | 8 | 610 | 13 |
| **New Zealand** | 344.79 | 13 | | | 66.00 | 4 | 0.46 | 12 | 380 | 3 |
| **Poland** | 318.75 | 14 | | | 14.00 | 15 | 1.79 | 16 | 320 | 1 |
| **Spain** | 402.87 | 12 | 81.0 | 1 | 47.67 | 8 | 0.40 | 10 | 670 | 15 |
| **Sweden** | 503.73 | 3 | 60.0 | 7 | 70.82 | 3 | 0.19 | 1 | 450 | 5 |
| **UK** | 414.26 | 9 | 69.0 | 3 | 45.47 | 9 | 0.41 | 11 | 560 | 11 |
| **US** | 429.77 | 6 | 67.0 | 5 | 49.42 | 7 | 0.63 | 13 | 760 | 16 |
| | | | | | | | | | | |
| **EU** | | | | | | | | | 550 | |
| **OECD** | | | | | | | | | 540 | |

## Education and Skills – Investment

| | 47 | | 48 | | 49 | |
|---|---|---|---|---|---|---|
| **Indicator** | **Public and private expenditure on educational institutions (% of GDP)** | | **Annual expenditure on educational institutions per student (US$ PPP) – all secondary education*** | | **Average class size (total secondary education, public private institutions)**** | |
| Year | 2000 | | 2000 | | 2000 | |
| Source | OECD Education at a Glance 2003 | | OECD Education at a Glance 2003 | | OECD Education at a Glance 2002 | |
| **Country** | **16** | **Rank** | **15** | **Rank** | **11** | **Rank** |
| **Denmark** | 6.7 | 3 | 7,726 | 2 | 18.6 | 1 |
| **Finland** | 5.6 | 7 | 6,094 | 8 | 19.9 | 2 |
| **France** | 6.1 | 5 | 7,636 | 3 | 24.5 | 6 |
| **Germany** | 5.3 | 8 | 6,826 | 5 | 24.6 | 7 |
| **Hungary** | 5.0 | 11 | 2,446 | 14 | 21.5 | 4 |
| **Ireland** | **4.6** | **15** | **4,638** | **12** | **22.7** | **5** |
| **Italy** | 4.9 | 12 | 7,218 | 4 | 20.7 | 3 |
| **Japan** | 4.6 | 15 | 6,266 | 7 | 34.7 | 10 |
| **Korea** | 7.1 | 1 | 4,069 | 13 | 38.5 | 11 |
| **Netherlands** | 4.7 | 14 | 5,912 | 10 | | |
| **New Zealand** | 5.8 | 6 | | | | |
| **Poland** | 5.2 | 10 | 1,583 | 15 | 24.6 | 7 |
| **Spain** | 4.9 | 12 | 5,185 | 11 | 26.0 | 9 |
| **Sweden** | 6.5 | 4 | 6,339 | 6 | | |
| **UK** | 5.3 | 8 | 5,991 | 9 | | |
| **US** | 7.0 | 2 | 8,855 | 1 | | |
| | | | | | | |
| **Ireland (GNP)** | 5.7 | | | | | |
| **EU** | | | | | | |
| **OECD** | 5.9 | | 5,465 | | 23.6 | |

** Note: Figure for Poland is for 1999.*

*** Note: Public institutions only for Ireland; German figure refers to 2001.*

## Education and Skills – Participation

| | 50 | | 51 | | 52 | |
|---|---|---|---|---|---|---|
| **Indicator** | **Change in total tertiary enrolment (1995=100)*** | | **% of population aged 25-64 that has at least upper secondary level education** | | **Full and part-time students aged 15-19 in public and private institutions as a % of population aged 15-19 (%)** | |
| Year | 2001 | | 2001 | | 2001 | |
| Source | OECD Education at a Glance 2003 | | OECD Education at a Glance 2003 | | OECD Education at a Glance 2003 | |
| **Country** | **11** | **Rank** | **16** | **Rank** | **15** | **Rank** |
| **Denmark** | 122 | 6 | 80 | 5 | 82.9 | 7 |
| **Finland** | 121 | 7 | 74 | 7 | 85.3 | 6 |
| **France** | 107 | 11 | 64 | 11 | 86.6 | 2 |
| **Germany** | 110 | 10 | 83 | 2 | 89.4 | 1 |
| **Hungary** | 195 | 1 | 70 | 8 | 79.0 | 11 |
| **Ireland** | **118** | **8** | **58** | **13** | **80.9** | **8** |
| **Italy** | | | 43 | 15 | 72.2 | 15 |
| **Japan** | | | 83 | 2 | | |
| **Korea** | 170 | 3 | 68 | 9 | 79.3 | 10 |
| **Netherlands** | | | 65 | 10 | 86.2 | 4 |
| **New Zealand** | | | 76 | 6 | 73.0 | 14 |
| **Poland** | 173 | 2 | 46 | 14 | 85.5 | 5 |
| **Spain** | 129 | 5 | 40 | 16 | 80.1 | 9 |
| **Sweden** | 134 | 4 | 81 | 4 | 86.4 | 3 |
| **UK** | 117 | 9 | 63 | 12 | 74.7 | 13 |
| **US** | | | 88 | 1 | 77.6 | 12 |
| | | | | | | |
| **EU** | | | n/a | | | |
| **OECD** | | | 64 | | 77.3 | |

** Note: Change in enrolment rate not due to population increase; Polish figure refers to 2000.*

## Education and Skills – Attainment

| | 53 | | 54 | | 55 | | 56 | | 57 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **% of population aged 25-34 that has at least third level education*** | | **Science and engineering graduates per 1,000 population aged 20-34** | | **Mean performance on the PISA mathematical literacy scale (age 15)** | | **Mean performance on the PISA reading literacy scale (age 15)** | | **Mean performance on the PISA scientific literacy scale (age 15)** | |
| Year | 2001 | | 2000 | | 2000 | | 2000 | | 2000 | |
| Source | OECD Education at a Glance 2002 | | European Commission: Science and Technology report 2003 | | OECD PISA Database 2001 | | OECD PISA Database 2001 | | OECD PISA Database 2001 | |
| **Country** | **16** | **Rank** | **12** | **Rank** | **15** | **Rank** | **15** | **Rank** | **15** | **Rank** |
| **Denmark** | 29 | 10 | 5.27 | 9 | 514.0 | 7 | 497.0 | 10 | 481 | 14 |
| **Finland** | 38 | 4 | 11.39 | 3 | 536.0 | 4 | 546.0 | 1 | 538 | 3 |
| **France** | 35 | 7 | 12.29 | 2 | 517.0 | 6 | 505.0 | 8 | 500 | 8 |
| **Germany** | 22 | 13 | 4.79 | 10 | 490.0 | 11 | 484.0 | 13 | 487 | 12 |
| **Hungary** | 15 | 14 | | | 488.0 | 12 | 480.0 | 14 | 496 | 10 |
| **Ireland** | **32** | **8** | **16.26** | **1** | **503.0** | **9** | **527.0** | **3** | **513** | **6** |
| **Italy** | 12 | 16 | 3.53 | 12 | 457.0 | 15 | 487.0 | 12 | 478 | 15 |
| **Japan** | 47 | 1 | 8.66 | 5 | 557.0 | 1 | 522.0 | 6 | 550 | 2 |
| **Korea** | 40 | 2 | | | 547.0 | 2 | 525.0 | 4 | 552 | 1 |
| **Netherlands** | 26 | 12 | 3.62 | 11 | | | | | | |
| **New Zealand** | 29 | 10 | | | 537.0 | 3 | 529.0 | 2 | 528 | 5 |
| **Poland** | 15 | 14 | | | 470.0 | 14 | 479.0 | 15 | 483 | 13 |
| **Spain** | 36 | 6 | 6.70 | 7 | 476.0 | 13 | 493.0 | 11 | 491 | 11 |
| **Sweden** | 37 | 5 | 7.38 | 6 | 510.0 | 8 | 516.0 | 7 | 512 | 7 |
| **UK** | 30 | 9 | 10.04 | 4 | 529.0 | 5 | 523.0 | 5 | 532 | 4 |
| **US** | 39 | 3 | 6.37 | 8 | 493.0 | 10 | 504.0 | 9 | 499 | 9 |
| | | | | | | | | | | |
| **EU** | n/a | | 6.9 | | | | | | | |
| **OECD** | 28 | | | | | | | | | |

** Note: Due to discrepancies in OECD data, the figure for Ireland refers to data from CSO QNHS 2001 Q2.*

## Education and Skills – Life-long Learning

| | 58 | | 59 | | 60 | | 61 | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **% of 25-64 year olds participating in continuing education and training** | | **Extent of staff training*** | | **Knowledge transfer between companies and universities**** | | **Course hours per 1,000 working hours in all enterprises** | |
| Year | 1998 | | 2003 | | 2003 | | 1999 | |
| Source | OECD Education at a Glance 2002 | | WEF – Global Competitiveness Report 2002-2003 | | IMD World Competitiveness Yearbook 2003 | | Statistics in Focus 1/2003 | |
| **Country** | **12** | **Rank** | **16** | **Rank** | **16** | **Rank** | **9** | **Rank** |
| **Denmark** | 56 | 1 | 5.5 | 6 | 5.477 | 5 | 14 | 1 |
| **Finland** | 55 | 2 | 5.8 | 1 | 8.270 | 1 | 11 | 3 |
| **France** | | | 5.2 | 9 | 4.785 | 9 | | |
| **Germany** | 42 | 7 | 5.8 | 1 | 4.990 | 8 | 5 | 7 |
| **Hungary** | 18 | 11 | 4.7 | 12 | 4.727 | 10 | 3 | 8 |
| **Ireland** | **22** | **9** | **5.2** | **9** | **5.769** | **4** | **9** | **5** |
| **Italy** | 22 | 9 | 4.3 | 15 | 3.253 | 16 | | |
| **Japan** | | | 5.6 | 5 | 4.369 | 12 | | |
| **Korea** | | | 4.8 | 11 | 4.163 | 13 | | |
| **Netherlands** | 36 | 8 | 5.5 | 6 | 5.032 | 7 | 11 | 3 |
| **New Zealand** | 46 | 5 | 4.7 | 12 | 5.321 | 6 | | |
| **Poland** | 14 | 12 | 3.3 | 16 | 4.111 | 14 | 2 | 9 |
| **Spain** | | | 4.6 | 14 | 4.029 | 15 | 6 | 6 |
| **Sweden** | 54 | 3 | 5.8 | 1 | 6.214 | 3 | 12 | 2 |
| **UK** | 45 | 6 | 5.5 | 6 | 4.554 | 11 | | |
| **US** | 51 | 4 | 5.8 | 1 | 7.030 | 2 | | |
| | | | | | | | | |
| **EU** | | | | | | | | |
| **OECD** | | | | | | | | |

** Note: 1=Companies generally invest little in training and employee development; 7=invest highly.*

*** Note: 1=Knowledge transfer between companies and universities is lacking; 7=highly developed.*

## Entrepreneurship and Enterprise Development – Entrepreneurship and Financing

| | 62 | | 63 | | 64 | | 65 | | 66 | | 67 | | 68 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Total Entrepreneurial Activity (TEA) %** | | **Ratio of men to women entrepreneurs** | | **Business angels – number of networks** | | **Cumulative venture capital raised – % chya** | | **High tech investment (% of total private equity investment)** | | **% of private equity investment directed to start-up/seed stages** | | **Total informal investment as percentage of GDP** | |
| Year | 2002 | | 2002 | | 2000 | | 2002 | | 2002 | | 2002 | | 2001 | |
| Source | Global Entrepreneurship Monitor 2002 | | Global Entrepreneurship Monitor 2002 | | European Business Angels Networks | | PWC Technology Investment Report | | PWC Technology Investment Report | | PWC Technology Investment Report | | Global Entrepreneurship Monitor 2002 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **10** | **Rank** | **12** | **Rank** | **6** | **Rank** | **12** | **Rank** | **9** | **Rank** |
| **Denmark** | 6.53 | 6 | 2.10 | 11 | 6 | 5 | -24.5 | 5 | 60.0 | 2 | 81 | 1 | 0.59 | 6 |
| **Finland** | 4.56 | 12 | 1.60 | 3 | 1 | 8 | -6.6 | 3 | | | 34 | 5 | 0.26 | 9 |
| **France** | 3.20 | 15 | 2.05 | 9 | 31 | 3 | -21.3 | 4 | 21.0 | 5 | 32 | 6 | | |
| **Germany** | 5.16 | 9 | 2.03 | 8 | 40 | 2 | -32.2 | 6 | 26.0 | 4 | 79 | 2 | 0.55 | 7 |
| **Hungary** | 6.64 | 5 | 2.02 | 7 | | | -91.7 | 12 | | | 16 | 9 | | |
| **Ireland** | **9.14** | **4** | **2.25** | **13** | **1** | **8** | **27.1** | **1** | **86.0** | **1** | **29** | **8** | **0.72** | **5** |
| **Italy** | 5.90 | 7 | 1.90 | 6 | 13 | 4 | -83.4 | 11 | | | 10 | 11 | | |
| **Japan** | 1.81 | 16 | 5.00 | 16 | | | | | | | | | | |
| **Korea** | 14.52 | 1 | 2.36 | 14 | | | | | | | | | 3.66 | 1 |
| **Netherlands** | 4.62 | 10 | 1.58 | 1 | 2 | 6 | -1.6 | 2 | | | 37 | 4 | | |
| **New Zealand** | 14.01 | 2 | 1.64 | 4 | | | | | | | | | 3.54 | 2 |
| **Poland** | 4.44 | 13 | 1.83 | 5 | | | -52.4 | 9 | | | 9 | 12 | | |
| **Spain** | 4.59 | 11 | 2.54 | 15 | 2 | 6 | -52.7 | 10 | | | 39 | 3 | | |
| **Sweden** | 4.00 | 14 | 2.08 | 10 | 1 | 8 | -44.2 | 7 | 57.0 | 3 | 14 | 10 | 0.30 | 8 |
| **UK** | 5.37 | 8 | 2.24 | 12 | 50 | 1 | -49.6 | 8 | 10.0 | 6 | 31 | 7 | 1.20 | 4 |
| **US** | 10.51 | 3 | 1.59 | 2 | | | | | | | | | 1.31 | 3 |
| | | | | | | | | | | | | | | |
| **EU** | | | | | 157 | | -39.9 | | | | | | | |
| **OECD** | | | | | | | | | | | | | | |

## Entrepreneurship and Enterprise Development – Business Formation

| | 69 | | 70 | | 71 | | 72 | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Cost as a percentage of GDP per capita to register a business** | | **Administrative burden for start-ups*** | | **Number of days to start a business** | | **Creation of firms (1=hindered by legislation, 7= supported by legislation)**** | |
| Year | 2002 | | 2002 | | 2002 | | 2003 | |
| Source | World Economic Forum | | World Economic Forum | | World Economic Forum | | IMD World Competitiveness Yearbook 2003 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 0.00 | 1 | 4.5 | 8 | 3 | 2 | 7.1 | 6 |
| **Finland** | 1.01 | 5 | 5.8 | 1 | 36 | 8 | 7.9 | 3 |
| **France** | 2.59 | 7 | 3.1 | 16 | 53 | 11 | 5.4 | 14 |
| **Germany** | 5.82 | 8 | 4.0 | 11 | 45 | 10 | 5.0 | 15 |
| **Hungary** | 66.72 | 16 | 5.1 | 5 | 66 | 14 | 7.9 | 2 |
| **Ireland** | **10.36** | **9** | **4.8** | **6** | **16** | **5** | **8.0** | **1** |
| **Italy** | 22.50 | 14 | 3.6 | 15 | 64 | 13 | 6.2 | 10 |
| **Japan** | 11.13 | 10 | 3.8 | 12 | 30 | 7 | 6.2 | 12 |
| **Korea** | 18.94 | 13 | 4.5 | 8 | 41 | 9 | 5.6 | 13 |
| **Netherlands** | 17.18 | 12 | 4.7 | 7 | 72 | 15 | 6.8 | 7 |
| **New Zealand** | 0.19 | 2 | 5.5 | 3 | 2 | 1 | 7.7 | 4 |
| **Poland** | 23.54 | 15 | 3.7 | 14 | 58 | 12 | 4.3 | 16 |
| **Spain** | 15.50 | 11 | 3.8 | 12 | 110 | 16 | 6.4 | 8 |
| **Sweden** | 0.70 | 4 | 4.5 | 8 | 18 | 6 | 6.2 | 9 |
| **UK** | 1.52 | 6 | 5.5 | 3 | 5 | 3 | 6.2 | 11 |
| **US** | 0.69 | 3 | 5.8 | 1 | 5 | 3 | 7.6 | 5 |
| | | | | | | | | |
| **EU** | n/a | | n/a | | n/a | | | |
| **OECD** | n/a | | n/a | | n/a | | | |

** Note: 1=extremely difficult to start a business; 7=easy to start a business.*

*** Note: Creation of firms is (1=hindered by legislation, 7=supported by legislation).*

## Entrepreneurship and Enterprise Development – Firm Level Management Skills

| | 73 | | 74 | | 75 | | 76 | | 77 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Value chain presence*** | | **Competent senior managers** | | **Extent of marketing**** | | **Adaptability to market changes***** | | **Customer satisfaction****** | |
| Year | 2002 | | 2003 | | 2002 | | 2003 | | 2003 | |
| Source | World Economic Forum | | IMD World Competitiveness Yearbook 2003 | | World Economic Forum | | IMD World Competitiveness Yearbook 2003 | | IMD World Competitiveness Yearbook 2003 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 6.1 | 5 | 6.667 | 7 | 5.60 | 8 | 7.24 | 3 | 7.64 | 3 |
| **Finland** | 6.0 | 7 | 7.432 | 2 | 5.50 | 10 | 7.46 | 2 | 7.81 | 1 |
| **France** | 6.0 | 7 | 6.738 | 5 | 6.10 | 3 | 5.37 | 14 | 5.55 | 13 |
| **Germany** | 6.4 | 1 | 6.654 | 8 | 6.00 | 4 | 5.40 | 13 | 5.96 | 10 |
| **Hungary** | 4.3 | 14 | 6.412 | 9 | 4.90 | 14 | 5.59 | 10 | 5.00 | 15 |
| **Ireland** | **5.4** | **11** | **7.259** | **4** | **5.30** | **11** | **7.22** | **4** | **6.56** | **8** |
| **Italy** | 5.9 | 9 | 5.613 | 13 | 5.60 | 8 | 5.96 | 8 | 5.44 | 14 |
| **Japan** | 6.3 | 2 | 5.086 | 16 | 5.80 | 5 | 4.42 | 15 | 7.68 | 2 |
| **Korea** | 5.1 | 12 | 5.184 | 14 | 4.70 | 15 | 5.47 | 12 | 5.96 | 11 |
| **Netherlands** | 5.8 | 10 | 6.677 | 6 | 5.80 | 5 | 6.52 | 7 | 6.71 | 7 |
| **New Zealand** | 3.5 | 15 | 5.962 | 11 | 5.20 | 12 | 7.21 | 5 | 7.36 | 4 |
| **Poland** | 3.5 | 15 | 5.178 | 15 | 4.50 | 16 | 3.98 | 16 | 3.98 | 16 |
| **Spain** | 5.1 | 12 | 6.314 | 10 | 5.20 | 12 | 5.54 | 11 | 6.00 | 9 |
| **Sweden** | 6.1 | 5 | 7.458 | 1 | 5.70 | 7 | 6.95 | 6 | 7.22 | 6 |
| **UK** | 6.3 | 2 | 5.663 | 12 | 6.60 | 2 | 5.68 | 9 | 5.95 | 12 |
| **US** | 6.2 | 4 | 7.333 | 3 | 6.70 | 1 | 7.59 | 1 | 7.24 | 5 |
| | | | | | | | | | | |
| **EU** | | | | | | | | | | |
| **OECD** | | | | | | | | | | |

** Note: Exporting companies are (1=primarily involved in resource extraction or production; 7=not only produce but also perform product design, marketing, sales, logistics and after sales services).*

*** Note: The extent of marketing is (1=limited and primitive; 7=extensive and employs the world's most sophisticated tools and techniques).*

**** Note: Adaptability to market changes is low/high for companies in the economy.*

***** Note: Customer satisfaction is/is not emphasised.*

## Entrepreneurship and Enterprise Development – Clustering, Networks and Long-term Planning

| | 78 | | 79 | | 80 | | 81 | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **State of cluster development*** | | **Extent of collaboration among clusters**** | | **Local availability of specialised research and training** | | **Cross-border ventures***** | |
| Year | 2002 | | 2002 | | 2003 | | 2003 | |
| Source | World Economic Forum | | World Economic Forum | | World Economic Forum | | IMD World Competitiveness Yearbook 2003 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 3.7 | 11 | 4.1 | 13 | 5.1 | 10 | 8.83 | 5 |
| **Finland** | 5.3 | 3 | 5.6 | 1 | 5.9 | 3 | 9.30 | 1 |
| **France** | 3.7 | 11 | 4.7 | 8 | 5.3 | 7 | 8.15 | 9 |
| **Germany** | 4.7 | 5 | 5.2 | 4 | 5.8 | 5 | 8.67 | 7 |
| **Hungary** | 3.2 | 14 | 4.0 | 13 | 4.6 | 14 | 8.55 | 8 |
| **Ireland** | **4.3** | **8** | **4.2** | **12** | **4.7** | **13** | **9.08** | **2** |
| **Italy** | 5.7 | 1 | 5.2 | 4 | 5.2 | 9 | 7.64 | 13 |
| **Japan** | 4.2 | 9 | 5.5 | 2 | 5.9 | 3 | 7.07 | 14 |
| **Korea** | 4.6 | 6 | 4.7 | 8 | 4.6 | 14 | 6.20 | 15 |
| **Netherlands** | 4.1 | 10 | 4.7 | 8 | 5.6 | 6 | 8.84 | 4 |
| **New Zealand** | 3.2 | 14 | 3.8 | 14 | 4.8 | 11 | 9.06 | 3 |
| **Poland** | 3.1 | 16 | 3.8 | 14 | 4.4 | 16 | 5.71 | 16 |
| **Spain** | 3.5 | 13 | 4.3 | 11 | 4.8 | 11 | 8.09 | 10 |
| **Sweden** | 4.4 | 7 | 4.9 | 6 | 5.3 | 7 | 8.76 | 6 |
| **UK** | 4.9 | 4 | 4.8 | 7 | 6.3 | 1 | 7.90 | 12 |
| **US** | 5.4 | 2 | 5.4 | 3 | 6.2 | 2 | 8.08 | 11 |
| | | | | | | | | |
| **EU** | | | | | | | | |
| **OECD** | | | | | | | | |

** Note: Clusters are (1=Limited and shallow clusters; 7=Common and deep).*

*** Note: Collaboration in your clusters with suppliers and partners is (1=almost nonexistant; 7=extensive and involves suppliers, local customers and local research institutions).*

**** Note: Cross-border ventures can/cannot be freely negotiated with foreign partners.*

## Innovation and Creativity – Research and Development

| | 82 | | 83 | | 84 | | 85 | | 86 | | 87 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Total researchers (per 1,000 total employment)** | | **Business R&D expenditure (% GDP) BERD** | | **R&D spending performed in public sector (% GDP) including GOVERD and HERD** | | **Gross domestic expenditure on R&D (% GDP) GERD – Total** | | **Government R&D appropriations (% GDP) GBAORD** | | **University/Industry research collaboration** | |
| Year | latest data | | latest data | | latest data | | latest data | | 2001 | | 2002 | |
| Source | Forfás/OECD Science and Technology Indicators | | Forfás/OECD Science and Technology Indicators | | Forfás/OECD Science and Technology Indicators | | Forfás/OECD Science and Technology Indicators | | Eurostat/OECD | | WEF – Global Competitiveness Report | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **12** | **Rank** | **16** | **Rank** |
| **Denmark** | 6.8 | 7 | 1.42 | 7 | 0.74 | 6 | 2.19 | 8 | 0.68 | 10 | 4.6 | 8 |
| **Finland** | 15.8 | 1 | 2.42 | 2 | 0.96 | 1 | 3.40 | 2 | 1.00 | 1 | 5.9 | 1 |
| **France** | 7.1 | 6 | 1.37 | 8 | 0.80 | 4 | 2.20 | 7 | 0.99 | 2 | 3.8 | 14 |
| **Germany** | 6.7 | 8 | 1.75 | 6 | 0.75 | 5 | 2.50 | 6 | 0.82 | 5 | 5.1 | 5 |
| **Hungary** | 3.8 | 14 | 0.38 | 14 | 0.49 | 13 | 0.95 | 15 | | | 3.9 | 12 |
| **Ireland** | **5.1** | **12** | **0.80** | **11** | **0.34** | **16** | **1.17** | **11** | **0.33** | **12** | **5.2** | **4** |
| **Italy** | 2.9 | 16 | 0.56 | 12 | 0.54 | 12 | 1.07 | 12 | 0.69 | 7 | 3.4 | 16 |
| **Japan** | 10.2 | 3 | 2.28 | 3 | 0.74 | 6 | 3.09 | 3 | 0.64 | 11 | 4.1 | 10 |
| **Korea** | 6.4 | 9 | 2.25 | 4 | 0.68 | 9 | 2.96 | 4 | | | 4.3 | 9 |
| **Netherlands** | 5.2 | 11 | 1.08 | 10 | 0.83 | 3 | 1.94 | 9 | 0.79 | 6 | 4.8 | 7 |
| **New Zealand** | 7.6 | 5 | 0.31 | 15 | 0.72 | 8 | 1.03 | 13 | | | 4.1 | 10 |
| **Poland** | 3.8 | 14 | 0.24 | 16 | 0.43 | 15 | 0.67 | 16 | | | 3.5 | 15 |
| **Spain** | 5.0 | 13 | 0.50 | 13 | 0.45 | 14 | 0.96 | 14 | 0.69 | 7 | 3.9 | 12 |
| **Sweden** | 10.6 | 2 | 3.31 | 1 | 0.95 | 2 | 4.27 | 1 | 0.88 | 3 | 5.4 | 3 |
| **UK** | 5.5 | 10 | 1.28 | 9 | 0.59 | 11 | 1.90 | 10 | 0.69 | 7 | 4.9 | 6 |
| **US** | 8.6 | 4 | 2.06 | 5 | 0.63 | 10 | 2.82 | 5 | 0.85 | 4 | 5.6 | 2 |
| | | | | | | | | | | | | |
| **Ireland – GNP** | | | 0.95 | | 0,41 | | 1.38 | | | | | |
| **EU** | 5.8 | | 1.24 | | 0.65 | | 1.93 | | 0.77 | | | |
| **OECD** | 6.5 | | 1.62 | | 0.65 | | 2.33 | | | | | |

## Innovation and Creativity – Inventiveness and Creativity

| | 88 | | 89 | | 90 | | 91 | | 92 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Inventiveness coefficient – patent applications to EPO (per million population)** | | **Technology Achievement Index (TAI) value*** | | **Total new science and engineering PHDs per 1,000 population aged 25-34 years** | | **Interest in science and technology** | | **Nature of competitive advantage (1=low cost, natural resources, 7=unique products and processes)**** | |
| Year | 2001 (Provisional) | | 2001 | | 2000 | | 2003 | | 2002 | |
| Source | European Commission: Statistics in Focus 4/2003 | | Human Development Report 2001 | | European Commission: Science and Technology report 2003 | | IMD World Competitiveness Yearbook 2003 | | WEF – Global Competitiveness Report 2002-2003 | |
| **Country** | **14** | **Rank** | **15** | **Rank** | **12** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 211 | 5 | | | 0.49 | 7 | 5.08 | 5 | 5.8 | 4 |
| **Finland** | 338 | 2 | 0.744 | 1 | 1.09 | 2 | 7.08 | 1 | 5.8 | 4 |
| **France** | 145 | 8 | 0.535 | 11 | 0.76 | 4 | 5.98 | 3 | 5.4 | 8 |
| **Germany** | 310 | 3 | 0.583 | 8 | 0.81 | 3 | 4.82 | 7 | 6.2 | 1 |
| **Hungary** | 19 | 13 | 0.464 | 14 | | | 6.41 | 2 | 3.5 | 14 |
| **Ireland** | **86** | **10** | **0.566** | **9** | **0.50** | **6** | **4.82** | **8** | **4.3** | **13** |
| **Italy** | 75 | 11 | 0.471 | 13 | 0.16 | 12 | 4.67 | 9 | 5.3 | 10 |
| **Japan** | 175 | 6 | 0.698 | 4 | 0.24 | 11 | 4.25 | 14 | 6.1 | 2 |
| **Korea** | | | 0.666 | 5 | | | 4.53 | 11 | 4.5 | 11 |
| **Netherlands** | 243 | 4 | 0.630 | 6 | 0.34 | 10 | 3.00 | 16 | 5.4 | 8 |
| **New Zealand** | | | 0.548 | 10 | | | 4.87 | 6 | 3.4 | 15 |
| **Poland** | 3 | 14 | 0.407 | 15 | | | 4.62 | 10 | 3 | 16 |
| **Spain** | 24 | 12 | 0.481 | 12 | 0.36 | 9 | 4.46 | 13 | 4.5 | 11 |
| **Sweden** | 367 | 1 | 0.703 | 3 | 1.24 | 1 | 4.48 | 12 | 5.8 | 4 |
| **UK** | 133 | 9 | 0.606 | 7 | 0.68 | 5 | 3.43 | 15 | 5.8 | 4 |
| **US** | 170 | 7 | 0.733 | 2 | 0.48 | 8 | 5.12 | 4 | 6 | 3 |
| | | | | | | | | | | |
| **EU** | 161 | | | | 0.42 | | | | | |
| **OECD** | n/a | | | | n/a | | | | | |

** Note: Reflects four dimensions of technological capacity; (i) creation of technology; (ii) diffusion of recent innovations; (iii) diffusion of old innovations; (iv) human skills.*

*** Note: 1=competitive advantage is based on low cost or local natural resources; 7=competitive advantage is based on unique products or processes.*

## Innovation and Creativity – Patents, Commercialisation and New Products

| | 93 | | 94 | | 95 | | 96 | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Production process sophistication*** | | **New-to-market products (% of sales by manufacturing firms)** | | **Employment in high-tech industries as % of total employment** | | **USPTO patents granted per million population** | |
| Year | 2002 | | 1996 (unless stated) | | 2000 | | 2000 | |
| Source | WEF – Global Competitiveness Report 2002-2003 | | European Commission: Science and Technology report 2003 | | European Commission: Science and Technology report 2003 | | European Commission: Science and Technology report 2003 | |
| **Country** | **16** | **Rank** | **8** | **Rank** | **12** | **Rank** | **12** | **Rank** |
| **Denmark** | 5.8 | 6 | | | 6.4 | 8 | 94 | 6 |
| **Finland** | 6.2 | 1 | 7.3 | 5 | 7.2 | 4 | 130 | 5 |
| **France** | 5.6 | 9 | 7.9 | 4 | 7.2 | 4 | 71 | 9 |
| **Germany** | 6.1 | 4 | 7.1 | 6 | 11.2 | 1 | 134 | 4 |
| **Hungary** | 4.1 | 15 | | | | | | |
| **Ireland** | **5.3** | **10** | **8.4** | **3** | **6.9** | **7** | **43** | **10** |
| **Italy** | 5.2 | 11 | 13.5 | 1 | 7.6 | 3 | 32 | 11 |
| **Japan** | 6.2 | 1 | | | 6.3 | 9 | 250 | 2 |
| **Korea** | 5.0 | 12 | | | | | | |
| **Netherlands** | 6.0 | 5 | 6.9 | 7 | 4.4 | 12 | 94 | 6 |
| **New Zealand** | 4.8 | 13 | | | | | | |
| **Poland** | 3.7 | 16 | | | | | | |
| **Spain** | 4.8 | 13 | 9.8 | 2 | 5.4 | 10 | 8 | 12 |
| **Sweden** | 5.8 | 6 | | | 7.9 | 2 | 196 | 3 |
| **UK** | 5.8 | 6 | 6.7 | 8 | 7.1 | 6 | 72 | 8 |
| **US** | 6.2 | 1 | | | 5.3 | 11 | 315 | 1 |
| | | | | | | | | |
| **EU** | | | 6.5 | | 7.6 | | 74 | |
| **OECD** | | | | | | | n/a | |

** Note: 1=Production process is labour intensive or uses previous generations of process technology; 7=Production process uses world's best and most efficient processes.*

## Intermediates – Productivity

| | 97 | | 98 | | 99 | |
|---|---|---|---|---|---|---|
| **Indicator** | **Productivity per employee per annum (US$)** | | **Labour productivity per person employed per hour, $US** | | **Overall productivity growth – real terms** | |
| Year | 2002 (e) | | 2002 (e) | | 2002 (e) | |
| Source | IMD World Competitiveness Yearbook 2003/Forfás | | IMD World Competitiveness Yearbook 2003/Forfás | | IMD World Competitiveness Yearbook 2003/Forfás | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** |
| **Denmark** | 63,396 | 3 | 37.58 | 2 | 2.27 | 6 |
| **Finland** | 55,523 | 7 | 32.22 | 6 | 1.41 | 9 |
| **France** | 58,822 | 5 | 37.06 | 4 | 0.98 | 11 |
| **Germany** | 51,359 | 11 | 30.43 | 9 | 0.77 | 12 |
| **Hungary** | 16,515 | 15 | 8.31 | 15 | 3.33 | 3 |
| **Ireland** | **67,213** | **2** | **37.38** | **3** | **3.87** | **2** |
| **Italy** | 54,332 | 9 | 31.37 | 7 | -1.08 | 16 |
| **Japan** | 63,132 | 4 | 33.87 | 5 | 1.62 | 7 |
| **Korea** | 21,499 | 14 | 10.37 | 14 | 4.20 | 1 |
| **Netherlands** | 52,827 | 10 | 31.33 | 8 | -0.52 | 15 |
| **New Zealand** | 30,107 | 13 | 16.07 | 13 | 0.30 | 13 |
| **Poland** | 13,295 | 16 | 7.11 | 16 | 2.84 | 5 |
| **Spain** | 40,229 | 12 | 23.33 | 12 | 0.05 | 14 |
| **Sweden** | 56,143 | 6 | 30.18 | 10 | 1.55 | 8 |
| **UK** | 54,775 | 8 | 29.88 | 11 | 1.15 | 10 |
| **US** | 77,812 | 1 | 40.57 | 1 | 3.06 | 4 |
| | | | | | | |
| **Ireland (GNP)** | 54,280 | | 30.15 | | -1.3 | |
| **EU** | | | | | | |
| **OECD** | | | | | | |

## Intermediates – Business Costs

| | 100 | | 101 | | 102 | | 103 | | 104 | | 105 | | 106 | | 107 | | 108 | | 109 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **OECD Composite business basket cost of calls (national and international) US$ PPP** | | **OECD business (high user) mobile basket US$ PPP** | | **Cost of broadband (basic service 0.5 Mbit/s) Euro*** | | **Monthly rental charges for 34 Mbit/s national circuits (city to city 200km) (€ excluding VAT)**** | | **Automotive diesel oil prices per litre for commercial use** | | **Industrial electricity prices (€) – 10 GWh – with taxes and VAT** | | **Industrial gas prices (€) – 4,186 GJ per annum – with taxes and VAT** | | **Office rents: total occupation costs US$/sq m per year** | | **Insurance premiums (total business) per capita US$** | | **Land-fill costs including tax (€/tonne)***** | |
| Year | May 2003 | | May 2003 | | Q4 2002 | | Dec 2002 | | 2002 Q1 | | Jan 2003 | | Jan 2003 | | 2002 | | 2001 | | | |
| Source | Teligen | | Teligen | | Forfás Broadband Benchmarking Study 2003 | | European Commission DG Information Society: Telecoms Tariff Data | | International Energy Agency | | Eurostat | | Eurostat | | IMD World Competitiveness Yearbook 2003 | | Swiss Re | | Eunomia Research & Consulting: Costs for Municipal Waste Management in the EU | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **13** | **Rank** | **8** | **Rank** | **16** | **Rank** | **9** | **Rank** | **9** | **Rank** | **16** | **Rank** | **16** | **Rank** | **10** | **Rank** |
| **Denmark** | 991.8 | 2 | 680.34 | 2 | 63 | 3 | | | 0.648 | 14 | 11.62 | 9 | 10.54 | 8 | 335.0 | 3 | 2,094.2 | 10 | 94.0 | 9 |
| **Finland** | 1,329.1 | 7 | 751.04 | 4 | 76 | 6 | 15,274 | 4 | 0.585 | 9 | 7.32 | 4 | 10.42 | 7 | 336.0 | 4 | 2,097.9 | 11 | 56.5 | 4 |
| **France** | 1,447.4 | 10 | 937.28 | 8 | 68 | 4 | 8,930 | 2 | 0.575 | 8 | 6.49 | 3 | 7.72 | 4 | 882.0 | 14 | 1,898.8 | 9 | 67.0 | 5 |
| **Germany** | 1,589.2 | 12 | 1,423.81 | 13 | 334 | 13 | 9,385 | 3 | 0.617 | 11 | 8.21 | 6 | 9.60 | 5 | 451.0 | 8 | 1,484.2 | 7 | 19.5 | 1 |
| **Hungary** | 3,596.1 | 16 | 1,927.30 | 16 | | | | | 0.706 | 15 | | | | | 283.0 | 2 | 142.7 | 2 | | |
| **Ireland** | **1,259.2** | **5** | **1,100.74** | **10** | **175** | **12** | **34,108** | **8** | **0.550** | **7** | **8.34** | **7** | **6.43** | **2** | **648.0** | **13** | **2,465.7** | **13** | **77.5** | **8** |
| **Italy** | 1,691.3 | 13 | 1,230.61 | 11 | 112 | 9 | 25,781 | 5 | 0.634 | 13 | 11.28 | 8 | 9.98 | 6 | 505.0 | 11 | 1,186.4 | 6 | 72.5 | 7 |
| **Japan** | 1,303.5 | 6 | 759.36 | 5 | 48 | 2 | | | 0.528 | 6 | | | | | 1,134.0 | 16 | 3,507.5 | 16 | | |
| **Korea** | 1,587.8 | 11 | 720.75 | 3 | 31 | 1 | | | 0.479 | 3 | | | | | 555.0 | 12 | 1,060.1 | 5 | | |
| **Netherlands** | 1,183.0 | 3 | 835.55 | 6 | 86 | 7 | | | 0.606 | 10 | | | | | 417.0 | 7 | 2,324.0 | 12 | 135.5 | 10 |
| **New Zealand** | 1,735.7 | 14 | 1,681.85 | 14 | | | | | 0.232 | 1 | | | | | 143.0 | 1 | 731.0 | 3 | | |
| **Poland** | 3,449.9 | 15 | 1,869.43 | 15 | | | | | 0.514 | 5 | | | | | 413.0 | 6 | 140.0 | 1 | | |
| **Spain** | 1,368.5 | 8 | 1,419.02 | 12 | 117 | 10 | 30,221 | 7 | 0.513 | 4 | 6.06 | 2 | 5.87 | 1 | 476.0 | 9 | 923.9 | 4 | 30.0 | 2 |
| **Sweden** | 972.6 | 1 | 992.04 | 9 | 69 | 5 | 5,348 | 1 | 0.624 | 12 | 8.04 | 5 | 14.67 | 9 | 498.0 | 10 | 1,823.6 | 8 | 70.6 | 6 |
| **UK** | 1,410.5 | 9 | 898.79 | 7 | 149 | 11 | 26,965 | 6 | 0.932 | 16 | 5.77 | 1 | 6.48 | 3 | 908.0 | 15 | 3,393.8 | 15 | 44.0 | 3 |
| **US** | 1,251.2 | 4 | 565.19 | 1 | 89 | 8 | | | 0.335 | 2 | | | | | 403.0 | 5 | 3,266.0 | 14 | | |
| | | | | | | | | | | | | | | | | | | | | |
| **EU** | | | | | | | | | | | | | | | | | 1,762.9 | | | |
| **OECD** | | | | | | | | | | | | | | | | | 1,968.9 | | | |

** Note: Irish broadband prices estimated from eircom.*

*** Note: December 2001 figure used for Denmark.*

**** Note: Average values used where only a range was available.*

## Intermediates – Price and Wage Stability

| | 110 | | 111 | | 112 | | 113 | | 114 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Consumer prices (% chya)** | | **House Price Index % change 1995-2002 Economics Intelligence Unit** | | **Nominal compensation per employee (€000 per annum)** | | **Nominal compensation per employee 2003-4 (% chya)** | | **Unit labour costs in the total economy – relative EU performance (double export weighted)** | |
| Year | 2002 | | 2002 | | 2003 (estimate) | | 2003 (estimate) | | 2004 | |
| Source | OECD Main Economic Indicators | | Economist – EIU | | AMECO Database DG ECFin | | AMECO Database DG ECFin | | AMECO Database DG ECFin | |
| **Country** | **16** | **Rank** | **10** | **Rank** | **16** | **Rank** | **16** | **Rank** | **10** | **Rank** |
| **Denmark** | 2.42 | 9 | n/a | | 40.146 | 3 | 3.69 | 13 | 3.49 | 5 |
| **Finland** | 2.01 | 8 | n/a | | 34.303 | 9 | 3.00 | 5 | -4.59 | 3 |
| **France** | 1.94 | 6 | 45 | 4 | 39.404 | 4 | 2.62 | 4 | -5.30 | 2 |
| **Germany** | 1.34 | 3 | -5 | 2 | 33.403 | 10 | 2.30 | 2 | -11.57 | 1 |
| **Hungary** | 5.29 | 16 | n/a | | 11.411 | 15 | -0.71 | 1 | | |
| **Ireland** | **4.72** | **15** | **219** | **10** | **37.036** | **7** | **5.20** | **15** | **2.19** | **4** |
| **Italy** | 2.59 | 10 | 29 | 3 | 31.480 | 11 | 3.11 | 7 | 3.98 | 6 |
| **Japan** | -0.91 | 1 | -20 | 1 | 38.189 | 5 | 2.36 | 3 | | |
| **Korea** | 2.77 | 12 | n/a | | 17.533 | 14 | 6.41 | 16 | | |
| **Netherlands** | 3.93 | 14 | 121 | 8 | 41.759 | 2 | 3.00 | 5 | 10.44 | 9 |
| **New Zealand** | 2.68 | 11 | n/a | | 27.863 | 12 | 3.54 | 9 | | |
| **Poland** | 1.92 | 5 | n/a | | 8.755 | 16 | 3.67 | 12 | | |
| **Spain** | 3.59 | 13 | 95 | 7 | 27.227 | 13 | 3.63 | 11 | 7.79 | 8 |
| **Sweden** | 1.96 | 7 | 68 | 6 | 37.213 | 6 | 3.59 | 10 | 6.70 | 7 |
| **UK** | 1.27 | 2 | 125 | 9 | 34.595 | 8 | 3.88 | 14 | 12.09 | 10 |
| **US** | 1.55 | 4 | 51 | 5 | 46.836 | 1 | 3.39 | 8 | | |
| | | | | | | | | | | |
| **EU** | 2.12 | | | | 34.081 | | 3.00 | | | |
| **OECD** | 2.51 | | | | n/a | | n/a | | | |

## Outputs – Macroeconomic Performance

| | 115 | | 116 | | 117 | | 118 | | 119 | | 120 | | 121 | | 122 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **GDP per capita (current prices PPP 000 US$)** | | **Real GDP growth % PPP** | | **Real GDP growth (5 years)** | | **Real exports of goods and services (% chya)** | | **ILO unemployment rate** | | **General Government balance (% GDP)** | | **General Government debt (% GDP)** | | **Average return on US investment abroad** | |
| Year | 2002 | | 2002 | | 1998-2003 | | 2002 | | 2002 | | 2002 | | 2002 | | 1998-2001 | |
| Source | IMD World Competitiveness Yearbook 2003 | | OECD Economic Outlook/CSO | | AMECO Database DG ECFin | | OECD Economic Outlook/CSO | | OECD Economic Outlook | | OECD Economic Outlook/ Dept of Finance | | OECD Economic Outlook | | US Bureau of Economic Analysis | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **15** | **Rank** |
| **Denmark** | 29,458 | 3 | 1.6 | 10 | 10.3 | 12 | 3.4 | 8 | 4.5 | 4 | 1.8 | 3 | 45.2 | 7 | 11.94 | 6 |
| **Finland** | 24,743 | 8 | 1.6 | 9 | 14.1 | 6 | 5.6 | 7 | 9.1 | 14 | 4.7 | 2 | 42.7 | 5 | 17.32 | 3 |
| **France** | 24,191 | 10 | 1.2 | 12 | 11.5 | 11 | 1.5 | 10 | 8.7 | 12 | -3.2 | 11 | 59.5 | 12 | 4.98 | 15 |
| **Germany** | 25,385 | 5 | 0.2 | 16 | 6.2 | 15 | 2.6 | 9 | 8.2 | 11 | -3.6 | 13 | 60.8 | 14 | 8.78 | 12 |
| **Hungary** | 12,792 | 15 | 3.3 | 4 | 21.7 | 3 | 5.9 | 5 | 5.6 | 9 | -8.4 | 16 | 57.0 | 11 | 23.66 | 1 |
| **Ireland** | **33,716** | **2** | **6.9** | **1** | **41.5** | **1** | **6.2** | **4** | **4.4** | **3** | **-0.1** | **5** | **33.5** | **3** | **18.53** | **2** |
| **Italy** | 24,747 | 7 | 0.4 | 13 | 8.2 | 14 | -1.0 | 13 | 9.0 | 13 | -2.5 | 10 | 106.7 | 15 | 11.96 | 5 |
| **Japan** | 25,138 | 6 | 0.3 | 15 | 5.2 | 16 | 8.1 | 2 | 5.4 | 8 | -7.1 | 15 | 146.4 | 16 | 9.43 | 9 |
| **Korea** | 15,869 | 14 | 6.3 | 2 | 40.2 | 2 | 14.9 | 1 | 3.2 | 2 | 6.0 | 1 | 12.5 | 1 | 12.16 | 4 |
| **Netherlands** | 27,123 | 4 | 0.3 | 14 | 9.6 | 13 | -1.4 | 15 | 2.8 | 1 | -1.1 | 8 | 52.5 | 9 | 11.61 | 7 |
| **New Zealand** | 19,642 | 13 | 4.6 | 3 | 18.5 | 4 | 7.6 | 3 | 5.2 | 7 | 1.3 | 4 | 28.7 | 2 | 6.03 | 14 |
| **Poland** | 9,548 | 16 | 1.3 | 11 | 13.6 | 9 | 5.7 | 6 | 19.9 | 16 | -5.7 | 14 | 43.8 | 6 | 9.10 | 10 |
| **Spain** | 21,035 | 12 | 2.0 | 6 | 15.9 | 5 | 1.4 | 11 | 11.3 | 15 | -0.1 | 6 | 54.0 | 10 | 8.99 | 11 |
| **Sweden** | 24,703 | 9 | 1.9 | 7 | 13.9 | 7 | 0.4 | 12 | 4.9 | 5 | 1.1 | 5 | 52.4 | 8 | 9.68 | 8 |
| **UK** | 24,027 | 11 | 1.8 | 8 | 12.1 | 10 | -1.0 | 14 | 5.1 | 6 | -1.3 | 9 | 38.4 | 4 | 6.99 | 13 |
| **US** | 35,055 | 1 | 2.4 | 5 | 13.7 | 8 | -1.6 | 16 | 5.8 | 9 | -3.4 | 12 | 60.3 | 12 | | |
| | | | | | | | | | | | | | | | | |
| **Ireland (GNP)** | 26,972 | | 0.1 | | 30.5 | | | | | | -0.1 | | | | | |
| **EU** | | | 1.0 | | 10.5 | | 0.8 | | 7.6 | | -2.0 | | | | 9.79 | |
| **OECD** | | | 1.8 | | | | 1.6 | | 6.9 | | -2.9 | | | | | |

## Outputs – Sustainability, Social Capital, Long Term Vision 2015

| | 123 | | 124 | | 125 | | 126 | | 127 | | 128 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Sustainable Development*** | | **Quality of Life** | | **Life expectancy at birth (years)** | | **Income inequality (gini co-efficient)** | | **House Price Affordability (ratio of average urban prices to average personal disposable income per head)** | | **Measure of aging population: Population over the age of 65 as a % of total in 2015** | |
| Year | 2002 | | 2002 | | 2001 | | latest year | | 1999 | | 2001 | |
| Source | IMD World Competitiveness Yearbook 2003 | | IMD World Competitiveness Yearbook 2003 | | World Health Report 2002 | | Luxembourg Income Study | | DKB | | Human Development Report 2003 | |
| **Country** | **16** | **Rank** | **16** | **Rank** | **16** | **Rank** | **13** | **Rank** | **11** | **Rank** | **16** | **Rank** |
| **Denmark** | 7.97 | 2 | 8.73 | 3 | 77.2 | 11 | 25.7 | 5 | 11.5 | 2 | 19.2 | 10 |
| **Finland** | 8.41 | 1 | 8.85 | 2 | 77.9 | 9 | 24.7 | 1 | | | 20.3 | 12 |
| **France** | 6.38 | 10 | 8.12 | 8 | 79.3 | 3 | 28.8 | 6 | 12.0 | 3 | 18.5 | 9 |
| **Germany** | 7.33 | 3 | 8.55 | 4 | 78.2 | 8 | 25.2 | 2 | 19.0 | 10 | 20.8 | 13 |
| **Hungary** | 5.59 | 14 | 5.00 | 15 | 71.7 | 16 | 29.5 | 8 | | | 17.4 | 6 |
| **Ireland** | **7.06** | **6** | **7.52** | **9** | **76.5** | **12** | **32.5** | **10** | **18.2** | **9** | **13.4** | **2** |
| **Italy** | 5.48 | 15 | 7.03 | 12 | 79.3 | 3 | 33.2 | 11 | 14.5 | 6 | 22.3 | 15 |
| **Japan** | 7.08 | 6 | 6.40 | 13 | 81.4 | 1 | | | 26.1 | 11 | 26.0 | 16 |
| **Korea** | 6.53 | 9 | 5.10 | 14 | 74.9 | 15 | | | | | 11.9 | 1 |
| **Netherlands** | 7.26 | 4 | 8.45 | 5 | 78.3 | 7 | 25.3 | 4 | 16.5 | 8 | 17.4 | 6 |
| **New Zealand** | 7.26 | 5 | 8.87 | 1 | 78.5 | 6 | | | | | 14.6 | 4 |
| **Poland** | 4.76 | 16 | 2.96 | 16 | 76.5 | 13 | 29.3 | 7 | | | 14.8 | 5 |
| **Spain** | 5.86 | 11 | 8.32 | 6 | 78.9 | 5 | 30.3 | 9 | 15.0 | 7 | 19.2 | 10 |
| **Sweden** | 7.03 | 8 | 8.10 | 9 | 80.0 | 2 | 25.2 | 2 | 13.0 | 4 | 21.4 | 14 |
| **UK** | 5.71 | 13 | 7.07 | 11 | 77.5 | 10 | 34.5 | 12 | 13.2 | 5 | 17.8 | 8 |
| **US** | 5.82 | 12 | 8.18 | 7 | 77.0 | 12 | 36.8 | 13 | 8.3 | 1 | 14.2 | 3 |
| | | | | | | | | | | | | |
| **EU** | | | | | | | | | | | | |
| **OECD** | | | | | | | | | | | | |

** Note: Sustainable development is/is not a priority in your economy.*

# Annex 2 Key Indicators

| Key Indicators | |
|---|---|
| **Business and Work Environment** | |
| **1** | Intensity of local competition |
| **2** | Burden of regulation |
| **3** | Employment growth |
| **4** | Labour market regulations |
| **5** | Standard rate of corporation tax |
| **6** | Total tax revenue (% GDP) – % GNP |
| **7** | Private business investment (% GDP) – % GNP |
| **8** | FDI inflow stock (% GDP) |
| **9** | Trade openness (exports plus imports/GDP) |
| **Economic and Technological Environment** | |
| **10** | Overall infrastructure quality |
| **11** | Efficiency of distribution infrastructure |
| **12** | Total ICT expenditure (% GDP) |
| **13** | Broadband take-up |
| **14** | % companies with broadband |
| **15** | Energy technology indicator |
| **16** | % of home-owners in population |
| **17** | Waste paper and cardboard recycling |
| **Education and Skills** | |
| **18** | Public and private expenditure on educational institutions (% of GDP/GNP) |
| **19** | Change in total tertiary enrolment (1995=100) |
| **20** | Mean performance on the PISA reading literacy scale (age 15) |
| **21** | Science and engineering graduates per 1,000 population aged 20-34 |
| **22** | % of 25-64 year olds participating in continuing education and training |
| **23** | Extent of staff training |
| **Entrepreneurship and Enterprise Development** | |
| **24** | Total Entrepreneurial Activity |
| **25** | Cost as a percentage of GDP per capita to register a business |
| **26** | Administrative burden for start-ups |
| **27** | Value chain presence |
| **28** | State of cluster development |
| **29** | Extent of collaboration among clusters |
| **Innovation and Creativity** | |
| **30** | Total researchers (per 1,000 total employment) |
| **31** | Business Expenditure on R&D |
| **32** | Patent applications to the EPO |
| **33** | Total new science and Engineering PhDs (per 1,000) |
| **34** | Production process sophistication |
| **35** | USPTO patents granted (per million population) |

An additional 12 key output competitiveness indicators have also been chosen for closer analysis in the report.

| Key Indicators | |
|---|---|
| **Intermediates** | |
| **36** | Productivity per employee per annum (US$000) |
| **37** | Composite business basket cost of calls (national and international) |
| **38** | Automotive diesel oil prices for commercial use (US$/lt) |
| **39** | Industrial electricity prices – 10 GWh |
| **40** | Insurance costs – International Insurance Organisation |
| **41** | Consumer prices (% chya) – 2003 |
| **42** | Nominal compensation per employee (€000 per annum) |
| **Results** | |
| **43** | GDP/GNP per capita (current prices PPP US$) |
| **44** | Real exports of goods and services (% chya) |
| **45** | ILO unemployment rate |
| **46** | Quality of life |
| **47** | Income inequality – Gini Co-efficient |

# Annex 3 NCC Publications

| | |
|---|---|
| Annual Competitiveness Report, 1998 | March 1998 |
| The Competitiveness Challenge Summary Statement | March 1998 |
| Statement on Telecommunications: A Key Factor in Electronic Commerce and Competitiveness | November 1998 |
| Statement on Skills | December 1998 |
| Annual Competitiveness Report, 1999 | May 1999 |
| Report on Costs | June 1999 |
| Statement on Social Partnership | September 1999 |
| Proposals on Transport Infrastructure, the Planning Process and Public Transport | March 2000 |
| The Competitiveness Challenge | May 2000 |
| Annual Competitiveness Report, 2000 | May 2000 |
| Statement on Telecommunications, e-Business and the Information Society | July 2000 |
| Statement on Regulatory Reform | July 2000 |
| Statement on Labour Supply and Skills | September 2000 |
| The Competitiveness Challenge, 2001 | December 2001 |
| Annual Competitiveness Report, 2001 | December 2001 |
| The Competitiveness Challenge, 2002 | November 2002 |
| Annual Competitiveness Report, 2002 | November 2002 |
| Inflation Statement | May 2003 |