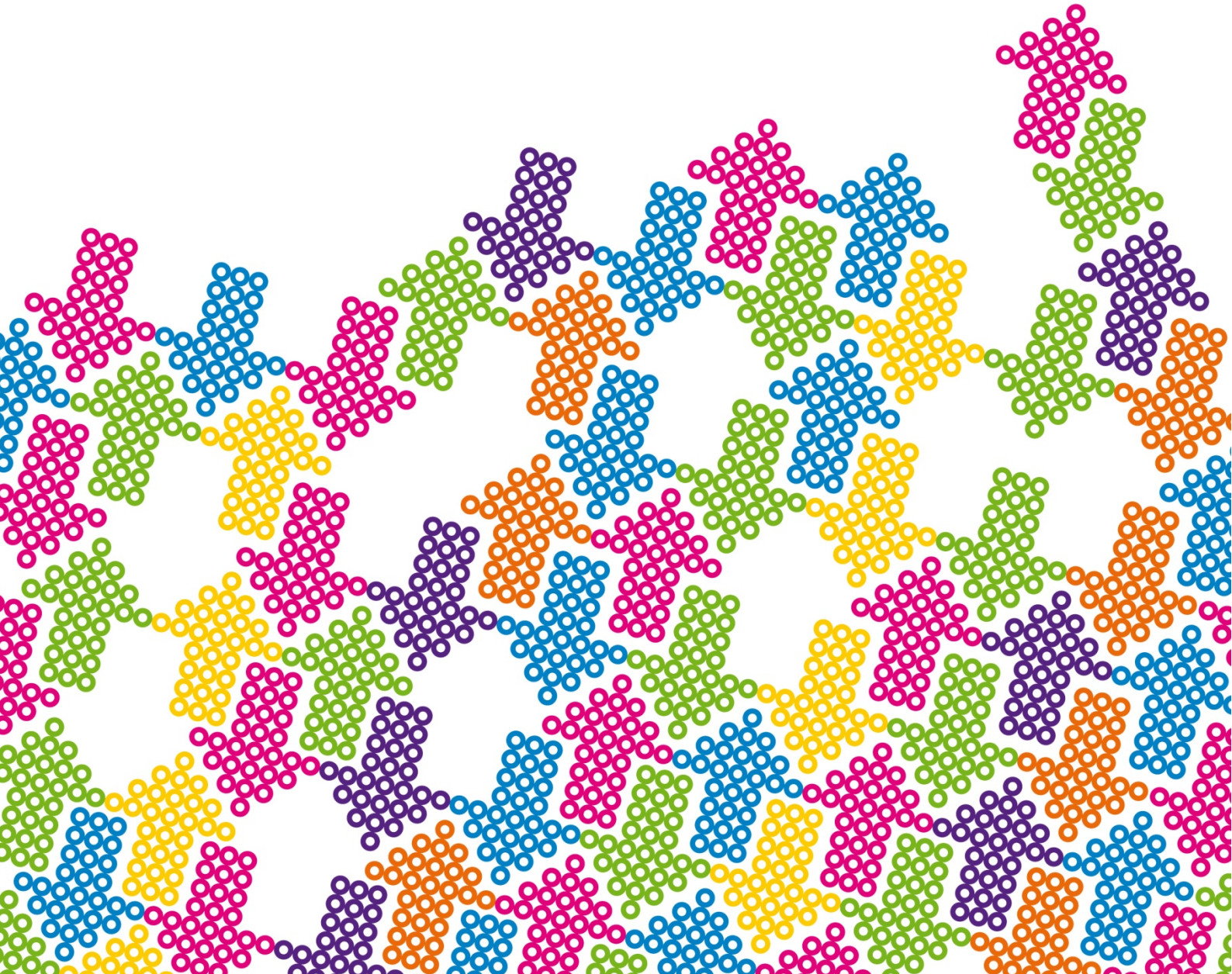
National Competitiveness Council

Benchmarking Ireland's Productivity Performance 2004-2014



Introduction to the National Competitiveness Council

The National Competitiveness Council reports to the Taoiseach and the Government, through the Minister for Jobs, Enterprise and Innovation on key competitiveness issues facing the Irish economy and offers recommendations on policy actions required to enhance Ireland's competitive position.

Each year the NCC publishes two annual reports:

- Ireland's Competitiveness Scorecard provides a comprehensive statistical assessment of Ireland's competitiveness performance; and
- Ireland's Competitiveness Challenge uses this information along with the latest research to outline the main challenges to Ireland's competitiveness and the policy responses required to meet them.

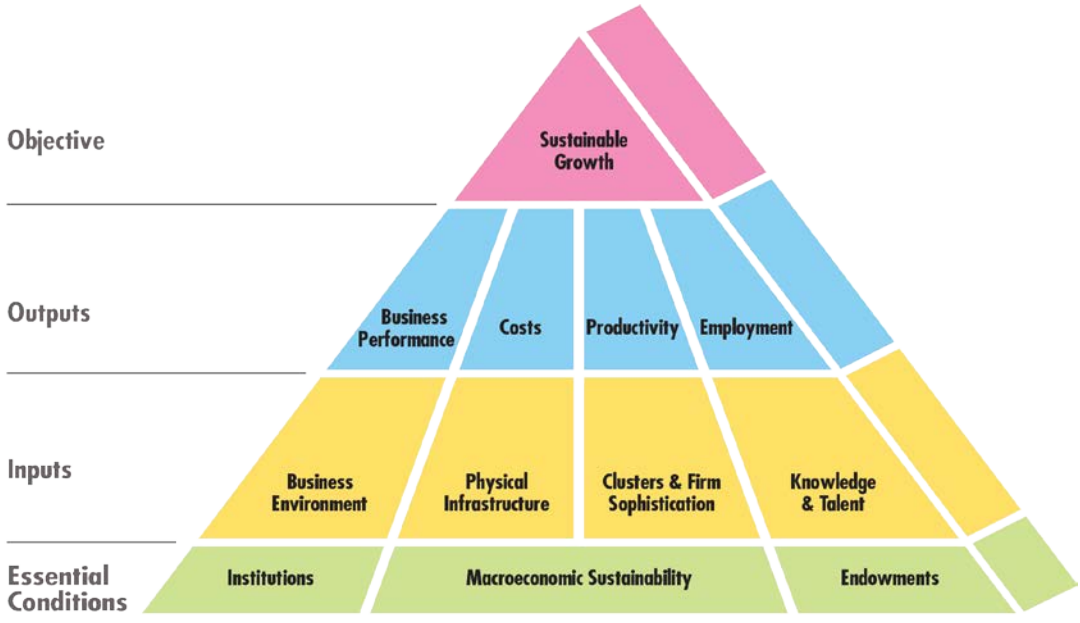
As part of its work, the NCC also:

- Publishes the Costs of Doing Business where key business costs in Ireland are benchmarked against costs in competitor countries; and
- Provides an annual Submission to the Action Plan for Jobs, quarterly bulletins on competitiveness and other papers on specific competitiveness issues.

The work of the National Competitiveness Council is underpinned by research and analysis undertaken by the Strategic Policy Division of the Department of Jobs, Enterprise and Innovation.

The NCC's Competitiveness Framework

The Council defines national competitiveness as the ability of enterprises to compete successfully in international markets. National competitiveness is a broad concept that encompasses the diverse range of factors which result in firms in Ireland achieving success in international markets. For the Council, the goal of national competitiveness is to provide Ireland's people with the opportunity to improve their living standards and quality of life. The Council uses a "competitiveness pyramid" to illustrate the various factors (essential conditions, policy inputs and outputs), which combine to determine overall competitiveness and sustainable growth. Under this framework, competitiveness is not an end in itself, but a means of achieving sustainable improvements in living standards and quality of life.



National Competitiveness Council Members

Professor Peter Clinch	Chair, National Competitiveness Council
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Kevin Callinan	Deputy General Secretary, IMPACT Trade Union
Micheál Collins	Associate Professor, School of Social Policy, Social Work and Social Justice, UCD
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Declan Hughes	Assistant Secretary, Department of Jobs, Enterprise and Innovation
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Chairman's Preface

Productivity is a multi-dimensional concept; it reflects our ability to produce more output by better combining inputs, thanks to new ideas, technological innovations and new business models. Measures of productivity growth constitute core indicators for the analysis of economic growth. Productivity growth is the primary way of financing improved living standards, wages and public services.

As set out in our framework for competitiveness analysis, the National Competitiveness Council considers productivity a crucial component and driver of Ireland's international competitiveness performance. In 2012 the Council published reports on Irish productivity for the period 1980-2011. Four years on, is important to revisit this work and benchmark Ireland's performance given the changes that have occurred in the Irish and global economy and the growing importance of productivity as a source of economic growth and competitiveness.

Global trends suggest that the rate of productivity growth has slowed both in terms of labour productivity and total factor productivity. Closer to home, average euro area and UK productivity growth rates are significantly lower than levels in the United States. Overall, Ireland's productivity performance is relatively strong and above the Euro area average and levels seen in the UK. However, Ireland's performance is highly influenced by shifts in the composition of employment and the influence of the FDI sector on output. Increasing productivity across all sectors remains a significant challenge in ensuring growth is sustainable in the long run. Ireland can take advantage of a sizeable competitiveness opportunity if we can avoid the 'productivity trap' being experienced by many developed economies.

Just as productivity performance differs between countries, so too it differs between sectors and firms. At sectoral level, growth in the value of output is driven primarily by 'modern' Manufacturing and services traded internationally. In Ireland, the performance of modern Manufacturing, ICT and Professional Services is particularly strong, while the contribution from sectors such as Retail and accommodation and food remains low. Equally, divergent firm-level productivity performance directly impacts upon aggregate national performance. OECD research indicates that firms can be classified into three cohorts based on their productivity performance: the globally most productive firms (i.e. global frontier firms); the most advanced firms nationally; and laggard firms. Despite the generally positive trends in Irish productivity performance, the trajectory of Ireland's growth path is linked to the performance of Ireland's high-productivity sectors such as ICT and manufacturing where value added is dominated by multinational firms. The narrow base of sectors driving overall productivity performance leaves Ireland vulnerable to external shocks but also serves to highlight the scope for reform. As noted by the OECD, over the next decade, productivity will increasingly be about "working smarter", rather than "working harder". The challenges in improving the quantity and quality of human and productive capital, and enhancing total factor productivity are complex and significant, but key to achieving long-run economic growth and rising prosperity. The Government's enterprise strategy Enterprise 2025 (EP2025) sets out a target for Ireland to achieve 2-2.5 per cent growth in productivity per annum over the next ten years. The Council welcomes this commitment but considers a range of actions will need to be undertaken to safeguard and enhance the drivers of Ireland's productivity performance. The challenge will be to ensure that productivity growth is driven by a broad range of sectors.

I would like to conclude by thanking the Council members and advisers for their input throughout the development of this report. I would particularly like to acknowledge the enthusiasm, commitment and expertise of the secretariat for taking on this exceptionally important area of work.

Professor Peter Clinch

Chairman, National Competitiveness Council

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Executive Summary

Since its inception in 1997, the National Competitiveness Council has considered productivity a subject of continuous importance. In 2006 and 2012 the Council published reports on Ireland's productivity performance spanning the period 1980-2011. This report is a benchmarking review of measured productivity performance over the period 2004-2014. The research draws extensively on productivity data by the Organisation for Economic Co-operation and Development (OECD), and examines both the overall performance relative to other countries (primarily the UK, Denmark, the Euro area and US) and the performance of individual sectors within Ireland. The report also considers Ireland's medium term productivity potential with regard to specific areas of policy focus which have the potential to broaden and deepen Irish productivity growth in the medium term.

Key Findings

- Over the decade 2004-2014, productivity growth has slowed in most OECD member states. The decline in labour productivity growth was underway prior to the crisis, in both manufacturing and business sector services and growth remains subdued.
- Ireland is a small open economy and has seen considerable shifts in the composition of economic activity over the period 2004-2014. Ireland's labour productivity performance as measured by the OECD is strong in an international context. Starting from a low base, Irish productivity levels now exceed those of many of our peers and key competitors. Ireland's labour productivity levels have increased but are weakening.
- Despite the severity of the economic crisis on output and employment levels, Ireland has continued to demonstrate strong levels of output and labour productivity (GDP per hour worked). OECD data indicates that in terms of output levels (i.e. GDP per hour worked), Irish labour productivity levels improved considerably in the past five years with average annual growth of 2.7 per cent. Using OECD data, Ireland's output per hour was $62.02 in 2014, an increase of 21.9 per cent compared with 2004. This represents the fifth highest labour productivity level among OECD member states, after Luxembourg, Norway, the US and Belgium.
- Labour productivity growth in Ireland is exceptionally strong. At 3.1 per cent, the growth rate of Irish (GDP) productivity per hour worked in 2014 exceeded the OECD average (1.5%). In the last decade, Ireland's gross value added output per hour increased by 20 per cent compared to growth of 10 per cent and 5 per cent in the Euro area and UK respectively. US levels increased by 13 per cent. However, when measured using GNP per hour worked, Ireland's relative position declines significantly.
- Ireland's productivity performance is heavily influenced by the performance of the Manufacturing and ICT sectors and the FDI sector. Ireland's output is more concentrated in Manufacturing and ICT than either the EU or the US. Within Manufacturing, output is dominated by chemicals, electronics and ICT where productivity measures are difficult to interpret due to the activities of multinational corporations. Ireland's financial sector is important but appears to be underperforming, relative to productivity performance before the crisis. Again methodological issues make it difficult to assess its productivity performance.
- At sector level, labour productivity growth between 2004 and 2014 was driven primarily by strong productivity growth in Manufacturing, ICT and Professional Services. The broad Food and Agriculture, Forestry and Fishing sector and the traditional Wholesale, Retail, Accommodation and Food services sector have not experienced similar productivity growth. The fall in employment (and thus hours worked) in these labour intensive sector affected the aggregate productivity figures, particularly over the 2008-2010 period when significant hours worked in construction were shed. Over the period 2004-2014 Irish workers worked more hours than the countries considered in this report and more than the OECD and Euro are averages.

- There is significant divergence at sectoral level in terms of output per hour. The contribution of an individual sector to overall productivity growth is dependent on its productivity growth rate, and its share of total value added and hours worked. In 2014, output per hour worked in Ireland was highest in the ICT (€133) and manufacturing (€81) sectors, and lowest in construction (€12) and agriculture (€9).
- Manufacturing accounts for approximately a third of productivity growth in Ireland. The relative contribution of ICT is also strong and the financial services and Professional Services sectors also made positive contributions to business sector productivity growth in Ireland. Taking the period as a whole, the significant negative contribution (-0.7 percentage points) of the Wholesale, Retail, Transport, Accommodation and Food sector to Irish productivity growth is notable and in contrast to the trend in the other selected countries, particularly in the UK.
- Comparing the performance of sectors across Ireland, higher value-added sectors outperform smaller sectors in per-hour productivity, even bearing in mind the caveats about the use of value-added statistics in certain sectors.
- Assessing productivity in terms of value added per person employed, firm size appears to matter. In most countries there is a significant productivity gap between micro, small and medium-sized firms compared to large firms. In Ireland, labour productivity amongst micro firms in the manufacturing sector was 60 per cent less than that of larger firms; the gap between medium and small firms compared to large firms was 84 per cent and 66 per cent respectively. The gap is also pronounced in the Irish services sector.
- Labour productivity metrics only partially reflect the actual productivity of labour. Reflecting the slowdown in investment and capital services growth since 2004, capital productivity growth has been negative or minimal in Ireland and in all of the countries considered in this report. As a percentage of total economy gross fixed capital formation, the share of investment in intellectual property products has increased from 13 per cent in 2004 to 26.8 per cent in 2014.
- Multifactor productivity (MFP) reflects the overall efficiency with which labour and capital inputs are used together in the production process. Prior to the crisis, MFP growth in most OECD countries contributed strongly to productivity growth. Post crisis, MFP growth decelerated.
- The most important policy considerations for increasing productivity identified by institutions such as the OECD, IMF and European Commission, include sound macroeconomic fundamentals, a regulatory environment favourable to enterprise and start-ups, trade, access to finance, education and training and knowledge and physical infrastructure.
- Increased measurement challenges in calculating GDP and the complexity of value added complicate the process of calculating accurate productivity estimates. Such estimates require precise evaluation of output, capital, and labour metrics. The development of national data to track productivity at sectoral level in Ireland would be welcome. In addition, productivity in the public sector is as important to economic performance as the productivity of the private sector. While benchmarking the sector is a complex task, the absence of data hinders analysis of productivity performance across the total economy.
- While it is difficult to directly impact national productivity performance through one simple reform path, policy must focus attention on various levers at national level which can, over time, enhance the capability of firms and individuals to effect change and boost productivity. In this regard, the prominence accorded to productivity performance in Enterprise 2025 (EP2025) is welcome. A range of actions aimed at improving collaboration amongst firms and sectors, increasing internationalisation, fostering start-ups, and stimulating innovation are required. Delivering uplift in management skills and quality at all levels is also particularly vital and improvements in management are associated with positive productivity gains.

Chapter 1: Why Productivity Matters

1.1 Introduction

National competitiveness is a broad concept that encompasses the diverse range of factors that support the ability of firms in Ireland to achieve success in international markets, in a way that provides Ireland's people with the opportunity to improve their living standards and quality of life. Put succinctly, sustainable improvements in quality of life are dependent on competitiveness as this sustains economic growth. As a small open economy, growth is highly dependent on the performance of firms in international markets. In addition, the capacity of firms trading domestically to compete with imports is important. Both are a function of the competitiveness of the business environment and the range of inputs to the production process.

National competitiveness and the productivity performance of an economy are closely related, particularly for small open economies. Productivity is both an indicator and a driver of competitiveness. It is an indicator of competitiveness, because in market economies (particularly small open economies such as Ireland), regardless of the method of measurement, goods and services will only be produced – and hence labour will only be productive – when there is demand for the goods and services. Productivity is a driver of national competitiveness, as it enables firms based in Ireland to compete successfully in international markets by facilitating output to be produced in a more efficient and effective manner. Productivity is about getting more from available resources of capital and labour, and is therefore the source of long run economic growth. Improving the levels of labour and capital productivity enables enterprises to improve their efficiency and profitability. At the macro level, high levels of productivity facilitate higher wages while at the same time ensuring competitiveness.

Ultimately, productivity growth depends on the performance of individual firms which is largely beyond the direct control of policy makers. However, many of the resources that enterprises draw on to maximise productive capability come from the surrounding competitiveness environment, including for example, a sound macroeconomic environment, the education attainment and skills base of the labour force, transport and communications networks, science and technology, capital investment, competition and regulation policies and access to finance. In the long-run, productivity is the primary determinant of improvements in national living standards relative to other countries and of its economic growth.

Historically, two key dynamics drove economic growth across OECD economies; an expanding labour force and rising productivity. Growth in the labour force was fuelled by population growth and increasing labour force participation. In the longer term, while people are living longer than ever before, they are having fewer children. This means the proportion of working-age people will decline. Faster productivity gains are necessary to compensate for the waning of demographic tailwinds. After a long period during which Europe was narrowing the productivity gap with the US, since 1995 that gap has widened steadily and shows no signs of narrowing. Europe's average economic growth rate, both pre and post crisis, has been lower than the US. Much of this has been attributed to differences in business structures, lower levels of R&D and investment in intangible assets, market barriers, and insufficient use of ICT[1]. Cumulatively, these factors make the European operating environment for enterprise relatively less competitive and hamper productivity growth. As noted by the Conference Board, "the widespread weakness in productivity growth among major European countries points to an inability to translate technology and innovation to productivity growth, weak demand and low investment as well as an increased negative impact of structural rigidities in labour, capital, and product markets"[2].

[1] European Commission, Mind the Gap to Closing the Gap Avenues to Reverse Stagnation in Europe through Investment and Productivity Growth, 2015
[2] Conference Board, Productivity Brief, 2015

Productivity is a measure of output produced per unit of input, and improvements in this regard are generally regarded as the ultimate engine of long run economic growth. While increases in the level of the capital stock (e.g., through higher investment) or in the supply of labour can expand the output capacity of an economy in the short run, for mature or close-to-frontier economies such as Ireland, the potential contribution to growth from these sources is declining. Contributions from additional capital investment are affected by diminishing returns and technical change, and labour supply is running up against demographic constraints and potential skills mismatches. The challenges in improving the quantity and quality of human and productive capital, and enhancing total factor productivity (through technological change, innovation and the application of competition policy) are complex and significant but key to achieving sustainable competitiveness resulting in economic growth, jobs and improved living standards.

1.2 Recent Policy Developments

For the past decade, productivity growth has been subdued in most OECD countries. The global slowdown in productivity growth has been attributed to a mix of cyclical factors such as low investment in physical capital, in a context of weak global demand and structural factors such as inefficient markets, low levels of innovative start-ups and skills mismatches. Recent research by the OECD[3] also suggests a possible link between declining productivity and rising income inequality as growing productivity dispersion across firms contributed to widening of the wage distribution. Ultimately improving levels of labour and capital productivity enable enterprises to increase their efficiency and profitability, and enhance the ability of countries to maintain international competitive advantage and sustainably improve living standards.

From a policy perspective, there is increased emphasis nationally and internationally on the role of and drivers of productivity as a means of facilitating economic growth. At **national level,** in 2015, the Government published Enterprise 2025, a strategy which sets out a range of cross sectoral initiatives designed to support the enterprise sector. Enterprise 2025 aims to enhance our relative competitiveness, leverage existing comparative advantage in key sectors, address structural issues in the economy, enhance the capacity of enterprises to innovate and improve productivity. In this regard, a key target of the strategy is to deliver 2-2.5 per cent productivity growth per annum in Irish companies. In addition, Foodwise 2025, the Government's strategic plan for the development of agri-food sector over the next decade sets out how the profitability and viability will be driven by productivity improvements, particularly the adoption and application of innovative processes and technologies.

At **European level,** while the EU is far from a homogeneous entity in terms of productivity, performance, Europe's average economic growth rate has been lower than the US partly due to a productivity gap. The prolonged slowdown in global productivity has been subject of considerable debate across advanced economies in recent years. Much of this is attributed by the European Commission to differences in business structures, lower levels of R&D investment, single market barriers, and insufficient use of information and communications technologies. In addition, higher costs (particularly energy), infrastructure pressures, and fewer available sources of finance make the European operating environment for enterprise relatively less competitive. Arising out of the 2015 report "Completing Europe's Economic and Monetary Union"- (the Five President's Report), the European Commission has published a Council Recommendation on Euro-area National Productivity Boards to systematically track developments and inform the national debate in the field of productivity and competitiveness.

[3] The Productivity-Inclusiveness Nexus, OECD, 2016

The **OECD** has had a longstanding focus on productivity: the OECD's 2015 Economic Survey of Ireland recommended that Ireland develop a stronger whole-of-government productivity agenda. In addition, in 2015, building on its extensive datasets and research in the area of productivity, the OECD launched a Global Forum on Productivity[4] (GFP) to foster international co-operation between public bodies with responsibility for promoting productivity-enhancing policies.

Recognising the importance that productivity plays as the key driver of longer term competitiveness and prosperity is essential. In this regard, the prominence accorded to productivity performance in Enterprise 2025 (EP2025) is to be welcomed. While the policy mix that best supports robust and broader based productivity growth varies between countries the Council welcomes the renewed policy focus on productivity at international level.

1.3 Competitiveness and the Determinants of Productivity Growth

Research and analysis of the underlying components of economic performance indicates a wide range of factors are particularly critical for determining the rate of productivity growth at national and firm level. Many of these factors reflect the competitiveness policy inputs and essential conditions set out in the NCC's competitiveness framework.

Macroeconomic stability and fiscal policy

A stable macroeconomic environment is conducive to investment by firms seeking to introduce new products, to adopt new production methods, or to undertake organisational changes that can lead to higher productivity growth and more efficient use of resources. Regarding fiscal policy, personal and corporate tax policy are particularly important to Ireland as a small open economy. Tax is an important consideration in investment decisions by firms, both in terms of corporate tax and the rate of return firms can expect in Ireland vis-à-vis other environments and the incentives for individuals to work. The structure of tax policy is important in that the tax burden has an impact on productivity. OECD research[5] suggests that the tax burden on individuals, particularly highly skilled individuals has a much stronger impact on productivity growth than the tax burden on firms. A particularly negative effect is found for tax structures with a heavy weight on distortionary taxes (including direct taxes on income and profits), which affect the choices of households and firms with respect to the level and composition of their (human and physical) capital investment and discourage entrepreneurship.

Institutional effectiveness, competition and regulation

The institutional environment is determined by the legal and administrative framework within which individuals, firms, and governments interact to generate wealth. The quality of institutions, regulation and competition has a strong bearing on the factors which enhance productivity growth. It influences investment decisions and the organisation of production and plays a key role in the ways in which societies distribute the benefits and bear the costs of development strategies and policies. Removing rigidities in product market regulation can support productivity growth, particularly in heavily regulated sectors.[6] Competition and competitive markets support productivity in three main ways. First, within firms, competition acts as a

[4] http://www.oecd.org/global-forum-productivity/

[5] OECD, The Sources of Economic Growth in OECD Countries 2003, Central Bank, Productivity in Ireland: Trends and Issues, Quarterly Bulletin Spring, 2004

[6] See OECD Economic Outlook 2014 re link between firm, industry and macro-level growth performance and competition-enhancing product market regulation is found by Bourlès et al. (2010), Bouis et al. (2011), Conway, et al. (2006) and Griffith, et al. (2004).

disciplining device in terms of resource allocation, placing pressure on the managers of firms to become more efficient. Secondly, competition ensures that more productive firms increase their market share at the expense of the less productive. These low productivity firms may then exit the market, to be replaced by higher productivity firms. Thirdly, and perhaps most importantly, competition drives firms to innovate, coming up with new products and processes which can lead to step-changes in efficiency.

Investment in physical and knowledge based capital

Investment in physical capital – machinery, equipment and buildings matters. The more capital that firms have at their disposal, generally the better they are able to do their jobs, producing more and better quality output. The availability of competitively priced world-class economic infrastructure (e.g. energy; telecoms; transport – road, public transport, airport, seaports; waste and water) and related services is also critical to support productivity growth. A significant body of research underscores the positive relationship between investment in high-quality public infrastructure and economy-wide productivity. Research by the IMF[7] suggests that a 1 percentage point of GDP increase in investment spending would increase the level of output by about 0.4 percent in the same year and by 1.5 percent after four years. Investment and growth in OECD economies is increasingly driven by knowledge based capital (KBC). Three types of KBC can be distinguished:

1. Computerised information (software and databases);
2. Innovative property (patents, copyrights, designs, trademarks); and
3. Economic competencies (including brand equity, firm-specific human capital, networks joining people and institutions, and organisational know-how that increase enterprise efficiency).

The development and diffusion of innovative products, services and processes provides the platform for productivity growth and is thus an important driver of competitiveness. While research and development is the main source of new technologies and productivity growth in the long run, the concept of innovation is a broad one encompassing a wide range of activities in addition to R&D, such as organisational changes, training, testing, marketing and design. At firm level, more intensive innovative activity is associated with higher productivity growth. Economy-wide productivity and employment gains are generated when innovations are diffused and widely adopted; meaning the strengthening of technology diffusion mechanisms represents a key policy challenge. Effective innovation activity facilitates an increase in the productivity and turnover of innovating firms. From a policy making perspective, the key issue is to foster a supportive environment for investment in innovation and technology adoption. As noted by the OECD, synergic investments in R&D, skills, organisational know-how (i.e. managerial quality) and other forms of knowledge-based capital enable economies to absorb, adapt and reap the full benefits of new technologies[8].

Productivity growth also entails sufficient investment in R&D, by both the public and private sector; the presence of high-quality scientific research personnel and institutions; collaboration between universities and industry; and advanced business processes and practices. Analyses of policies which support innovation suggest that when R&D spending or patent applications increase, labour productivity and multi-factor productivity rise in a statistically significant manner[9]. In order to create a supportive framework for R&D activity, an economy needs a well-developed risk capital market, a good system to protect intellectual property rights and adequately resourced efficient education and research support systems. =

[7] IMF, World Economic Outlook,2014
8 OECD, The Future of Productivity, 2015
[9] OECD Economic Outlook, Volume 2016 Issue 1

Talent and skills

Talent and skills complement physical capital, and are needed to take advantage of investment in new technologies and organisational structures. Increasing educational attainment levels and labour quality is associated with large increases in productivity[10]. Evidence suggests that positive labour quality growth contributes significantly to growth in labour productivity with approximately a third of labour productivity growth attributable to improvements in labour quality. ECB research suggests that the main drivers of improved labour quality are tertiary education and labour market experience. While acknowledging that other (not measured) factors, such as quality of education are likely to also matter, the results suggest that policies designed to promote growth in euro area human capital should be geared towards an increase in educational attainment and increased on-the-job training both of which matter for productivity growth[11]. Research[12] suggests that an important factor accounting for differences in productivity is variations in management practices. For example, in the Manufacturing sector, managerial quality differs significantly between countries and Ireland scores relatively poorly, particularly when compared to the US, Japan and Germany. Increasing managerial quality in Manufacturing in Ireland to the best practice levels observed in the US could potentially boost manufacturing productivity by over ten per cent[13].

Skills mismatch is associated with lower aggregate labour productivity. The OECD estimates that approximately 25 per cent of workers report a mismatch between their skills and those required to do their job. A better use of talent could translate in to as much as a 10 per cent higher labour productivity in some economies[14]. A greater focus on collaboration between industry and education and training providers is important for reducing mismatches between demand and supply for skills and improving productivity performance. Higher investment in basic research and policies that promote firm-university collaboration are found to be effective tools that increase the capability of countries to absorb external knowledge and technologies and increase productivity. Results from OECD firm-level micro data suggest that more R&D collaboration between universities and firms reduces the productivity gap between the less productive and most productive firms (Andrews et al., 2015)[15].

Entrepreneurship, trade and access to finance

In most countries there is a divergent productivity performance at sectoral and national level between the most productive enterprises and the long tail of relatively poorly performing firms with low or no productivity growth. There is evidence that suggests a firm's rate of growth, job creation, and export activity is related more directly to the age of the business than to its size[16]. New firms are therefore especially relevant for expanding productivity performance. New start-ups, particularly in ICT, are more inclined to engage in more radical innovations which enhance productivity than incumbents who tend to adopt a more incremental approach. A continuous flow of new business start-ups that can survive and thrive in international markets strengthens the productivity base not only through the creation of new businesses, products and services but also by stimulating improved performance in existing businesses. More than half of productivity growth at the industry level has been attributed to new entrants. From a policy perspective therefore, facilitating entrepreneurship, start-ups and firms of scale must be seen as the dynamo of productivity growth in the long run.

[10] OECD, The Future of Productivity, 2015
[11] ECB, Growth in Euro area labour quality, Working Paper 575, 2006
[12] Bloom, N. et al, Management Practices Across Firms and Countries, National Bureau of Economic Research, 2012
[13] Ibid
[14] OECD, The Future of Productivity, 2015
[15] OECD, Frontier Firms, Technology Diffusion and Public Policy: Micro Evidence from OECD Countries,2016
[16] IMF, Fiscal Monitor: Acting Now, Acting Together, 2016

An economy's ability to sustain productivity growth through learning from the global frontier will depend on enhanced global trade and international investment. It has long been recognised that trade can be a spur to productivity growth. Trade allows greater specialisation in activities where a country or a firm has a comparative advantage. Access to a larger market allows firms to benefit from economies of scale, generating larger volumes of activity without increasing the number of people employed or other inputs in the same proportion. Firms which are more heavily exposed to international competition benefit from a larger market and have a stronger incentive to innovate and find efficiency improvements than businesses which are more sheltered in domestic markets. A recent working paper by IMF staff estimates that a 1 percentage point decline in input tariffs is estimated to increase total factor productivity by about 2 percent[17].

Access to competitively priced sources of finance for investment is also essential to facilitate enterprises establish and expand their operations, invest in productivity enhancing infrastructure and skills and to ultimately survive and scale. A recent ECB working paper suggests that financial constraints significantly lower productivity growth with the effect particularly pronounced in innovative sectors and for small and micro sized firms[18].

Firm sophistication

Firm sophistication concerns two elements that are intricately linked: the quality of a country's overall business networks and the quality of individual firms' operations and strategies. These factors are especially important for countries at an advanced stage of development when, to a large extent, the more basic sources of productivity improvements have been exhausted. The quality of a country's business networks and supporting industries, as measured by the quantity and quality of local suppliers and the extent of their interaction, is important for a variety of reasons. When companies and suppliers from a particular sector are interconnected in geographically proximate groups, i.e., clusters, efficiency is heightened, greater opportunities for innovation in processes and products are created, and barriers to entry for new firms are reduced. Individual firms' advanced operations and strategies (branding, marketing, distribution, advanced production processes, and the production of unique and sophisticated products) spill over into the economy and lead to sophisticated and modern business processes across the country's business sectors. The speed and pervasiveness of technology diffusion, absorption and use throughout the economy is particularly important for productivity. OECD research suggests that frontier technologies do not immediately diffuse to all firms. Instead, they are first adopted by national frontier firms, and only diffuse to laggards once they are tested by the leaders and adapted to country specific circumstances. As a technologically advanced economy, domestic innovation, as opposed to imitation, increases in importance for Ireland.

[17] IMF Working Paper, Reassessing the Productivity Gains from Trade Liberalization, 2016
[18] ECB Working Paper 1823, Financial constraints and productivity: evidence from euro area companies, 2015

2 Methodologies, Definitions and Scope

2.1. Methodologies

Measures of productivity are important barometers of the competitiveness of firms, sectors and economies. Productivity is defined as a ratio between the output volume and the volume of inputs. In other words, it measures how efficiently production inputs, such as labour and capital, are being used in an economy to produce a given level of output. Accurately measuring productivity is a complex task. In deriving estimates of productivity at national, sector, industry or firm level, both output and input data need to be assessed. There are a number of ways to quantify and assess productivity performance. In general, productivity may be considered in terms of single and multi-factor productivity measures. Single factor measures are those where output is considered in relation to a single measure of input, such as, labour or capital. Multifactor productivity measures relate output to a number of inputs, for example, capital, labour and intermediate inputs, such as, energy and business services. The variables involved such as output, value-added, hours worked and changes in capital stock are conceptually complicated. In addition, the data sources tend to use a mix of administrative, survey and national accounts data.

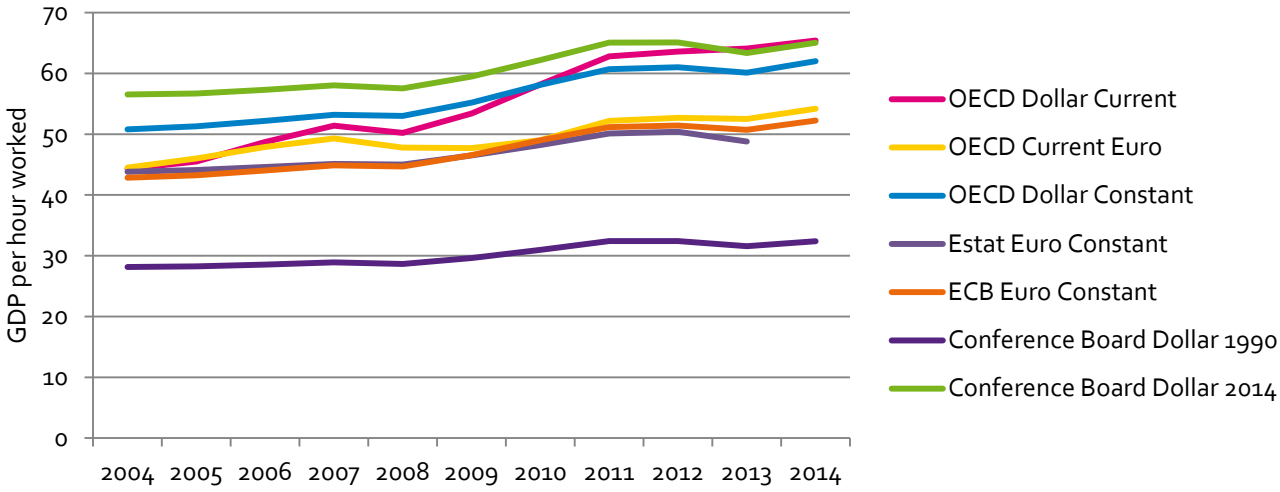
While national accounts are the preferred source for productivity measurement, a caveat with the available figures from an Irish perspective is that they tend to be based on Gross Domestic Product (GDP)[19], which can be particularly problematic for measuring economic activity in highly globalised economies such as Ireland. Revisions to the 2015 National Income and Expenditure accounts in July 2016 led to an upgrade of the 2015 GDP growth to 26.3 per cent and GNP to 18.7 per cent. These revisions, which are in line with ESA2010 and BPM6 methodology, are largely related to relocation of multinational companies to Ireland and the resulting larger net exports contributions.

Various commentators have stated these revised figures are not reflective of actual economic activity taking place in Ireland. Instead, these developments reflect the statistical 'on-shoring' of economic activity associated with an increase in the size of the Irish capital stock arising from corporate restructuring and balance sheet reclassification in the multinational sector, and also growth in aircraft leasing activity. As a result, National Accounts data now include a very significant amount of activity carried out elsewhere, but formally recorded as part of Irish GDP and GNP. Consequently, metrics derived from these measures, such as GDP per hour worked require careful consideration, in particular when undertaking international comparisons.

A number of sources of data exist on international productivity developments that cover Ireland, however unlike other jurisdictions (e.g. the UK's Office of National Statistics), an authoritative set of national statistics at the domestic level is not produced in Ireland. (See Box 2.1). The Conference Board's Total Economy Database (TED), Organisation for Economic Co-operation and Development (OECD), Eurostat and European Central Bank (ECB) provide estimates of annual data covering Gross Domestic Product (GDP), employment, hours worked, and using these it is possible to estimate productivity performance. However, across all of these datasets issues arise regarding base years, price deflators, currency and exchange rates, constant and current prices and disaggregation of performance by economic activity and hours worked. As outlined in Figure 2.1.1 there are discrepancies between international productivity datasets in terms of measurements, base years and definitions used.

19 Gross Domestic Product (GDP) and Gross National Product (GNP) are closely related measures. GDP measures the total output of the economy in a period i.e. the value of work done by employees, companies and self-employed persons. This work generates incomes but not all of the incomes earned in the economy remain the property of residents (and residents may earn some income abroad). The total income remaining with Irish residents is the GNP and it differs from GDP by the net amount of incomes sent to or received from abroad. In Ireland's case, for many years past, the amount belonging to persons abroad has exceeded the amount received from abroad, due mainly to the profits of foreign-owned companies, and our GNP is, therefore, less than our GDP.

Figure 2.1.1 GDP per hour worked, Ireland 2004-2014



Source OECD, Eurostat, ECB, Conference Board/TED

Figure 2.1.1 shows that while the trends in GDP per hour worked for the total economy are similar, the absolute value can vary significantly depending on the data source used.

Table 2.1.1: GDP per Hour Worked by Source (2013)

GDP Per Hour Worked by Source	2013 Value
OECD, Current Prices in USD	64.1
OECD, Current Prices, in euro	52.5
OECD, Constant Prices, in USD	60.1
Eurostat, Constant Prices, in euro	48.8
ECB, Constant Prices, in euro	50.7
Conference Board, 1990 Prices, in USD	31.5
Conference Board, 2014 Prices, in USD	63.3

Source OECD, Eurostat, ECB, Conference Board/TED

Table 2.1.1 illustrates the scale of variation in data and how the absolute value of GDP per Hour Worked for the total economy in one year varies significantly depending on the source used. When the sources of labour productivity are adjusted to a common currency and rebased to a common year there is a considerable degree of consistency as to the overall trend output. The choice of measurement in terms of base year and currency presents issues for Ireland. Previously, the Council assessed Ireland's labour productivity performance by sector using EU-KLEMS data. The absence of compatible sector level data from the EU KLEMS project means that it is not possible to update the 2012 report using the same methodology and data source. The OECD compiles productivity statistics based on information provided by National Statistical Institutions to monitor and model the economic performance of member countries and has set out a comprehensive theoretical background on how best to define and measure productivity in its Productivity Manual. The OECD's data is presented annually in its Compendium of Productivity Indicators. As all OECD productivity measures are constructed with a view to maximising international comparability and are based on national accounts data, this report therefore draws extensively on the OECD's long standing experience in the field.

2.2. Definitions

The following section sets out the main definitions used throughout this report drawing on the OECD's Measuring Productivity Manual.

Output

Output is a key methodological consideration of particular relevance at sectoral and firm level. Productivity analysis distinguishes between productivity measures that consider movements of output in terms of gross output and those which use a gross value-added concept. Measures of output include total economic output, gross domestic product and value added; inputs include labour and capital. Gross Domestic Product (GDP) and Gross Value Added (GVA) are both compiled from National Accounts data based on a common conceptual framework which almost all OECD countries follow in the compilation of their accounts. GVA is the value of output less the value of intermediate consumption (i.e., the difference between the value of goods and services produced and the cost of raw materials and other inputs used in production). It is a measure of the contribution to GDP made by an individual producer, industry or sector. The choice is largely dependent on whether the productivity measure relates only to primary inputs (such as labour and capital) or intermediate inputs (such as materials, energy and business services). In general the OECD concludes that when only primary inputs are involved then GVA should be used as this does not include intermediate consumption.

Labour productivity

Measures of labour productivity show how productively labour is used to generate gross output or value added. Expressed as a ratio, it represents the volume of output produced per unit of labour input. Labour productivity may be calculated in terms of either output per person employed (Gross Domestic Product and Value Added) or output per hour worked. The OECD define hours worked as "Hours actually worked reflect regular hours worked by full-time and part-time workers, paid and unpaid overtime, hours worked in additional jobs, excluding time not worked because of public holidays, annual paid leaves, strikes and labour disputes, bad weather, economic conditions and other reasons". Labour input is defined as total hours worked by all persons engaged in production i.e. employees plus self-employed, broken down by sector. The OECD consider labour input is most appropriately measured as the total number of hours actually worked, this is, effectively used in production, whether paid or not (System of National Accounts 2008).

Capital productivity

Capital productivity is a measure of how effectively capital is used to generate output or value added. Capital productivity reflects the combined influence of labour, intermediate inputs, technical change, and efficiency change, economies of scale, capacity utilisation and measurement errors. It is defined as the ratio between the volume of output, measured as GDP, and the volume of capital input, defined as the flow of productive services that capital delivers in production, i.e. capital services. Capital services refer to the flow of productive services provided by an asset used in production. Capital services reflect a (physical) quantity, and are considered the appropriate measure of capital input by the OECD.

Multifactor productivity

Multifactor productivity (MFP), also referred to as Total Factor Productivity, is measured as a residual, i.e. that part of output growth that cannot be explained by growth in labour and capital inputs. It reflects the overall efficiency with which labour and capital inputs are used together in the production process. Changes in MFP reflect the effects of changes in management practices, brand names, organisational change, general knowledge, network effects, spill overs from production factors, adjustment costs, economies of scale, the

effects of (imperfect) competition and measurement errors. In simple terms therefore, if labour and capital inputs remain unchanged between two periods, any changes in output reflect changes in MFP.

Sectoral data

Macro level productivity data is supplemented with a range of benchmarks of key sectors broken down by NACE Rev. 2 classification. Data are provided for the total economy and individual sectors.

- A –Agriculture, Forestry and Fishing
- C – Manufacturing
- F – Construction
- G– I Wholesale and Retail trade; repair of motor vehicles and motorcycles; H – Transportation and storage; I – Accommodation and food service activities;
- J – Information and communication (ICT);
- K – Financial and insurance activities;
- M – Professional, scientific and technical activities; N-Administrative and Secretarial support activities

Activities that are generally often provided by non-market producers such as public sector activities are excluded. According to the OECD "this reflects the fact that non-market activities are measured on a sum-of-costs approach in current prices, with an implicit imputation made for labour productivity growth (usually zero) for volume estimates, together with an assumption of zero net operating surplus"[20]. The analysis of Irish productivity trends at sectoral level in this report draws on the OECD and complimentary CSO datasets.

International comparisons

To facilitate international comparisons of labour productivity levels over time, GDP in national currency and at current prices are converted to a common currency by the OECD (US dollars), using constant (2010) Purchasing Power Parities (PPPs). In productivity analysis there are advantages and disadvantages in using either the current or constant PPP approach. The OECD considers that in comparing differences in productivity growth across countries, the constant PPP approach is best applied as this method ensures the price structure is constant and changes in output are determined by changes in volume rather than price as prices do not vary over time. It should be noted that in the analysis of sectors set out in Chapter 5 that data on output per hour at sectoral level is only presented for Ireland. This is because the OECD provides international comparisons of indices and growth rates of sectoral productivity but not the levels. This is due to the absence of reliable industry-level PPPs, which are needed to carry out cross-country comparisons. Subject to data availability, in this report, Ireland's national productivity performance from 2004 to 2014 and at the sectoral level is considered, drawing extensively on OECD productivity and national accounts data. Where possible, and subject to data availability, Ireland's performance is compared with the following:

- The Euro area 19 as a key trading partner and representative of Ireland's economic peer group;
- The US, as the source of much inward and outward direct investment, an important trading partner and traditional global leader in productivity growth;
- The UK, as a key trading partner and competitor for foreign direct investment;
- Denmark, as a relatively small but globalised small advanced European economy.

[20] OECD Compendium of Productivity Indicators, 2016

Box 2. 1: Irish Productivity Data

In depth analysis of Ireland's performance is severely limited by the absence of comprehensive, sectoral level and firm level data. Evidenced based policy making relies on the availability of data to identify issues, devise responses and assess progress.

In the Council's 2015 Competitiveness Challenge, the Council recommended that the potential to develop and publish a comprehensive productivity dataset should be explored by the CSO. Such an exercise should consider measures of labour (both overall and on a per hour worked basis), capital and total factor productivity. Data is required for both productivity levels and growth rates, and data should be disaggregated to the degree possible to identify sectoral trends. Such a dataset should draw on existing CSO data.

The Department of Finance and the Department of Jobs, Enterprise and Innovation have engaged with the Central Statistics Office to develop and publish a comprehensive national productivity dataset, as a priority. This would allow the various practitioners to delve into the detail of the proposed compendium and develop a clear roadmap to ensure that the final product is as comprehensive and robust as possible, and meets the needs of all interested parties.

3. Labour Productivity Performance 2004-2014

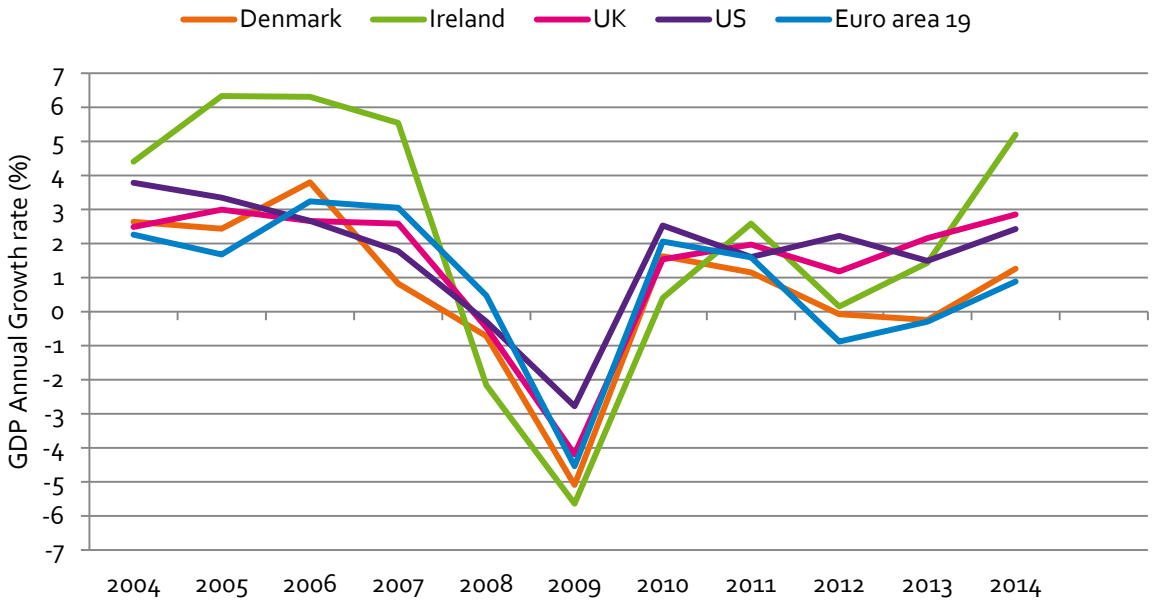
3.1 Overview

This chapter outlines Ireland's national labour productivity levels and growth rates from 2004 – 2014 with reference to the US, UK, Denmark and Euro area.

In terms of Irish economic growth Figure 3.1.1 shows the economy in the period 2004-2014 can be considered in three distinct phases, a domestically driven surge of growth in the period 2004-2007, a severe decline 2008-2011 and recovery 2012-2014. The effects of the global economic and financial crisis on economic growth were felt in all of the countries below but the effect was particularly pronounced in Ireland where GDP decreased faster and more deeply than the countries considered in this report. In Ireland GDP growth decreased from 5.5 per cent in 2007 to -2.1 per cent in 2008 and -5.6 per cent in 2009. Growth returned in 2010 -2012 but was moderate and accelerated in 2013/2014.

The recovery in GDP growth per annum in the years 2013 and 2014 was particularly strong in an international context. As set out previously by the Council[21], over the course of the recession net exports (the value of a country's total exports minus the value of its total imports) were the primary positive driver of Irish growth. Following some volatility in 2012 and 2013, in 2014 the drivers of growth became more balanced with a noticeable increase in the contribution made by investment. In 2014, the Irish economy grew by 5.2 per cent. Economic growth was 2.8 per cent and 2.4 per cent in the UK and US respectively. In contrast growth in Denmark and the Euro area was considerably more subdued at 1.3 per cent and 0.9 per cent respectively.

Figure 3.1.1 GDP annual growth rate Ireland and selected countries, 2004-2014



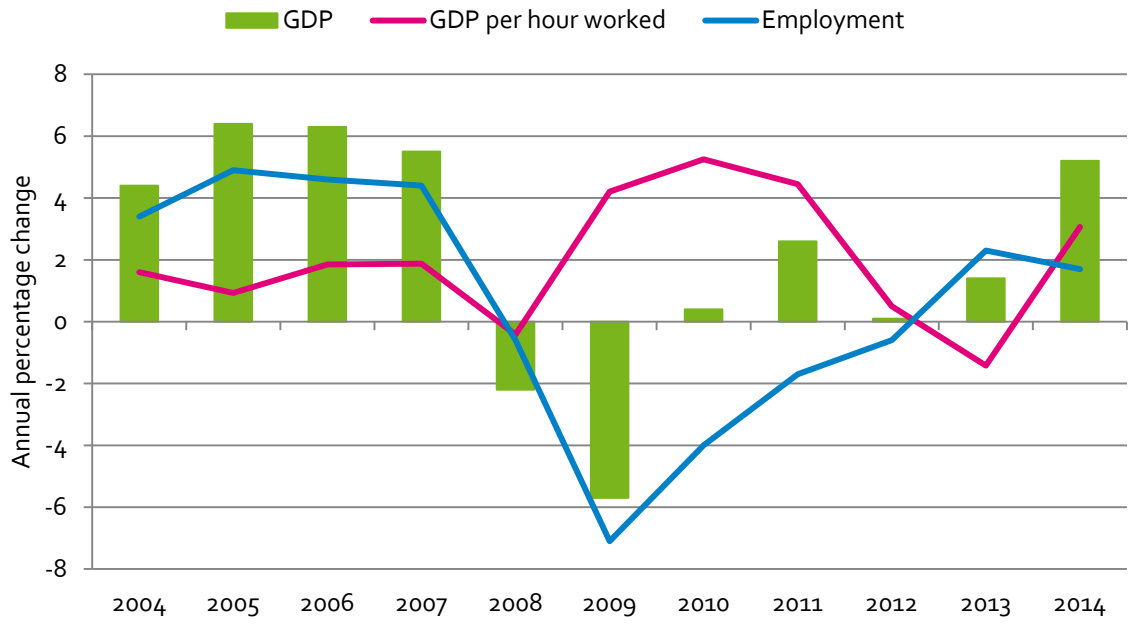
Source OECD

[21] National Competitiveness Council, Ireland's Competitiveness Scorecard 2015

3.2 Productivity and the Economic Cycle in Ireland

The factors driving productivity growth over time are difficult to measure and growth can be cyclical and counter cyclical depending on the drivers of economic growth in individual countries. The economic cycle and more generally trends in the composition of value added and employment – can have a significant effect on measured productivity levels. This is particularly relevant for understanding the apparent improvement in Ireland's productivity performance. Previous NCC research[22] set out how the downturn in the economic cycle has affected Ireland's productivity trends in a number of guises. From 2007 to 2011 the total hours worked in the Irish economy fell by nearly 17 per cent, while output declined by 9 per cent. If the total hours worked in an economy declines by more than output, the economy realises a productivity gain. At a sectoral level, the fall in employment (and thus hours worked) in the labour intensive and relatively low productivity Construction sector affected the aggregate productivity figures, particularly over the 2008-2010 period when significant hours worked in construction were shed.

Figure 3.2 .1 Growth in GDP, GDP per hour worked and employment, Ireland 2004-2014



Source OECD

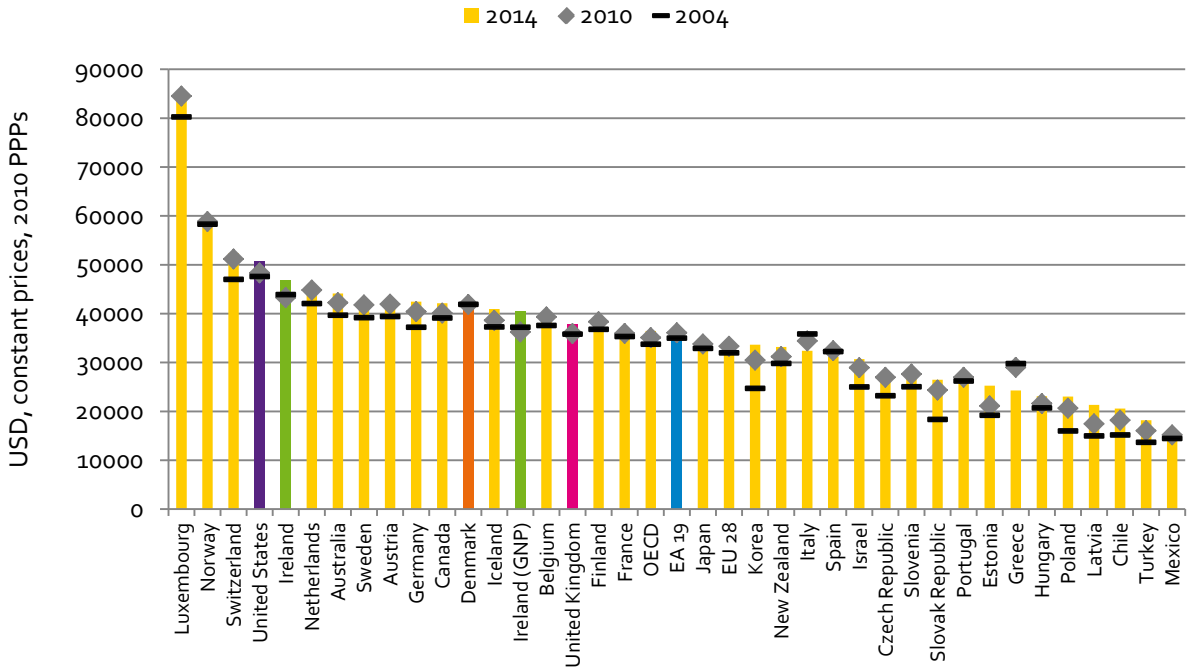
Figure 3.2.1 shows that at the tail-end of the Celtic Tiger (2004-2007), strong economic growth (>5%) was driven by increased domestic consumption was accompanied by employment growth (>4%), there was however, limited labour productivity growth. Over the period 2004-2008, GDP per hour worked was less than 2 per cent; well below productivity growth rates at the end of the nineties and start of the decade. Over the course of the recession (2009-2011) as output and employment growth collapsed, labour productivity growth increased at a strong rate. Since the recession (2008-12), productivity growth weakened as employment began to increase. Despite this positive trend in productivity performance, the impact of the composition of employment on productivity growth should be noted. In particular in Ireland's case, the collapse in the labour

[22] NCC, Irelands Productivity Performance 1980-2011, 2012

intensive Construction sector and Ireland's growing base of multinationals in high value added sectors (particularly in the Pharma and ICT sectors) disguises to a degree underperforming sectors and boosts Ireland's per capita productivity levels .

Figure 3.2.2 shows in an OECD context Ireland had the third highest labour productivity output among EU states in 2014, after Luxembourg, when measuring productivity using GDP per capita. Using the OECD's measure in USD, constant prices, 2010 PPP, Irelands output per capita was $46,855 in 2014, an increase of 6.5 per cent on 2010 and 21.9 per cent increase compared with 2004. In 2014 Irelands GDP per capita was 92 per cent of the United States level. Over the period 2004-2014, Ireland had the seventh highest increase in output in the OECD, behind Korea, Estonia, Slovakia, Poland, Chile and Hungary. While Irish levels remain above the Euro area, Ireland's relative performance is less impressive if considered in terms of GNP.

Figure 3.2.2 Output per capita (GDP) USD, constant prices, 2010 PPP, selected countries, 2004, 2010 and 2014



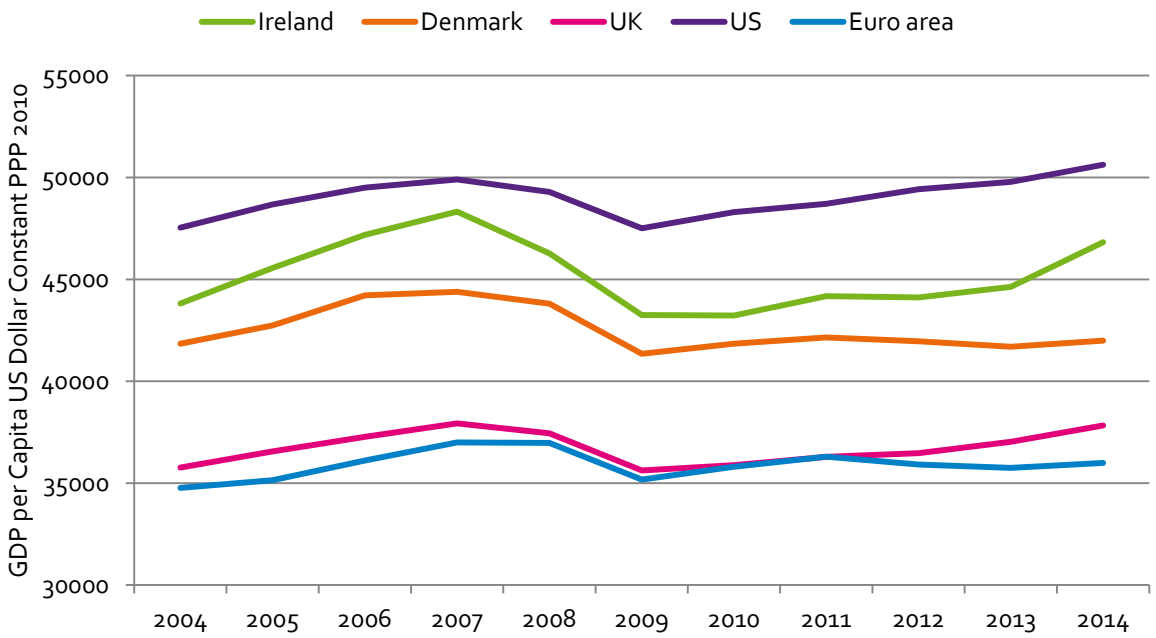
Source OECD

Over the period 2004-2014 growth in output has been subdued in most OECD countries. The global slowdown in productivity has been attributed to a mix of cyclical factors such as low investment in physical capital, (in a context of weak global demand) and structural factors such as inefficient markets, low levels of innovative start-ups and skills mismatch. Productivity in the Euro area is considerably lower than in the United States and Ireland. As Figure 3.2.2 shows, the productivity level in the Euro Area, was just 84 percent of the US level and 77 per cent of the Irish level in 2014. This differential in productivity has remained constant over the past ten years. Within the Euro area, there is large variation in productivity growth rates between economies. This reflects different states of the economic cycle, employment structure, and labour market and the intensity of ICT and capital investment.

The gap between European productivity growth levels and US growth has been attributed to differences in business structures, lower levels of R&D and capital investment, market barriers and regulation, and insufficient use of information and communications technologies. In addition, higher costs (particularly energy), infrastructure pressures, and fewer available sources of finance make the European operating environment for enterprise relatively less productive. The widespread weakness in productivity growth among

major European countries points to an inability to translate technology and innovation to productivity growth, weak demand and low investment as well as an increased negative impact of structural rigidities in labour, capital, and product markets. France and Germany have higher productivity levels than the Euro Area average at 97 and 94 percent of the United States, respectively, while economies such as Spain and Italy only reach 77 percent and 76 percent, respectively. UK productivity is significantly below the levels recorded in Ireland and the US, as well as other large economies such as France and Germany.

Figure 3.2.3 GDP per capita, constant prices, 2010 PPP, Ireland and selected countries 2004-2014



Source OECD

In the long-run, productivity is the primary determinant of improvements in national living standards relative to other countries. Growth in GDP per capita is a core indicator of economic performance and commonly used as a broad measure of average living standards or economic well-being despite some recognised shortcomings.

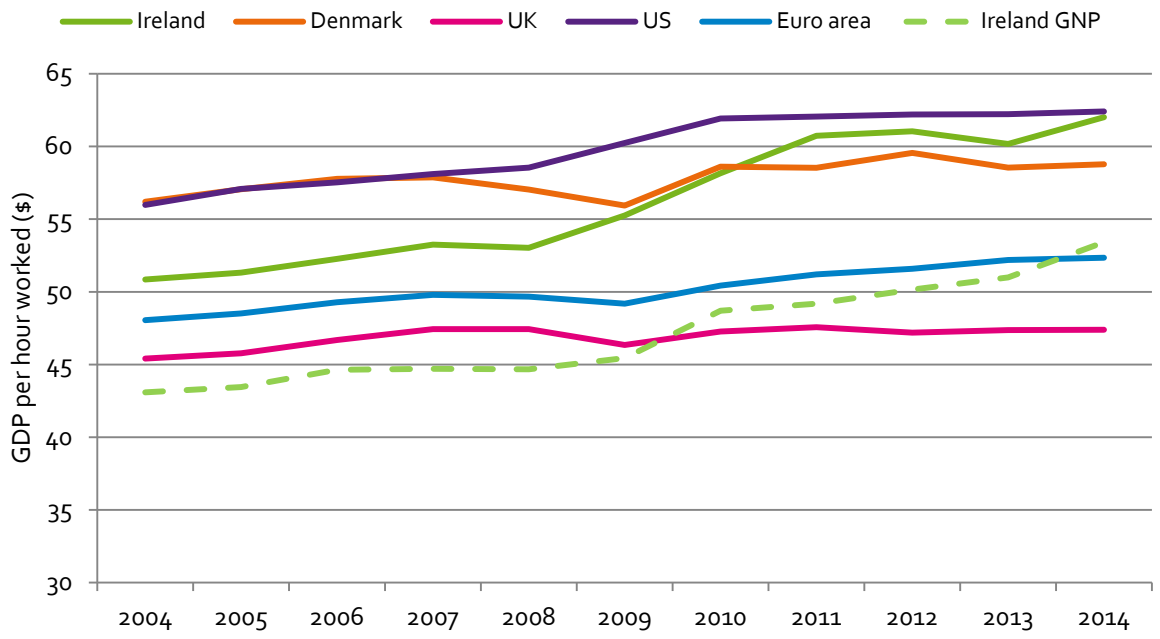
As shown in Figure 3.2.3, Ireland's GDP per capita levels have been second only to the US over the period 2004-2014. In the years 2004-2007, GDP per capita grew in all of the countries above. However, Irelands GDP per capita increased at a much more significant level increasing 10.3 per cent to $48,324 compared to rates of 6 per cent in Demark, the UK and Euro area and 5 per cent in the US. Between 2008 and 2009 this increase in Irish GDP per capita was completely eroded as GDP per capita decreased to $43,247 but remained significantly above the Euro area average. On the back of stronger economic and employment growth, Irish incomes per capita began to increase rapidly in 2013/2014. In 2014 GDP per capita (€46,822) was well above the Euro area average (+37%) and the annual percentage growth rate of GDP per capita was well in excess of the US, UK, Denmark and the Euro area average.

3.3 Changes to Ireland's Long-run Labour Productivity Performance

Having started from a low base, Irish productivity levels exceed those of many of our peers and key competitors. In historical terms the transformation has been profound. To set the current data in a historical

context, in 1970, GDP per hour worked in Ireland was $12.81 compared to $24.30 in Denmark, $19.37 in the UK and $31.06 in the US. In the eighties, and early nineties, productivity in Ireland was significantly below levels in the UK, the Euro area, Denmark and the USA. The gap began to narrow in the mid-nineties and early noughties as Ireland has strong export led economic growth. As set out in Figure 3.3.1 the differential began to narrow further during the period 2004-2014 with a particularly strong surge occurring over the course of the recession.

Figure 3.3.1 GDP per hour worked, USD, constant prices, 2010 PPPs, Ireland and selected countries 2004-2014



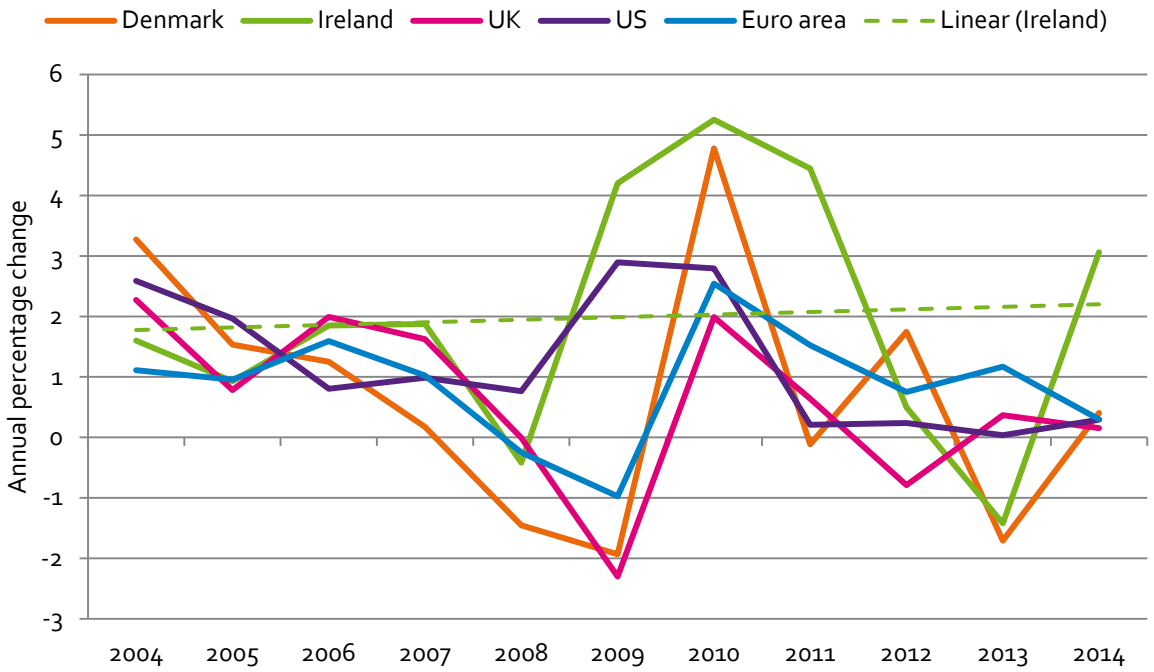
Source OECD

By 2014, Ireland's per hour productivity levels were above the figures for the Euro area average, the UK and Denmark. In addition, the productivity gap between Ireland and the US narrowed substantially, particularly in the period 2008-2011. As measured by GDP per hour worked, productivity in Ireland has converged to the EU and US averages. Ireland went from being approximately 9 percent below the US in 2004 to the same level by 2014.

A concern with these figures is that they are based on GDP, which may include some pricing activities by multinational corporations. Using GNP figures, which measures income to Irish citizens rather than output, brings Ireland's productivity performance more into line with other countries. In short, despite the impact of the recession, Ireland has continued to perform relatively strongly in terms of productivity growth. Ireland went from approximately two-thirds of the output per hour of the rest of the EU and the US during the 1980s to almost the same level by 2014. As Figure 3.3.1 outlines, GNP per hour productivity figures indicate that although recent growth rates have been impressive in absolute terms, Ireland's productivity in terms of GNP per hour worked while above the UK and Euro area remains well below that of Denmark and the US.

3.4 Labour Productivity Growth

Figure 3.4.1 Annual growth in GDP per hour worked, constant prices



Source OECD

Figure 3.4.1 shows the annual figures for labour productivity growth in output per hour worked – the key determinant of rising living standards in Ireland and selected economies over the period 2004-2014. As the chart shows, annual growth in productivity is volatile reflecting the various stages of the business cycle. However, the overall trend in Ireland as highlighted by the linear trend has seen productivity growth average around 2 per cent per annum over the last decade.

In Ireland, growth slowed from above 4 per cent between 1995 and 2003 to less than 1.6 per cent per annum in 2004 and 2005. It dipped to -0.4 per cent in 2008 before recovering strongly in the period 2009-2012. Labour productivity growth has slowed considerably in the last decade in Denmark, the UK, US and Euro area. The slowdown was in evidence pre crisis and the decline in productivity growth was particularly pronounced in Denmark and the UK. Ireland's labour productivity growth rates remain relatively strong in an international context.

Some of Ireland's gains, however, have arisen as a result of the impact of the recession on the labour market. Over the period 2008- 2012 the economy was contracting and national income and employment declining, as construction investment and domestic demand fell from the unsustainably high levels of previous years. The intensity of the economic downturn was exacerbated by unprecedented national and international economic difficulties, particularly in the banking and financial sectors. The structure of employment changed significantly and quickly as a result of the recession. CSO QNHS data shows that over the period Q2 2008-Q2 2011, total employment decreased by 13.4 per cent, from 2,146,400 to 1,857,600. In this period over a quarter of a million jobs were lost, with over half of the jobs lost were in construction. At a sector level, the largest declines in employment occurred in labour intensive sectors Construction (-57%) agriculture (-27%), industry (-18%), Professional Services (-13%), Wholesale and Retail (-13%) and accommodation and food (-11%).

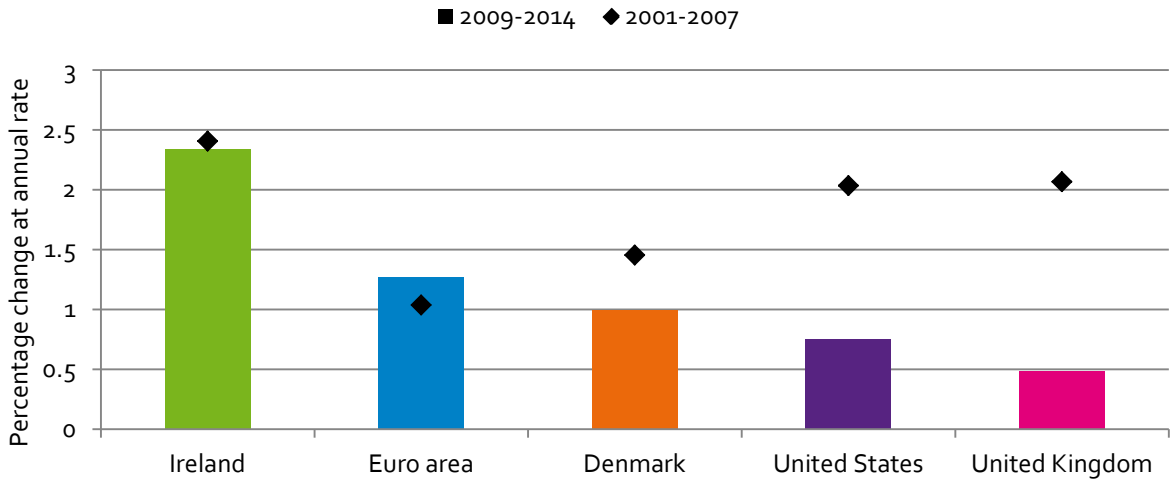
Table 3.4.1 Annual growth rate in GDP per hour worked, constant prices, selected countries 2004-2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Denmark	3.3	1.5	1.3	0.2	-1.5	-1.9	4.8	-0.1	1.7	-1.7	0.4	0.4
Ireland	1.6	0.9	1.8	1.9	-0.4	4.2	5.3	4.4	0.5	-1.4	3.1	1.8
UK	2.3	0.8	2.0	1.6	0.0	-2.3	2.0	0.6	-0.8	0.4	0.2	0.6
US	2.6	2.0	0.8	1.0	0.8	2.9	2.8	0.2	0.2	0.0	0.3	0.8
Euro area	1.1	1.0	1.6	1.0	-0.3	-1.0	2.5	1.5	0.8	1.2	0.3	1.0

Source OECD

Table 3.4.1 shows the trend in annual per hour labour productivity growth over the period 2004-2014. In 2004, Ireland's growth rate was above the euro area average but below the rates observed in the UK, US and Denmark. Ireland's growth rate increased at a particularly high rate in the period 2009-2011. In 2014, at 3.1 per cent, Ireland recorded the highest growth rate in the OECD and the rate was considerably above the rate observed in Demark, the UK and US.

Figure 3.4.2 GDP per hour worked, total economy, percentage change at annual rate selected periods



Source OECD

Figure 3.4.2 shows that the average annual rate of growth[23] productivity growth in the US, UK, Denmark and Euro area counties has been below 2 per cent both in the run up to and particularly during and after the economic and financial crisis in 2008. Irish productivity grew at 2.3 per cent growth over the period 2009-2014. Ireland recorded a slight decline of 0.1 per cent on 2001-2007. Productivity growth increased in the Euro area from 1 per cent to 1.2 per cent. However, productivity growth declined in Denmark, the US and the UK. The decline in productivity was particularly pronounced in the UK (a decline from 2 per cent in the period 2001-2007 to 0.5 per cent in 2009-2014) and in the US where growth declined from 2 per cent to 0.75 per cent over the same period. Productivity growth has been subdued in most OECD countries over the decade

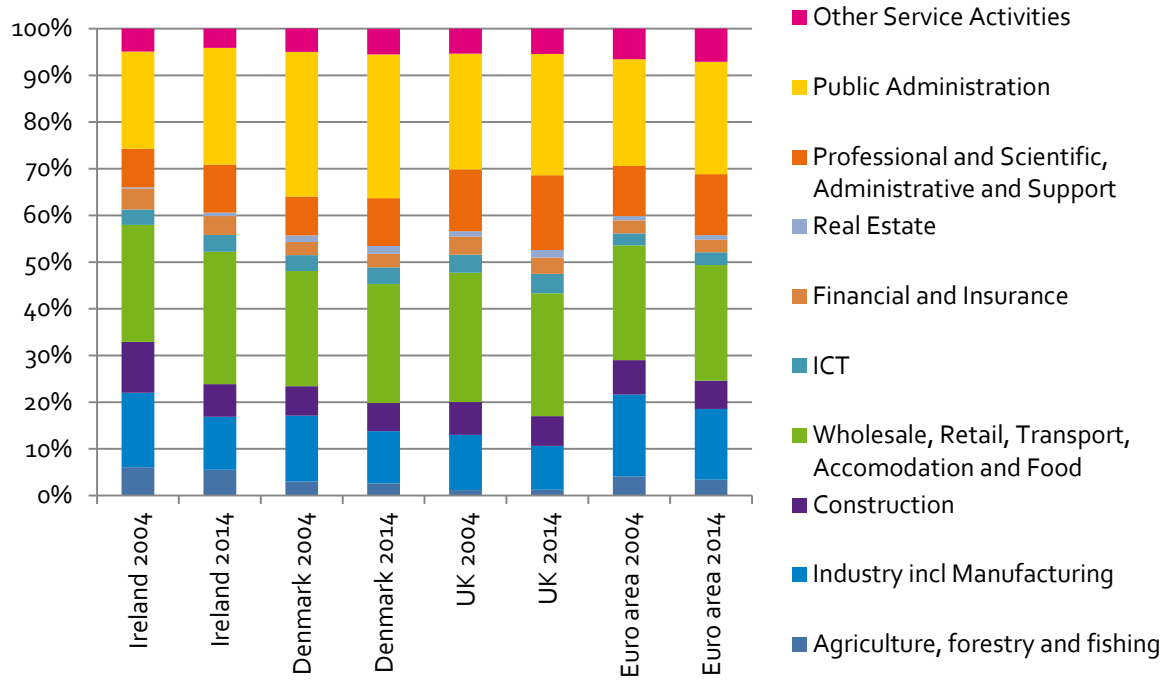
[23] The average annual growth rate (AAGR) is the arithmetic mean of a series of growth rates.

4. Trends in Employment and Hours Worked 2004-2014

4.1 Overview

Understanding the drivers of productivity growth at the total economy level requires an understanding of the contribution that each sector makes in terms of employment and hours worked. Following a most dramatic transition from boom to bust, one cannot consider Irish productivity trends without reference to the changing composition of employment in the midst of the unprecedented national and international economic crisis. Looking at international comparisons of the composition of employment at sectoral level a number of features of Ireland's labour market over the period 2004-2014 are evident.

Figure 4.1.1 Percentage share of total employment by sector, Ireland and selected countries 2004 and 2014[24]



Source OECD

Figure 4.1.1 shows that the share of total Irish employment in agriculture while declining remains high relative to the Euro area average. The proportion employed (10.9%) in construction in 2004 was significantly above Denmark, the UK and the Euro area in 2004 but at 7 per cent is now similar to international averages. High value added sectors such as financial services, real estate and ICT account for relatively small proportions of total numbers employed.

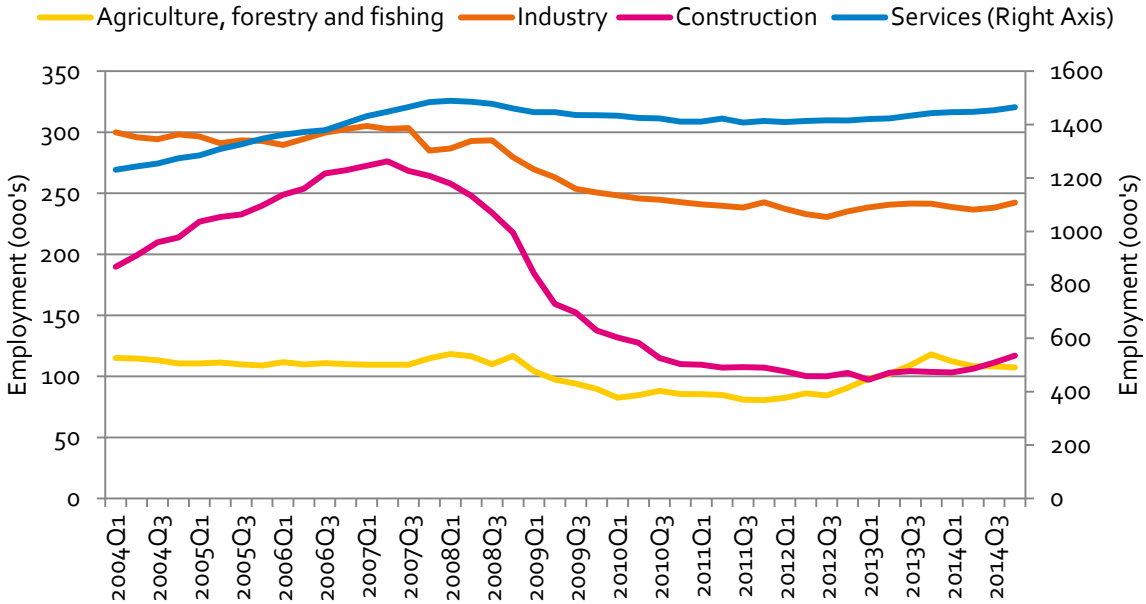
ICT as a share of total employment has increased in Ireland and elsewhere but accounts for less than 5 per cent of total employment. The share of employment accounted for by Professional Services in Ireland has increased over the decade and at 10.3 per cent in 2014 is similar to Denmark but lower than the UK (16%) and Euro area (13%). The share of total employment in the services sectors (Retail, food, transport and storage) is highest in Ireland (28.4%). The growth in share of Irish public services employment is notable accounting for 25 per cent of total employment in 2014 compared with 20.8 per cent in 2004 and is now higher than the euro

[24] Data not available for the US

are average but below Denmark and the UK. As is the case across the OECD the composition of employment in Ireland over the period 2004-2014 is notable for the increasing share of total employment accounted for by the services sector and the declining numbers employed in industry.

Across the OECD, shifting patterns of comparative advantage and the process of structural and technological change mean that employment in the traditionally high productivity Manufacturing sector has been declining with employment growth increasingly concentrated in the services sector. In 2004, employment in industry accounted for 15.9 per cent of employment in Ireland and 14.1 percent, 11.8 per cent and 17.5 per cent in Denmark, the UK and the Euro area respectively. In 2014 the corresponding shares were 11.3 per cent in Ireland, 11.2 per cent in Denmark 9.4 per cent in the UK and 15.2 per cent in the Euro area.

Figure 4.1.2Total employment by broad economic sector, Ireland 2004-2014



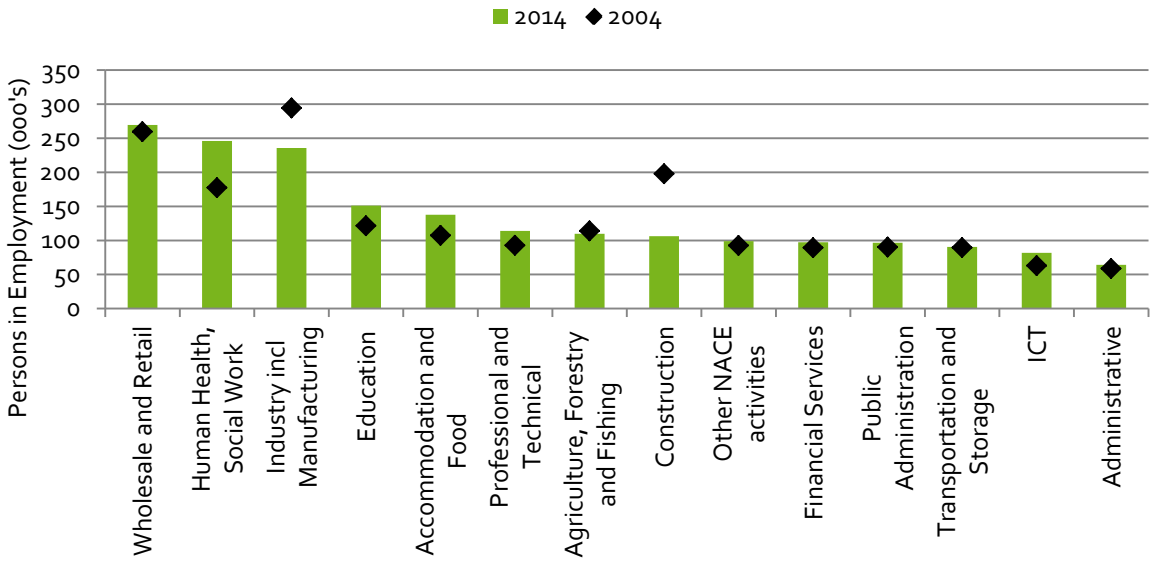
Source CSO

Looking at Ireland in more detail the changing composition of employment at broad sectoral level is evident. Figure 4.1.2 shows that in the period 2004-2014, total employment in agriculture decreased by 3.5 per cent, industry declined by 19.5 per cent, Construction decreased by 46.3 per cent with services sector employment increasing by 16.1 per cent. In the years 2004-2007 employment in the services and Construction sectors grew rapidly. In services, employment increased from 1,230,500 in Q1 2004 to 1,431,800 Q1 2007. This was primarily driven by increases in employment in health and social work (+22%) the Accomodation and Food (+19%) and the Wholesale and Retail sector (+14%). In Construction, the rate of growth was exceptional. Employment increased from 189,100 in Q1 2004 to 272,500 in Q1 2007, an increase of 44 per cent.Over the same period, employment in agriculture declined by 4.8 per cent to 109,600. Employment growth in Industry was minimal and increased by 1.7 per cent to 305,100.

Over the period 2008- 2012 the economy was contracting and national income and employment declining, as construction investment and domestic demand fell from unsustainably high levels. The intensity of the economic downturn was exacerbated by unprecedented national and international economic difficulties, particularly in the banking and financial sectors. The structure of employment changed significantly and quickly as a result of the recession. Over the period Q2 2008-Q2 2011, total employment decreased by 13.4 per cent, from 2,146,400 to 1,857,600. In this period over a quarter of a million jobs were lost, approximately half

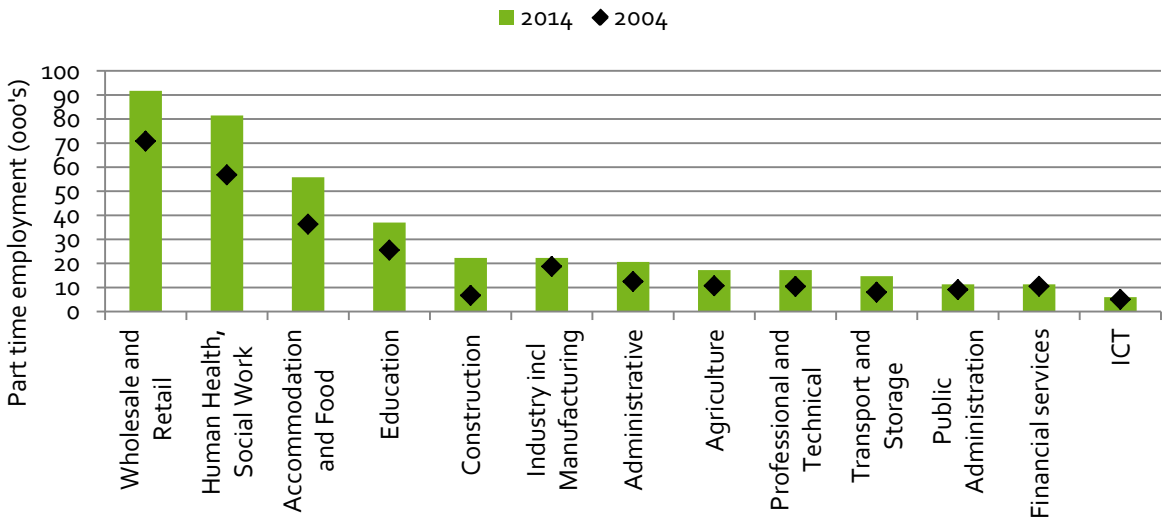
of the jobs lost were in construction. At sector level, the largest declines in employment occurred in labour intensive sectors construction (-57%), agriculture (-27%), industry (-18%), Professional Services (-13%), Wholesale and Retail(-13%) and accommodation and food (-11%). Figure 4.1.3 (overleaf) shows the changing composition of employment at sectoral level over the period 2004-2014. These sectoral level trends are considered further in Chapter 5.

Figure 4.1.3 Total employment by detailed economic sector, Ireland 2004 and 2014



Source CSO

Figure 4.1.4 Part time employment by detailed economic sector, Ireland 2004 and 2014



Source CSO

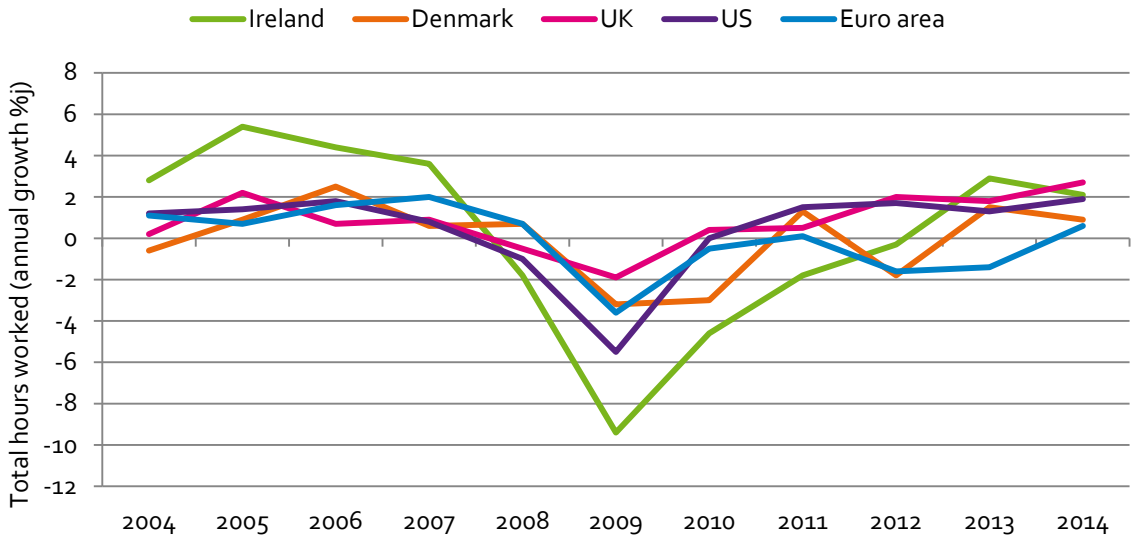
One important development in terms of determining labour productivity (in terms of hours worked) is the incidence of part time work. Part-time workers are defined as working less than 30 hours per week. Figure 4.1.4 shows the number of persons working part time in all NACE sectors increasing from 310,700 in Q2 2004 to 450,300 in Q2 2014 (+45%). At sectoral level, taken together, the numbers working part time increased by

41 per cent in Wholesale and Retail, Transport and Storage, Food and Accommodation Services. In industry part time work increased by 20 per cent and there were also large increase in the Health and Social Work (+43%), Education (+45%) and albeit from low bases in agriculture and Construction (+232%)

4.2 Trends in Hours worked

Measurement of hours worked in the economy and by sector is an essential element in the calculation of in productivity as labour is the single most important factor of production. While it is possible to account for total hours worked and persons employed there is limited data availability on labour quality. In addition, while it is acknowledged that there are issues with regard to the accurate measurement of hours worked, particularly disaggregated at sector level[25], labour input is most appropriately measured as the total number of hours worked. Total hours worked are the aggregate number of hours actually worked during the period in employee and self-employment jobs and are closely related to the level of employment growth.

Figure 4.2.1 Annual growth total hours worked, Ireland and selected countries 2004-2014



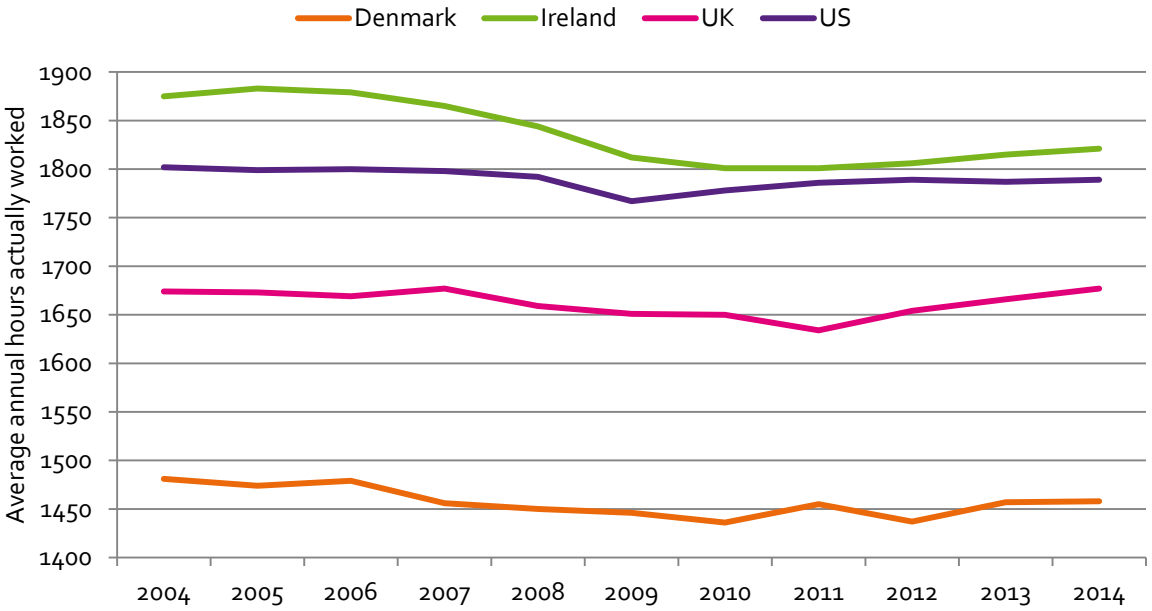
Source OECD

In Ireland, strong economic and employment growth saw growth in hours worked in the economy increase in the years preceding the crash. Figure 4.2.1 shows that over the period 2004-2007, annual growth was higher than the Euro area average and the growth rates observed in competitor economies. Annual growth in total hours worked increased from 2.8 per cent in 2004 to a peak of 5.4 per cent in 2005. Growth in hours worked was negative throughout the period 2008-2012 and declined at much faster rate than other countries reflecting the severe collapse in output and employment. In the years 2009 and 2010 total hours worked decreased by 9.4 percent and 4.6 per cent respectively. Growth in total hours worked rebounded strongly in Ireland in 2013 and 2014 reflecting the pick-up in employment. In 2014 growth in Irish total hours worked was 2.1 per cent second only to the UK (2.7%).

[25] As acknowledged by the OECD Productivity Manual specific challenges in this context include successfully combining information from the two main statistical sources, enterprise and household surveys, and measuring labour input and compensation of self-employed persons.

Growth in hours worked in the Euro area remains relatively weak at 0.6 per cent. In addition to growth in total hours worked, data is available which shows the average annual hours worked per worker. This measure is defined as the total number of hours actually worked[26] per year divided by the average number of people in employment per year and covers employees and self-employed workers.

Figure 4.2.2 Average annual hours actually worked per worker, total employment, selected countries 2004-2014



Source OECD

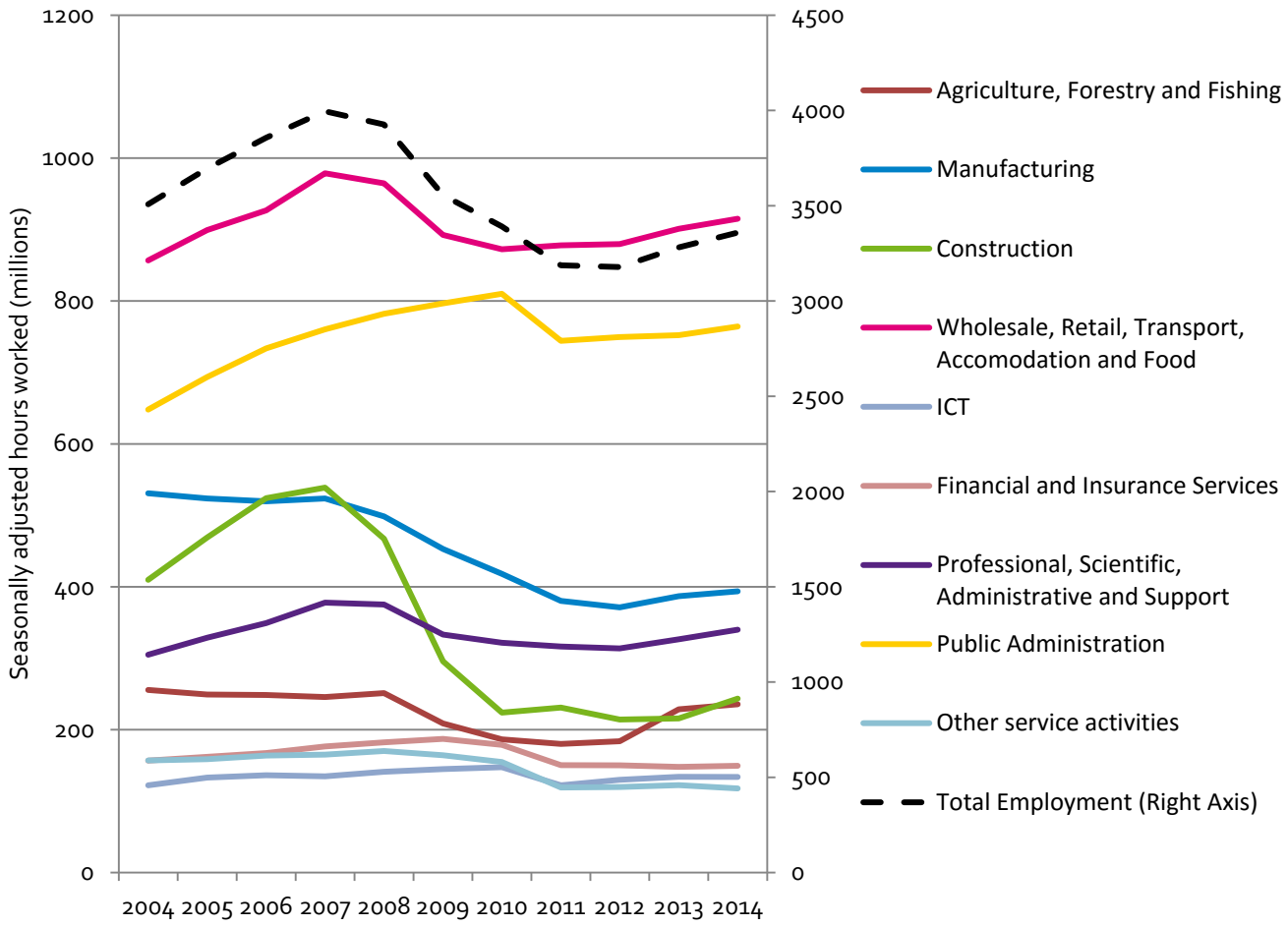
Figure 4.2.2 shows that in terms of the average[27] annual hours actually worked per worker, over the period 2004-2014 Irish workers worked more hours than the countries considered in this report[28]. It shows that while the differential has narrowed over the recession Irish workers tend to work more than the OECD and Euro are averages. In the period 2004-2014, the average annual hours actually worked per worker in Ireland decreased by 2.8 per cent in Ireland from 1,883 in 2004 to 1,821 hours per worker in 2014. In comparison in 2014 average annual hours actually worked per worker were 1,458 in Denmark, 1,677 in the UK and 1,789 in the US. The trend in declining hours is common across advanced economies where the average annual hours actually worked per worker have been declining since 2000.

This drop in working hours is attributed by the OECD to being in part a reflection of the effect of the economic recession and in part related to the greater number of part-time workers in employment. Over the past decade this has increased across much of the EU, from 16.7 per cent to 19.6 per cent of total employment between 2004 and 2014[29]. Part-time employment has traditionally been more common among women and is the means by which they combine paid employment and childcare. However, it should be noted that there is

[26] Actual hours worked include regular work hours of full-time, part-time and part-year workers, paid and unpaid overtime, hours worked in additional jobs, and exclude time not worked because of public holidays, annual paid leave, own illness, injury and temporary disability, maternity leave, parental leave, schooling or training, slack work for technical or economic reasons, strike or labour dispute, bad weather, compensation leave and other reasons.
[27] This data is calculated as the total number of hours worked over the year divided by the average number of people in employment with part-time and full-time workers counted.
[28] Data not available at Euro area level
[29] Eurofound, Developments in working life in Europe 2014: EurWORK annual review,2015

considerable variation in the trajectory and composition of hours worked and the incidence of part time working at sectoral level.

Figure 4.2.3 Hours worked (millions), seasonally adjusted, Ireland 2004-2014



Source OECD

Figure 4.2.3 shows the trends in hours worked measured in seasonally adjusted millions of hours for the Irish economy and at sectoral level over the period 2004-2014. Reflecting the trend highlighted in Figure4.2.2, in the period 2004-2012, total hours worked increased significantly and then declined sharply in the run up to and during the economic crisis, thereafter growth in hours worked resumed as the economy recovered. Using this measure, total hours worked decreased by 4.2 per cent in the decade. However, the chart highlights the considerable variation between sectors in terms of hours worked.

Hours worked in Manufacturing decreased by 25.8 per cent and the sector accounted for a declining share of total hours worked in 2014 13 per cent of total hours compared with 16.7 per cent in 2004. The rise and fall of the Construction sector is evident with hours worked declining by a similar share to the fall in employment (-40%) and the sectors share of total hours worked decreasing from 12 per cent to 7 per cent between 2004 and 2014.

The trend in the services sector is mixed. The Distribution trade, transport, accommodation and food sector continues to account for the largest share of hours worked (27.2%) and hours worked increased by 6.8 per cent over the decade. Hours worked in Professional services increased by 11.5 per cent and the sector accounted for

10.1 per cent of hours worked in 2014 (+1.4%). Hours worked in ICT increased by 9.6 per cent and the sector accounted for a relatively small and static share of total hours worked (4.5%). The significant increase in hours worked in the broad public services sector is notable with hours worked increasing by 25 per cent in the period 2004-2010 and the sectors share of total hours worked increasing from 18.5 per cent to 22.8 per cent over the decade to 2014.

5. Trends in Productivity at Sector level

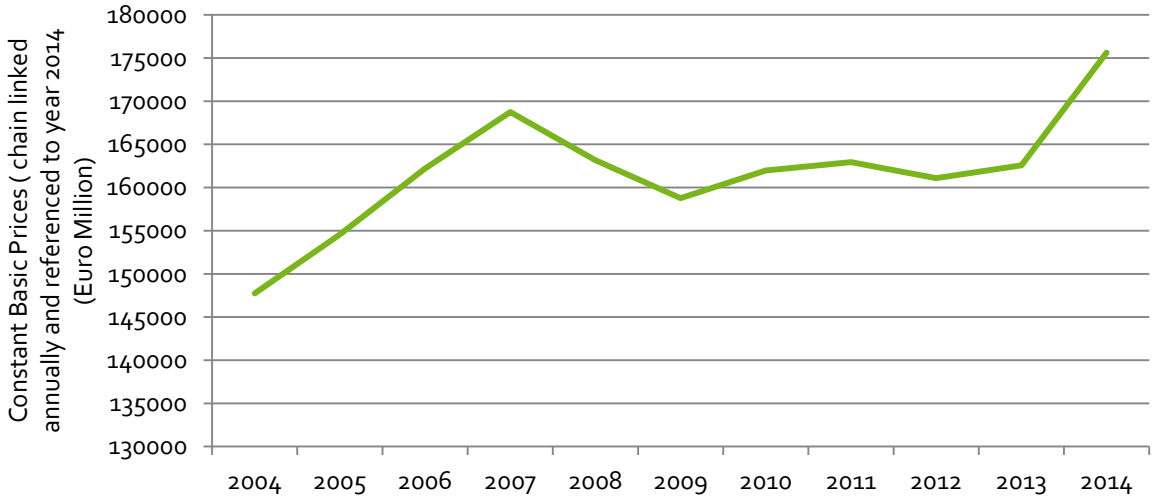
5.1 Overview

There is considerable heterogeneity between sectors in terms of productivity growth. There are many possible factors which can influence diverging growth patterns. These can include the intensity of competition and regulation in the market, the degree of skilled labour and capital in production, propensity to innovate and export degree of standardisation, economies of scale, and participation in global value chains. It is beyond the scope of this benchmarking report to establish the root causes of differing productivity growth across sectors. This chapter sets out trends with specific productivity at sector levels drawing largely on CSO/OECD data30. OECD analysis suggests that the rate of productivity growth varies across economic sectors, with global (exporting) sectors and firms tending to perform best and larger indigenous domestically traded sectors performing poorly.

5.2 Total and Sectoral Output Trends

In analysing productivity at sectoral level, the OECD considers Gross value added (GVA) an appropriate measure of output. GVA is the measure of the value of goods and services produced in industry or sector of an economy. Figure 5.2.1 shows the trend in total economy value added in Ireland over the period 2004-2014. Over the period 2004-2014 output as measured by GVA at constant prices[31] increased by 18.8 per cent from €147,741 million in 2004 to €175,626 million in 2014. As the chart shows, the trajectory of growth was not uniform and the overall trend masks considerable changes at sectoral level over time.

Figure 5.2.1 Gross Value Added at Constant Prices, Ireland, 2004-2014



Source CSO

In the period 2004-2007, output in Ireland grew by 14 per cent. Table 5.2.2 ,overleaf, shows this growth was largely driven by significant growth in the export facing manufacturing and ICT sectors as well as by domestic

[30] OECD data is compiled by the Central Statistical Office (CSO) and provided to the OECD by Eurostat. The official estimates are published in 'the CSO's National Income and Expenditure' International comparisons are made subject to data availability.

[31] Constant prices are used to remove the effect of changes in inflation. Using constant prices in output enables real changes to be assessed

consumption driven by increases in Retail, real estate and Construction. Between 2007 and 2009, total output decreased by 6 per cent.

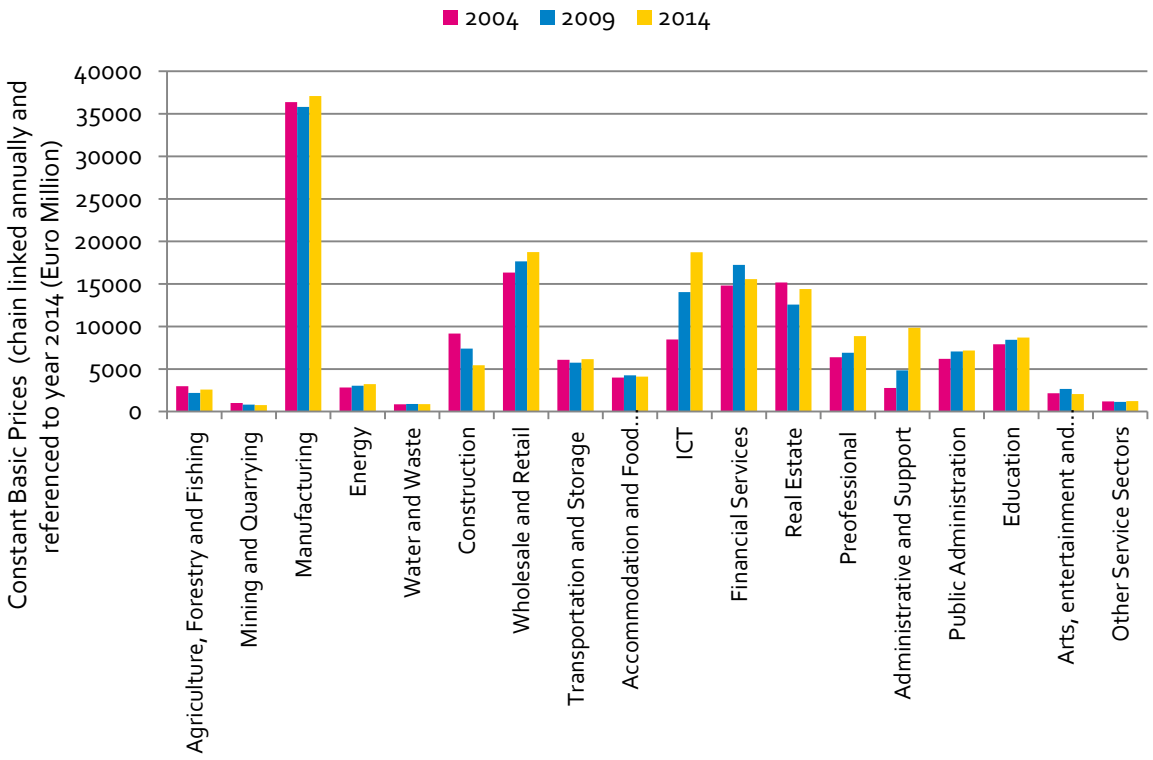
Table 5.2.1 Gross Value Added at Constant Prices, by Industrial Sector, € millions, Ireland, 2004-2014

NACE Sector	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Agriculture, forestry and fishing (**A**)	2978	2161	2358	2404	2325	2189	2274	2524	2263	2178	2585
Mining and quarrying (**B**)	999	1016	1034	1003	938	819	762	651	583	840	754
Manufacturing (**C**)	36380	38492	40534	40047	37806	35815	37782	37968	37332	34819	37093
Electricity, gas, steam and air conditioning supply (**D**)	2834	2941	2941	3083	3219	3041	3141	3066	3005	2845	3230
Water supply, sewerage, waste management activities (**E**)	856	1003	986	1029	1024	890	893	888	884	863	871
Construction (**F**)	9168	10030	10498	10573	9966	7402	5638	4917	4586	4966	5434
Wholesale and retail trade: repair of motor vehicles and motorcycles (**G**)	16329	16513	17692	20616	19462	17654	17923	17713	17612	17678	18748
Transportation and storage (**H**)	6091	6260	6409	6712	6701	5735	5463	5445	5519	5584	6163
Accommodation and food service activities (**I**)	3992	4104	4276	4642	4668	4250	4081	4053	3885	4011	4112
Information and Communication (**J**)	8464	9325	10265	11781	13211	14042	14819	14771	14772	17362	18719
Financial and insurance activities (**K**)	14812	14986	16671	17427	17946	17238	20217	19643	15780	13988	15560
Real estate activities (**L**)	15167	17778	19101	17370	12435	12573	10170	8294	9770	11118	14392
Professional, Scientific and Technical (**M**)	6382	6757	6789	6887	7177	6912	7174	8296	8182	8481	8863
Administrative and support service activities (**N**)	2773	3865	4605	4759	4618	4833	5697	6077	7123	7988	9850
Public administration and defence; compulsory social security (**O**)	6187	6273	6366	6709	7155	7061	7523	7597	7426	7166	7167
Education (**P**)	7912	8084	8186	8441	8377	8443	8468	8515	8534	8606	8691
Arts, entertainment and recreation (**R**)	2154	2228	2461	2581	2647	2667	2657	2448	2310	2158	2063
Other service activities (**S**)	1187	1141	1097	1097	1115	1142	1086	1106	1205	1259	1233
Total Economy	**147741**	**154552**	**162206**	**168734**	**163160**	**158765**	**161968**	**162941**	**161081**	**162561**	**175626**

Source CSO

Table 5.2.1 shows that between 2007-2009, in absolute terms, the largest decreases in productive output were in Manufacturing (-€4,232m), Construction (€-4,797m) and the Wholesale and Retail sector (-€2,962m). In percentage terms output decreased in these sectors by 105.5 per cent, 30 per cent and 14.3 per cent respectively. The ICT sector is notable in that output increased by 19 per cent in this period. Output recovered gradually over the period 2010-2013, driven by strong ICT activity and growth in output in the administrative and professional sectors. In 2013/2014 output increased by 8 per cent with growth 16 of the 18 sectors presented below but driven by an increase in Manufacturing, ICT, Financial Services, Professional and Administrative services and the Wholesale and Retail sectors.

Figure 5.2.2 Gross Value Added at Constant Prices, by Industrial Sector NACE Rev 2, Ireland, selected years



Source CSO

Figure 5.2.2 shows the value added component of total economic activity at detailed NACE level in Ireland in 2004, 2009 and 2014. It highlights that changing levels of output at sectoral level that have occurred over the last decade and pre and post-recession. In a number of services sectors (administrative and support, Professional Services, and Wholesale Retail) that output in 2014 has recovered. Construction output in 2014 was about half below the level of 2004. The chart illustrates the significant proportion of value added accounted by a relatively concentrated number of sectors. In terms of total value added the performance of four sectors, namely, Manufacturing, Wholesale and Retail, ICT and Financial services is particularly important to total output over the period 2004-2014.

Table 5.2.2 Value added and its sectoral components as a percentage of total activity, Ireland 2004 and 2014

	Total Value add € millions		Percent of toal value added	
NACE Sector	**2004**	**2014**	**2004**	**2014**
Total Economy (A-S)	129498	151136	100.0	100.0
Manufacturing (C)	36380	37093	28.1	24.5
Wholesale and retail trade: repair of motor vehicles and motorcycles (G)	16329	18748	12.6	12.4
Information and Communication (J)	8464	18719	6.5	12.4
Financial and insurance activities (K)	14812	15560	11.4	10.3
Administrative and support service activities (N)	2773	9850	2.1	6.5
Professional, Scientific and Technical (M)	6382	8863	4.9	5.9
Education (P)	7912	8691	6.1	5.8
Public administration and defence; compulsory social security (O)	6187	7167	4.8	4.7
Transportation and storage (H)	6091	6163	4.7	4.1
Construction (F)	9168	5434	7.1	3.6
Accommodation and food service activities (I)	3992	4112	3.1	2.7
Electricity, gas, steam and air conditioning supply (D)	2834	3230	2.2	2.1
Agriculture, forestry and fishing (A)	2978	2585	2.3	1.7
Arts, entertainment and recreation (R)	2154	2063	1.7	1.4
Other service activities (S)	1187	1233	0.9	0.8
Water supply, sewerage, waste management activities (E)	856	871	0.7	0.6
Mining and quarrying (B)	999	754	0.8	0.5

Source CSO/OECD

Table 5.2.2 shows value added and its sectoral components expressed as a proportion of total economy (excluding real estate) value added. At 24 per cent, the Manufacturing sector accounts for the largest share of value added in 2014 although its total share has decreased slightly compared to 2004. At 12.4 per cent the proportion of value added accounted for by the Wholesale, Retail and motor trade has declined by a small margin. The increased significance of the ICT sector to the economy is evident in that the sector's share of total value added has almost doubled (from 6.5% to 12.4%) in the period 2004-2014. The proportion of value added accounted for by Administrative and support service activities has also increased significantly from 2.1 per cent to 6.5 per cent. The contribution of the Financial Services sector remains below pre-recession levels.

The declining share of total output in employment intensive sectors is notable. The Construction sector is evident, with output declining and the sector's share decreasing from 7.1 per cent to 3.6 per cent of the total. While the level of value added increased in the Education, Accommodation and Food, and Public Administration sectors their relative shares of the total declined. In Agriculture, Forestry and Fishing both the level and share of value added declined over the decade to 2014.

5.3 Trends in Labour Productivity Growth at Sectoral Level

The composition of Irish economic activity and employment has a big impact on total economy level Irish labour productivity growth. Reflecting trends in output and employment labour productivity growth varies substantially across sectors. Measured on an annual basis, gross value added per hour worked can be extremely volatile over periods as short as a few quarters, and on an annual basis. In considering the productivity growth performance of economic sectors in the period 2004-2014 it is useful to consider the overall trends in terms of average annual changes. Figure 5.3.1 uses OECD data to highlight the trends in a number of key sectors of economic activity in Ireland in the years preceding, during, and after the economic and financial crisis in 2008.

Figure 5.3.1 Gross value added per hour worked, average annual growth, Ireland, selected periods, 2001-2014

Source OECD

Figure 5.3.1 shows that in the period 2001-2014, total economy labour productivity growth in Ireland has remained positive. At 2.2 per cent, average annual productivity growth was higher in the period 2007-2009 compared to 2001-2007 when it grew by 1.9 per cent. In Ireland, the superior productivity performance in the exporting sectors before the boom and after the crisis has long been striking. It shows that the positive trend in total economy productivity performance masks considerable variation at sectoral level. While the growth rate in the Manufacturing sector declined from 5.6 per cent in 2001-2007 to 3.1 per cent in 2009-2014, it remained relatively robust. The ICT sector is generally associated with strong labour productivity growth and reflecting the significant increase in value added highlighted earlier its performance was very strong, averaging 19.1 per cent in 2001-2007 and although declining 9.6 per cent in 2007-2014. The most significant improvement in terms of value added per hour worked is in the Professional Services sector where growth increased from 0.7 per cent over the period 2001-2007 to 4.1 per cent in 2007-2014. The improved performance of the Agriculture, Forestry and Fishing and Construction sectors in the period 2007-2014 is likely to reflect strong growth from changes in numbers employment in the period 2007-2009. The negative performance in financial services in the period 2007-2009 is common in OECD countries whose banking sectors were severely hit by the crisis, including Ireland. Growth was negative in the Wholesale, Retail, Transport, Accommodation and Food sector in all time periods.

Figure 5.3.2 Gross value added per hour worked, constant prices, average annual growth, selected countries[32] 2001-2014

Source OECD

Figure 5.3.2 supplements Figure 5.3.1 to show Irelands' performance at sectoral level with reference to performance in Denmark, the UK and the Euro area. In terms of total economy productivity, at 2 per cent, Ireland's performance was stronger than Denmark (0.7%), the UK (0.9%) and Euro area (0.9%). In an international context, Ireland's sectoral growth performance is particularly strong in Manufacturing, ICT and Professional Services. Labour productivity growth rates generally tend to higher in the Manufacturing sector compared to agriculture, Construction and the services sectors. This trend is evident across the OECD.

The strength of Ireland's Manufacturing sector productivity growth is also evident, with growth averaging 4.3 per cent over 2001-2014. As highlighted by the OECD, average labour productivity of large manufacturing firms is significantly higher in Ireland, reflecting in large part the high intellectual property content of output, typically provided by multinational firms. Growth in the sector was also relatively strong in Denmark where it increased by 3.2 per cent. In Ireland's case the performance of the ICT sector is particularly striking. This reflects the increasing presence of ICT multinationals producing high value added services in Ireland in recent years. The average annual growth in ICT gross value added per hour worked in Ireland was 15 per cent over the period 2001-2014, compared with rates of 6.4 per cent, 1.9 per cent and 2.8 per cent in Denmark, the UK and Euro area respectively. Value added per hour worked in Professional Services grew by 3.7 per cent in Ireland and 2.1 per cent in the UK but growth was negative in Denmark (-1.3%) and the Euro area (-1%). In all countries growth was positive but comparatively low in the Construction sector. In agriculture, productivity growth was negative (-0.5%) in Ireland but strong in the Euro area (3.1%) and Denmark (2.3%). The negative growth performance of Ireland's Wholesale, Retail, Transport, Accommodation and Food sector is notable in an international context. Labour productivity growth declined by 3.1 per cent in Ireland but increased in

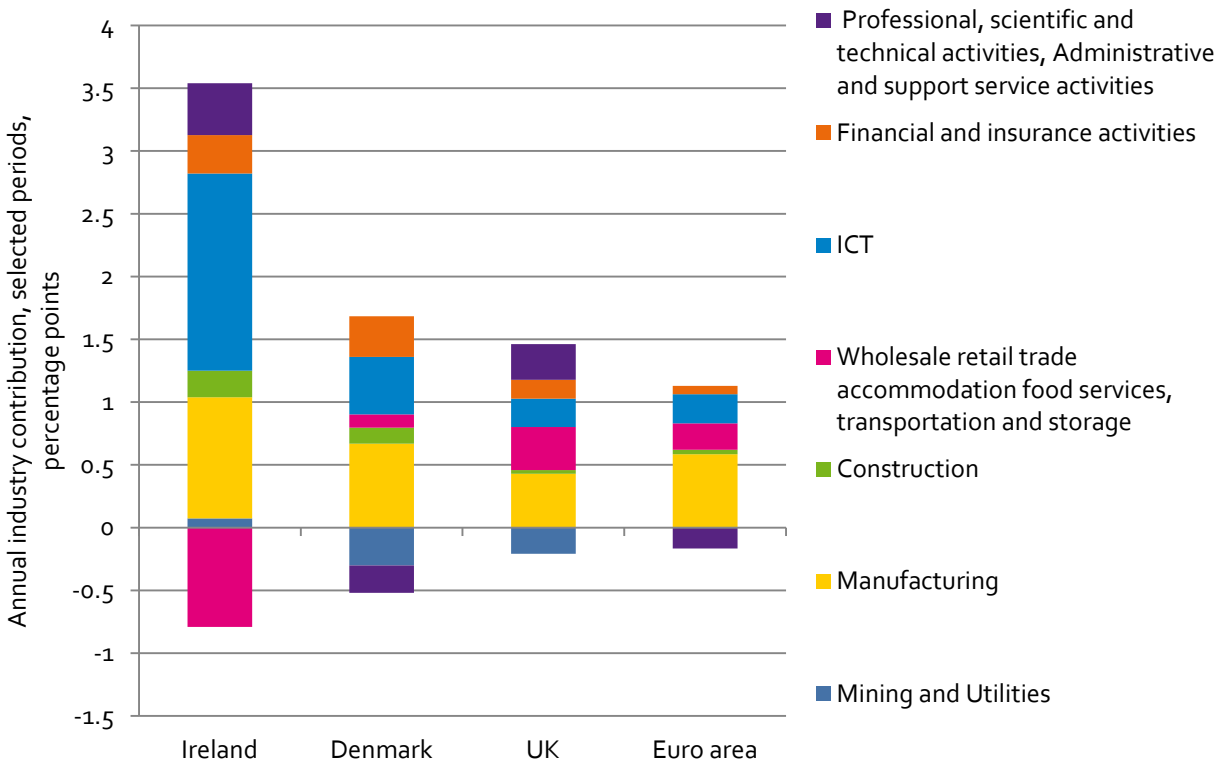
[32] Comparable OECD data for the US was not available

Denmark (0.3%), the Euro area (0.7%) and the UK (1.2%). With the exception of Denmark (3.8%), growth in the financial services sector was positive but below 2 per cent in the selected countries.

5.4 Sectoral Contributions to Business Sector Labour Productivity

The contribution of an individual sector to overall business sector labour productivity growth is dependent on its productivity growth, share in total value added and hours worked. It is calculated by the OECD[33] as the difference between the growth rate of value added and that of hours worked, with each weighted by the sector's share in total nominal value added and total hours worked respectively. The business sector is measured as the non-agricultural business sector excluding real estate.

Figure 5.4.1 Sectoral contribution to growth in business sector labour productivity, selected countries 2001-2014



Source OECD

Figure 5.4.1 sets out the annual industry contribution in percentage points to growth in business sector labour productivity in selected countries over the period 2001-2014. It shows that the comparative level of Irish productivity growth has been relatively strong. Examining the contributions of individual sectors shows that Manufacturing has been a key driver of productivity growth in all of the examined countries. Manufacturing accounts for approximately a third of productivity growth in Ireland and the UK and close to 60 per cent in Denmark and the Euro area. The relative contribution of ICT is also strong in all countries and particularly

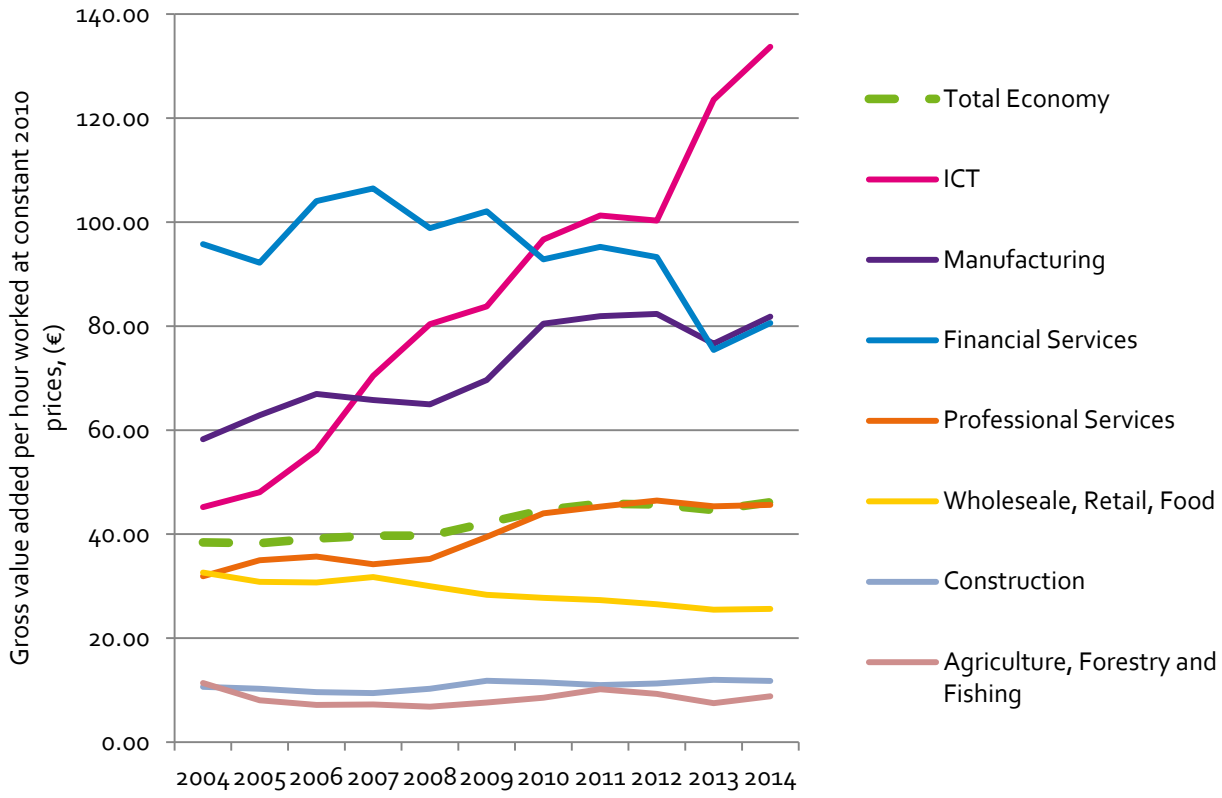
[33] Agriculture, Forestry and Fishing and real estate sectors are excluded by the OECD in this measure

pronounced in Ireland were it accounts for 1.6 percentage points of the total. Compared to the other countries examined, the financial services and Professional Services sectors also made positive contributions to business sector productivity growth in Ireland. Taking the period as a whole, the significant negative contribution (-0.7 percentage points) of Wholesale, Retail, Transport, Accommodation and Food sector to Irish growth is notable and in contrast to the trend in the other selected countries, particularly in the UK.

5.5 Trends in Sectoral Gross Value Added per hour Worked

Figure 5.5.1 shows Gross Value added per hour worked (GVAphw) in euro in Ireland over the period 2004-2014. The chart illustrates the considerable variation and diverging labour productivity performance at sectoral level. Over the decade GVAphw in the total economy increased by 20 per cent and in 2014 output per hour worked for the economy was €46. It was highest in the ICT sector at €134phw and Manufacturing €82phw and lowest in Construction and Agriculture, Forestry and Fishing at €12phw and €9phw respectively. The scale and rate of the increase in the ICT sector is striking. From 2007 onwards GVAphw in ICT increased at a much faster rate than any other sector. In 2004 GVAphw in the sector was €45 and below the Financial Services (€95) and Manufacturing (€58) sectors. GVAphw in Manufacturing increased by 33 percent over the decade. GVAphw in the Financial Services sector decreased by 16 per cent over the decade with the sector experiencing a significant decline in output per hour worked in the period 2009-2013. Output per hour in the Professional Services, Technical and Administrative sector increased by 40 per cent in the period 2004-2014. Growth was particularly strong from 2009 onwards. GVAphw in the Wholesale, Retail, Food and Accommodation services decreased from €32 in 2004 to €26 in 2014, a decline of 20 per cent. GVAphw remained below €20 in Construction and the Agriculture, Forestry and Fishing sector over the decade.

Figure 5.5.1 Gross value added per hour trends by sector, Ireland 2004-2014



Source OECD

It should be noted that in the analysis of sectors set out here and in section 5.6 data on Irish output per hour at sectoral level is used. The data is presented for Ireland only and international comparisons are not used. This is because the OECD provides international comparisons of indices and growth rates of industry productivity but not the levels owing to the absence of reliable industry-level PPPs, which are needed to carry out cross-country comparisons.

5.6 Focus on Sectors

5.6.1 Agriculture, Forestry and Fishing

In the period 2004-2014, the absolute size of the agricultural economy and its share in overall economic activity has declined. In 2014 the Agriculture, Forestry and Fishing sector accounted for 1.6 per cent of total value added in the Irish economy (€2,681 million in current prices) compared to 1.8 per cent in 2004. Over the decade the overall level of value added has remained relatively constant, however, in a number of years it has been volatile and it declined significantly in 2008 and 2009. In terms of employment, the sector accounted for 5.5 per cent of total employment compared with 6.1 per cent in 2004. Over the period 2004-2014, the numbers employed decreased by 3.9 per cent from 113,900 to 109,800. Part time employment in the sector increased by 60 per cent to 17,200 over the period 2004-2014. In terms of hours worked, OECD data shows the sector totalled 235.6 million hours in 2014 a decrease of 8 per cent on 2004. The sector accounts for 7 per cent of total hours worked, marginally down on 7.3 per cent in 2004.

Table 5.6.1.1 Annual growth rates GVA per hour worked in Agriculture, Forestry and Fishing, selected countries, 2004-2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Ireland	7.8	-29.3	-11.2	1.6	-6.2	11.9	12.1	19.2	-8.9	-19.2	17.7	1.6
Denmark	3.7	-0.4	11.1	8.2	-20.5	1.3	33.9	-8.7	12.7	-19.4	17.3	3.7
United Kingdom	-4.3	3.4	-6.3	-0.9	3.6	-14	-7.3	14.7	-3.6	9.6	0	-0.9
Euro area (19 countries)	14.8	-5.7	1.6	7.5	7.5	3.1	-0.9	4.1	-1.1	4.7	3.6	3.6

Source OECD

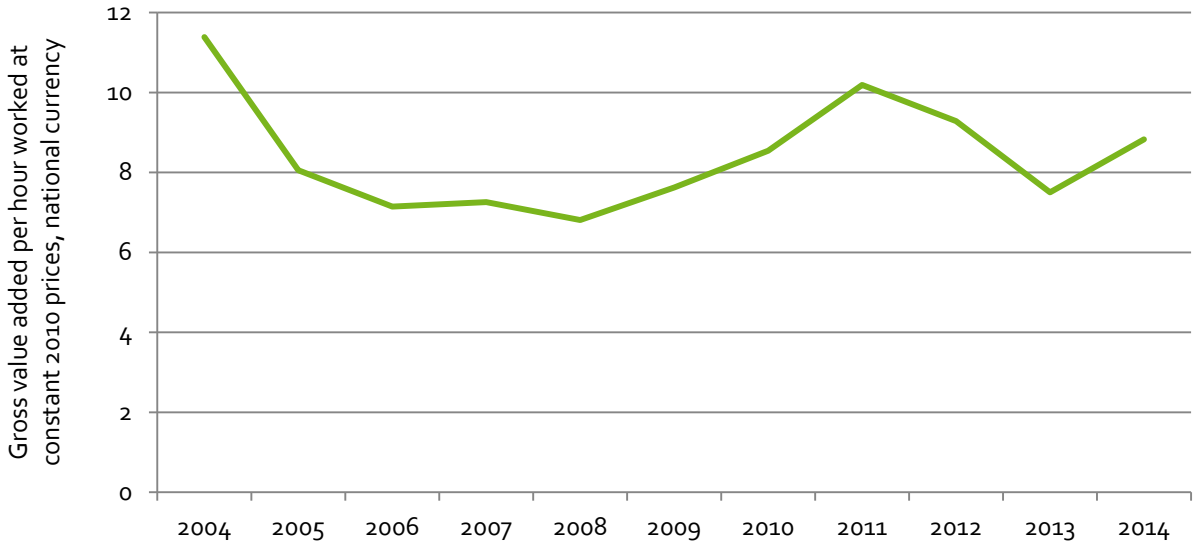
Table 5.6.1.1 shows that over the period 2004-2014 productivity growth in the sector in Ireland ranged from a low of 29.3 per cent in 2005 to a peak of 17.7 per cent in 2014. Over the period as a whole median growth was 1.6 per cent which was below the Euro area (3.6%) and Danish growth rate (3.7%) but well above that of the UK. The table shows that in all of the selected countries, there are significant and wide fluctuations in productivity growth between years. This trend is evident across all of the selected countries. In general, such changes may reflect factors such as climatic influences on crop output and input volumes or outbreaks of animal diseases[34]. While Agriculture, Forestry and Fishing has declined in importance since the eighties and

[34] OECD, Fostering Productivity and Competitiveness in Agriculture,2011

nineties, in terms of value added and employment the proportion of total employment in agriculture in Ireland is high in an OECD context and above that in the Euro area, UK and Denmark.

Productivity levels in Agriculture, Forestry and Fishing are low relative to other sectors in Ireland (and this is common in other OECD countries). Figure 5.6.1.2 outlines in the trend in per-hour productivity in agriculture as measured by the OECD from 2004 to 2014. Productivity performance in the sector is closely related to trends in employment, with the strong increase in value added per hour in the period 2007-2012 corresponding to the decrease in numbers employed. Averaging over the whole sector, per-hour productivity measured as gross value added per hour worked stood at about €9 per hour in 2014, significantly below the total economy level of €41 per hour worked.

Figure 5.6.1.2 Gross value added per hour worked in Agriculture, Forestry and Fishing, Forestry and Fishing, Ireland, 2004-2014



Source OECD

5.6.2 Manufacturing

Manufacturing plays a crucial role in all advanced economies. It is particularly important as a source of productivity growth as the sector is a major driver of innovation and technological advance. It also provides employment across a broad range of skills levels, and generates additional indirect jobs throughout the economy. In the period 2004-2014, the absolute size of the sector in terms of value added increased, however its share in overall economic activity has declined. In 2014 the sector accounted for 24.5 per cent of total value added in the Irish economy (€37,093million) compared to 28.1 per cent in 2004. Over the decade the level of value added in the sector has been volatile at times. For example, it declined significantly in 2013. Output in the sector can be particularly due to sector-specific development, particularly in the pharma-chemical sector. For example, owing to the weight of the pharmaceutical sector, the impact of the 'patent cliff' in the pharmaceutical sector in 2012-2013 acted to depress value added in the year.

Over the period 2004-2014, total employment in the sector decreased by twenty five per cent with 235,000 persons employed in 2014. While Manufacturing still accounts for a significant proportion of total employment, its share is on a long term downward trend. The sectors share of total employment was 20 per cent in 1992, 16 per cent in 2004 and 12 per cent in 2014, although some of this shift in contribution results from the relative increase in employment in services and in the public sector. This trend is not specific to Ireland, however. Many developed countries within the OECD have experienced a similar structural

employment shift in their economies. OECD analysis indicates that in the UK, and US, the contribution of Manufacturing to total employment is between 10 per cent and 11 per cent. In terms of hours worked, OECD data for Ireland shows the sector totalled 394 million hours in 2014 a decrease of 25 per cent on 2004. The sector accounted for a declining share of total hours worked in 2014, 13 per cent of total hours compared with 16.7 per cent in 2004.

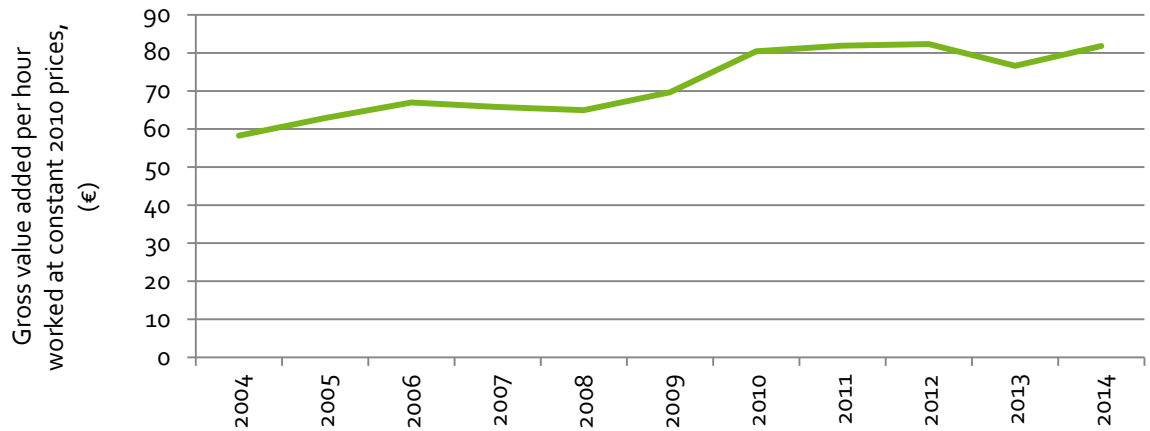
Table 5.6.2.1 Annual growth rates GVA per hour worked in Manufacturing, selected countries, 2004-2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Ireland	2.9	7.9	6.5	-1.8	-1.2	7.2	15.5	1.8	0.5	-7	6.8	2.9
Denmark	5.6	2.6	6.7	1.1	-1.7	0	12.1	3.5	7.2	-0.6	0.5	2.6
United Kingdom	7	3.5	4.6	3	1.5	-2	5.7	1.9	-2.1	-1.9	1.7	1.9
Euro area-19	3.8	3.5	6	3.4	-2.3	-5.1	11.1	3.9	0.3	1.6	1.2	3.4

Source OECD

Table 5.6.2.1 shows that over the period 2004-2014 productivity growth in the sector in Ireland ranged from a low of -1.8 per cent in 2007 to a peak of 15.5 per cent in 2010. Over the period as a whole median growth was 2.9 per cent which was below the Euro area (3.4%) but above the Danish growth rate (2.6%) but well above that of the UK. The table shows that in all of the selected countries, there are significant and wide fluctuations in productivity growth between years. As set out earlier, Manufacturing accounts for approximately a third of productivity growth in Ireland and the UK and close to 60 per cent in Denmark and the Euro area. Ireland's strong productivity performance in manufacturing has been attributed[35] to two factors, namely higher productivity growth in the high-technology sectors than the European average and also a greater degree of specialisation in these sectors. These sectors include chemicals and ICT software products. Figure 5.6.2.3 shows that gross value added per hour worked increased by 40 per cent in the period 2004-2014. Labour productivity in the sector is double that of the level in total economy.

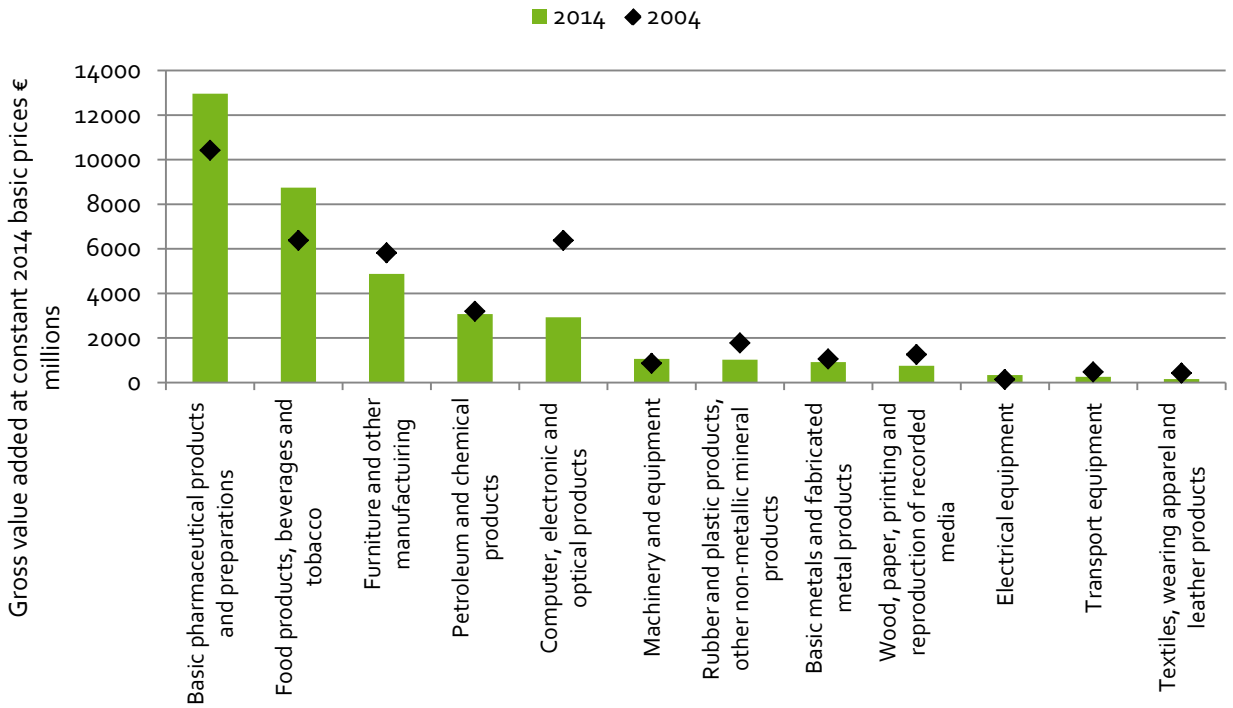
Figure 5.6.2.3 Gross value added per hour worked in Manufacturing, Ireland, 2004-2014



Source OECD

[35] Central Bank, Productivity in Ireland Mark Cassidy,2004, Forfás, Irelands Productivity Performance 1980-2011

Figure 5.6.2.4 Gross value added in Manufacturing, Ireland, 2004 and 2014



Source CSO

Figure 5.6.2.4 shows that there is significant variance in value added within the Manufacturing sector. It is clear that a number of sectors (chemicals, food. electronics and publishing) account for the bulk of value added. The basic pharmaceutical sector is particularly significant, accounting for 35 per cent of Manufacturing value added and 7 per cent of total economy gross value added. The sector experienced particularly strong growth in the period 2008-2010. Value added in the he Food and Beverage sector increased by 37 per cent over the period 2004-2014. The declining importance of the computer, electronic and optical products sector is notable with value added decreasing from €6,375 billion in 2004 to €2929 billion in 2014. While high value added sectors of now dominate manufacturing output, employment in the more traditional indigenous sectors, including the food, furniture and machinery sectors, is still significant, particularly in terms of employment. Overall the largest contributors to Manufacturing employment are the Food, Chemicals, and Computer, Electronics & Optical Products sectors, which together equate to 50 per cent of manufacturing employment. Further analysis in chapter 8 shows an interesting difference in the sectoral composition of manufacturing value added between foreign and Irish-owned firms supported by the enterprise agencies.

5.6.3 Construction

The Construction sector in Ireland is a key driver of economic growth and employment. Broadly, it comprises three sub-sectors (residential, commercial and infrastructure) and each in turn captures investment in new buildings and infrastructure and expenditure on repair, maintenance and improvement of the existing building and infrastructure stock. A decade of phenomenal growth in the period 1997-2007 saw the sector almost double in size and a credit and housing bubble saw the sector overshoot what would be considered a sustainable level of employment and output. The financial and economic crisis had a major negative impact on the sector in nearly all EU Member states with the effect on Ireland being particularly adverse as the economy had become over reliant on the sector. The effects of the crash were particularly pronounced and the fall off in

activity, particularly residential accommodation, resulted in total employment and value added decreasing by over 50 per cent between 2008 and 2012. In 2004, the sector accounted for 9 per cent of the value added in the Irish economy and 11 per cent of total employment. In 2014 the sector accounted for 3 per cent of total value added and 7 per cent of total employment.

Table 5.6.3.1 Annual growth rates GVA per hour worked in Construction, selected countries, 2004-2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Ireland	-0.9	-3.5	-6.3	-1.8	8.7	14.9	-2.4	-4.6	2.9	6.1	-1.6	-1.6
Denmark	-0.9	-4.2	3.1	-3.4	9.2	1.1	-3.1	1.3	4.9	-1.1	1.2	1.1
United Kingdom	4	-6.3	-0.9	-1	0	-12.3	15.2	3	-7.5	-0.3	1.6	-0.3
Euro area (19 countries)	-0.8	-2.4	-0.4	-3	1	1.5	0.7	0.7	1	2.3	0.9	0.7

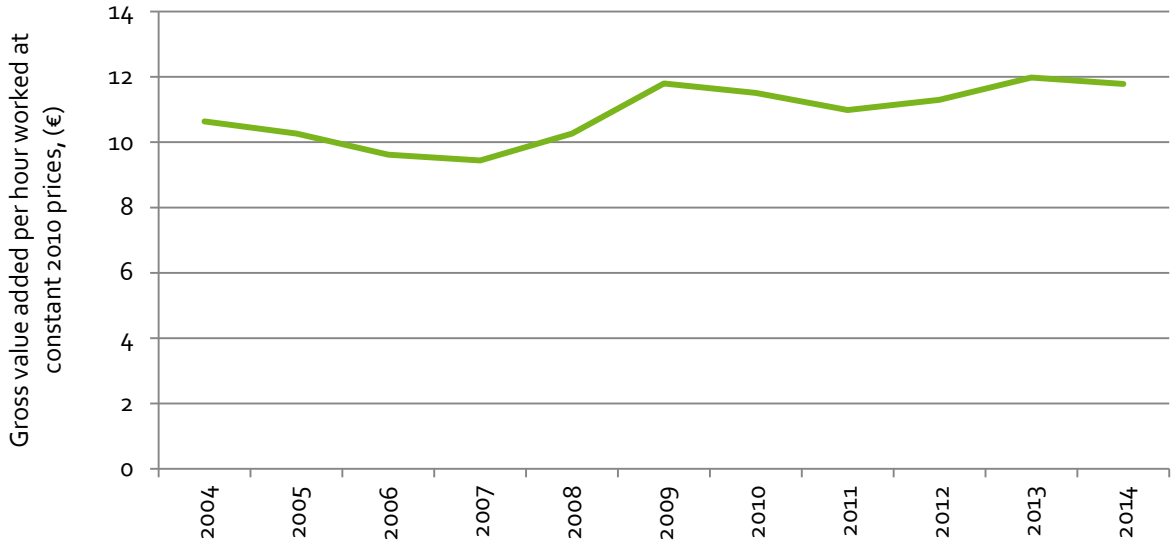
Source OECD

Table 5.6.3.1 shows that labour productivity in Irish construction tends to be cyclical in nature, as activity and employment levels fluctuate over time in response to positive and negative supply and demand factors which respectively encourage or discourage activity levels. The table shows that over the period 2004-2014 productivity growth in the sector in Ireland ranged from a low of -6.3 per cent in 2006 to a peak of 14.9 per cent in 2009. Over the period as a whole median growth was negative at -1.6 per cent. While the median rate was also negative in the UK it was positive in the Euro area (0.7%) and 1.1 per cent in Denmark. The table shows that in all of the selected countries, there are significant and wide fluctuations in productivity growth between years.

Employment in the sector grew significantly in the years preceding the crash (employment in Construction rose by 40 per cent over the period 2002 to 2008) and at peak, it accounted for 13 per cent of total employment in 2006 and 2007. Given that residential construction is relatively labour intensive compared to other areas of construction, its share of employment was even higher. The residential Construction sector accounted for 60 per cent of the value of output from the Construction sector in 2006/2007 as the completion rate of housing increased. The peak of level of residential construction output was in 2006 when 88,400 dwellings were completed. However the number of dwelling unit completions collapsed over the next eight years to 11,000 in 2014 below the levels of the early 1970's. In terms of hours worked, OECD data shows the sector accounted for 243.4 million hours in 2014 a decrease of 40 per cent on 2004.

Reflecting the boom in activity and employment, hours worked in the sector peaked in 2006/2007, when they accounted for 13 per cent of all hours worked. In 2014 the sector accounts for 7 per cent of total hours worked, compared with 11 per cent in 2004.

Figure 5.6.3.2 Gross value added per hour worked in Construction, 2004-2014



Source OECD

Productivity levels in the labour intensive construction are low relative to other sectors in Ireland. Figure 5.6.3.2 outlines the trend in per-hour productivity in the sector over the period 2004 to 2014. Productivity performance in the sector is closely related to trends in employment, with the strong increase in value added per hour in the period 2007-2009 (+25%) corresponding to the decrease in numbers employed. Averaging over the whole sector, per-hour productivity measured as gross value added per hour worked was approximately €12 per hour in 2014, significantly below the total economy level of €46 per hour worked.

5.6.4 Wholesale, Retail, Transport, Accommodation and Food Services

In Ireland, and across the OECD Wholesale, Retail and accommodation and food services comprise large components of the services economy and account for a significant proportion of total employment. Taken together, these services have accounted for 25 per cent of total employment in Ireland over the period 2004-2014 and approximately 20 per cent of total value added. The sector is labour intensive and accounts for the highest number of hours worked in the economy over the period 2004-2014. OECD national accounts data shows that these sectors have maintained a steady proportion (25%) of the total hours worked in the economy. Two labour intensive sub-sectors, Wholesale, Retail and motor trade and accommodation and food services are analysed in depth here.

Wholesale, Retail and Motor Trade Sector

The Wholesale, Retail and motor trade sector accounts for the largest share of employment in the Irish economy, employing over 270,000 people in 2014 and representing approximately 14 per cent of total employment over the period 2004-2014. In quarter 4 2014, 276,700 persons were employed in the sector, accounting for 14.3 per cent of national employment. Of these, 188,900 persons were employed in Retail trade, 48,900 in Wholesale and 38,900 in motor trade. QNHS data shows the sector experienced particularly strong growth over the period 2004-2008 with employment increasing by 23 per cent to reach a peak of 319,600 persons employed in the sector in Q1 2008. However, the sector experienced considerable job losses over the period 2008-2012 as a result of the economic crisis and the consequent decline in consumer spending. The number of people employed in Wholesale and Retail fell by 15 percent from 319,600 in Quarter 1 of 2008,

to a low of 268,200 in Q1 2012 and of Q1 2014. The bulk of the loss of employment were in full time jobs, with the numbers in full time employment in the sector declining from 229,500 in Q1 2008 to a low of 173,800 in Q1 2011 (-24%). The numbers of persons employed part time in the sector has increased by approximately 20 percent over the period 2004-2014, and the share of total sectoral employment accounted for by part time workers has increased by 6 percent to 33.7 per cent. Recovery in employment figures in the sector has been relatively slow and employment levels have fluctuated around 275,000 over 2014. OECD data shows the sector's share of gross value added in current prices also reflects the rise, fall and revival of output over the decade. In the period 2004-2008, value added increased by 37 per cent from €13,082 million to a peak of €18,041 million in 2007. Value added by the sector decreased by 18 per cent over the period 2008-2010 and recovery over the period 2010-2014 saw value added increasing by 5 per cent over the period 2011-2014 to stand at €15,947 million in 2014. In the period 2004-2007, the sector saw a 14 percent increase in hours worked, from 856.9 million hours to 978.7 million hours worked. Over the course of the recession total hours worked declined and fell by 11 per cent to 872.3 in 2010. In the period 2011-2014, total hours worked in the sector have increased albeit at a relatively moderate rate and totalled 915.1 million hours in 2014.

Accommodation and Food Services

The accommodation and food sector is also a relatively labour intensive activity. QNHS seasonally adjusted data shows that in 2014 approximately 137,000 people were employed in the sector (7.2% of total employment) compared with 112,000 persons employed in 2004 (6% of total employment).Overall, employment numbers in this sector fluctuate, and the changes are not just seasonal. The sector accounted for approximately 6.4 per cent of total employment over the period 2004-2014. The sector experienced strong employment growth over the period 2004-2007 with employment increasing by 18 per cent reaching a peak of 135,900 persons employed in the sector in Q1 2007. However, while the scale of job losses were less severe than in other labour intensive sectors such as Construction or Retail the sector experienced a significant and rapid loss of employment as a result of the economic crisis and employment fell by 16 percent from 134,300 in Q1 2008, to a low of 112,500 in Q1 2011. There has been a recovery in employment since 2011, with employment averaging 137,200 in 2014. OECD data shows the sector's share of gross value added also reflects the rise, fall and revival of output over the decade. In the period 2004-2008, value added increased by 17 per cent from €3,992million to a peak of €4,668 million in 2008. Value added by the sector decreased to €4,250 million in 2009 and continued to fall up until 2013. Overall, from peak to trough in 2009-2012, value added decreased by 17 per cent. Value added recovered in 2013 and 2014 and increased to €4,112 million in 2014, however, it remains below pre-recession levels.

Table 5.6.4.1 Annual growth rates GVA per hour worked in Wholesale, Retail, Transport, Accommodation and Food services, selected countries, 2004-2014

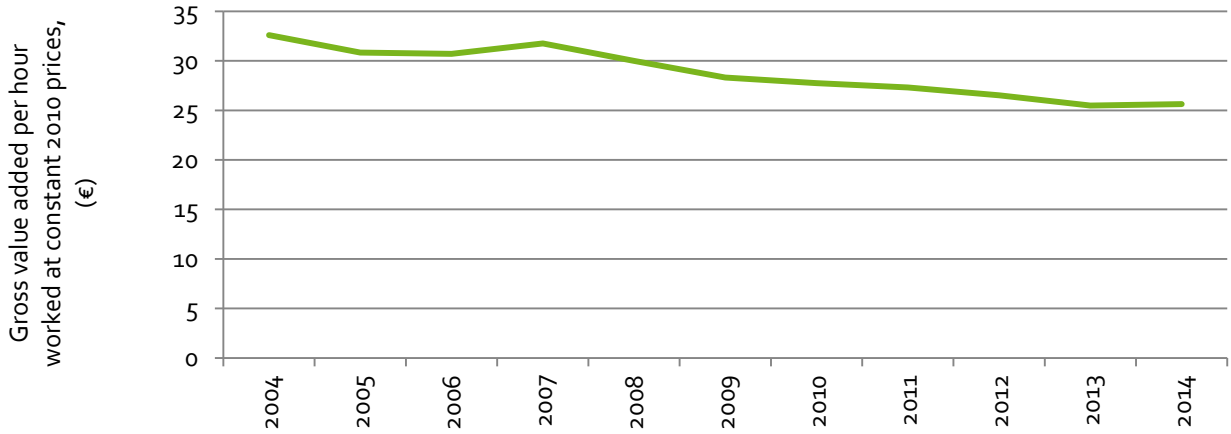
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Ireland	-5.2	-5.4	-0.4	3.4	-5.6	-5.6	-2	-1.6	-2.9	-3.9	1	-2.9
Denmark	1	2.7	3.2	0.2	-8.4	-3.5	8.3	0.6	0.4	-0.9	-0.3	0.4
United Kingdom	2.6	0.5	3	2.8	-2.8	-2.9	2.1	1.1	-1.3	1.3	2.7	1.3
Euro area-19	1	1.5	1.9	0.9	-0.6	-2.9	1.7	2.1	1.2	0.7	0.8	1

Source OECD

Table 5.6.4.1 shows that over the period 2004-2014 productivity growth in the sector in Ireland was negative in every year with the exceptions of 2007 and 2014. Growth was low or negative both in the run up to the

recession, and afterwards. Productivity growth in Ireland and in the other selected countries was particularly low in 2008 and 2009 (-5.6%) reflecting the impact of the crisis. Over the period as a whole Irish median growth per annum was -2.9 per cent. Ireland's labour productivity in this sector appears peculiar given the positive median growth trends observed in the Euro area (1%), Denmark (0.4%) and particularly that of the UK (+1.3%). Ireland's poor performance in terms of annual growth in GDP per hour worked in Wholesale, Retail, transport, accommodation and food services, was shown Figure 5.4.1 which examined the sectoral contribution to productivity over the period 2001-2014. The significant negative contribution (-0.7 percentage points) of the sector to Irish productivity growth is notable and in contrast to the trend in the other selected countries, particularly, the UK. Figure 5.6.4.1 shows that gross value added per hour worked decreased by 21.5 per cent in the period 2004-2014, from €35 to €25phw. GVAphw in the sector is 55 per cent of the level of the total economy. Further investigation and more in-depth research and analysis of the determinants and drivers of labour productivity growth in the sector would be useful. This is particularly the case with regard to the Wholesale and Retail sub sector (which accounts for two thirds of total value added in the sector).

Figure 5.6.4.1 Gross value added per hour worked in Wholesale, Retail, Transport, Accommodation and Food services, 2004-2014



Source OECD

5.6.5 Information and Communication Technology (ICT)

As well as being a sector in its own right, the pervasive nature of ICTs means that it has an impact upon all business and sectors. ICTs are an enabler of productivity growth in terms of logistics and supply chain management; building customer and supplier relations; optimising business processes; enhancing production processes and efficiencies. Over the period 2004-2014 Ireland has cultivated a successful ICT enterprise base, in both software and hardware comprised of both indigenous and multinational enterprises. Ireland has emerged as a global technology hub, with 10 of the top 10 global technology companies and the top 10 'born on the internet' companies. The increased significance of the ICT sector in Ireland is evident in that the sector's share of total value added has almost doubled (from 6.5% to 12.4%) in the period 2004-2014. The ICT sector contributes significantly in exports and high quality employment. While employment in the sector has increased by 20 per cent to 81,900 in 2014, its share of total employment remains relatively small and has been constant over the decade at approximately 4 per cent of total employment.

Table 5.6.5.1 Annual growth rates GVA per hour worked in ICT, selected countries, 2004-2014

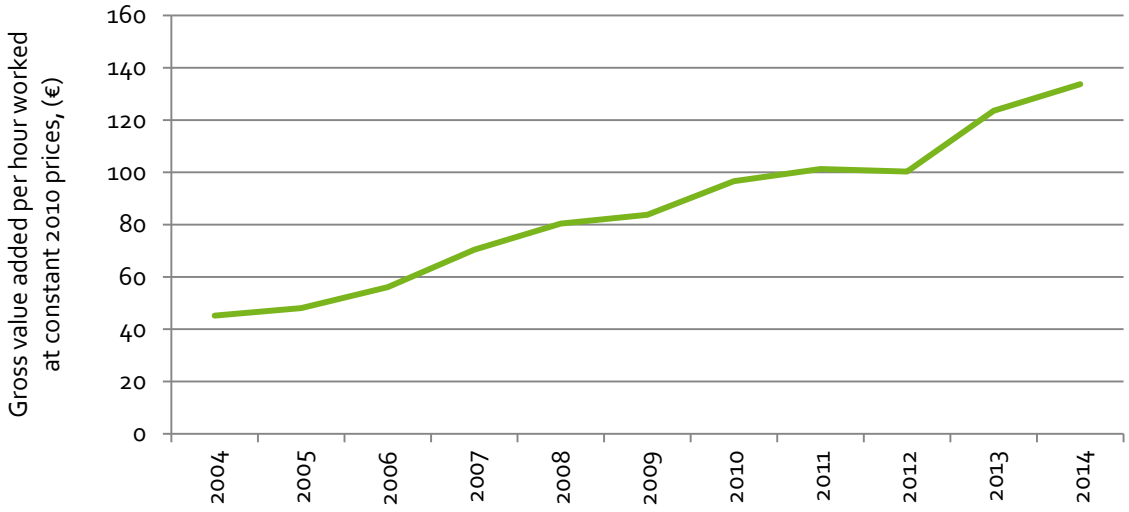
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Ireland	26.1	6.3	16.8	25.5	14.1	4.2	15.3	4.8	-1	23.2	8.2	14.1
Denmark	7.4	6	1.4	10.4	10.9	3	4.7	4.8	3.5	1.1	6.1	4.8
United Kingdom	6.5	1.5	0.6	4.5	5.1	-1.7	6.6	-3.3	4.6	-1.7	-5.3	1.5
Euro area-19	4.8	0.4	4.1	6	1.5	0.3	3.3	3.6	1.5	2.6	1	2.6

Source OECD

Table 5.6.5.1 shows that over the period 2004-2014 labour productivity growth in the ICT sector in Ireland significantly outpaced growth rates in the other selected countries. Growth ranged from a peak of 26.1per cent in 2004 to a low of -1 per cent in 2012. Over the period as a whole, median growth was 14.1 per cent which was below the Euro area (2.6%) and Danish growth rate (4.8%) and the UK (1.5%). The table shows that in all of the selected countries (with the exception of the UK) productivity growth has tended to be positive and well above total economy level growth. In the period 2001-2014, the relative contribution of ICT to overall labour productivity is strong in all selected countries but particularly pronounced in Ireland were it accounts for almost 50 per cent of the total. Across the OECD, the share of total labour productivity growth accounted for by the ICT sector is highest in Ireland over the period. ABSEI data in chapter 8 shows that productivity was strong in both the Irish-owned and Foreign-owned sectors. Growth in Computer Facilities Management, Computer Programming and Computer Software subsectors drove the increased output in the sector.

Over the decade, GVAphw in the ICT sector grew at a stronger and faster rate than any other sector and was considerably stronger than the rate of growth in the total economy. Figure 5.6.5.1 shows that output per hour increased from €45 in 2004 to €134phw in 2014, an increase of 200 per cent. The scale and rate of the increase in the ICT sector is striking. From 2007 onwards, GVAphw in ICT increased at a much faster rate than any other sector. In 2014, ICT GVAphw was three times the level of the total economy.

Figure 5.6.5.1 Gross value added per hour worked in ICT, 2004-2014



Source OECD

5.6.6 Financial Services

Financial Services is a key sector both as a source of value added and high quality employment. The sector in Ireland is diverse, encompassing domestic financial activities and internationally-traded financial services. Broadly the sector is comprised of: Investment/asset management: incl. real estate, hedge funds & private equity. Banking & capital markets: incl. trading debt, equities, funds, foreign exchanges, commodity & derivative instruments and Insurance & pensions.

Across the OECD, the contribution of financial and insurance services to the economy is greater in value added terms than in employment terms. In Ireland over the period 2004-2014, the sector has accounted for less than 5 per cent of total employment but more than 10 per cent of value added. Despite the impact of the recession, total employment in the sector increased by 9 per cent from 89,200 in 2004 to 97,200 in 2014.9%. The contribution of this sector to total economy value added is high in Ireland. Financial and insurance services generated €15.56 billion of value added in 2014 an increase of 5.3 per cent over the decade. The sector's contribution to total economy value added falling from 11.4 per cent in 2004 to10.3 per cent in 2014. Value added in the sector is derived from three sub-sectors – banks, insurance and financial auxiliaries. The contribution of the banking sector is particularly important. Central Bank[36] analysis of value added in the sector show that in 2011 estimated that Banking accounted for 67 per cent of the value added of the sector with 15 per cent of added attributable to insurance activities.

It should be noted that there are significant methodological difficulties[37] in accurately measuring financial sector output in terms of value added, particularly for the banking system and significant caution is necessary in interpreting the productivity data presented below. The period 2008-2013 was marked by significant turbulence in the domestic and international financial services yet trends in value added output do not necessarily reflect this. As noted by the Central Bank "While Irish banks balance sheets began to contract from 2008 onwards, and government support of around €63bn was injected into banks between 2009 and 2012 (of which €42.96bn were capital transfers), the financial sector itself continued to add value within national statistical accounts, amounting to €15 billion in 2010, which seems counter-intuitive[38]".

Table 5.6.6.1 Annual growth rates GVA per hour worked in Financial Services, selected countries, 2004-2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Ireland	1.1	-3.7	12.9	2.3	-7.2	3.3	-9	2.6	-2.1	-19.1	6.9	1.1
Denmark	9.7	14.4	6.3	7.3	7.5	-11.2	5.3	-4.7	2.9	-1.5	2.9	5.3
United Kingdom	8.2	4.7	9.2	1.1	0.9	1.9	-5.7	-5.3	-1.2	1.8	-2.2	1.1
Euro area (19 countries)	2.1	2.2	3.4	4.4	0.5	-0.4	2.7	1.7	0.3	-1	0.5	1.7

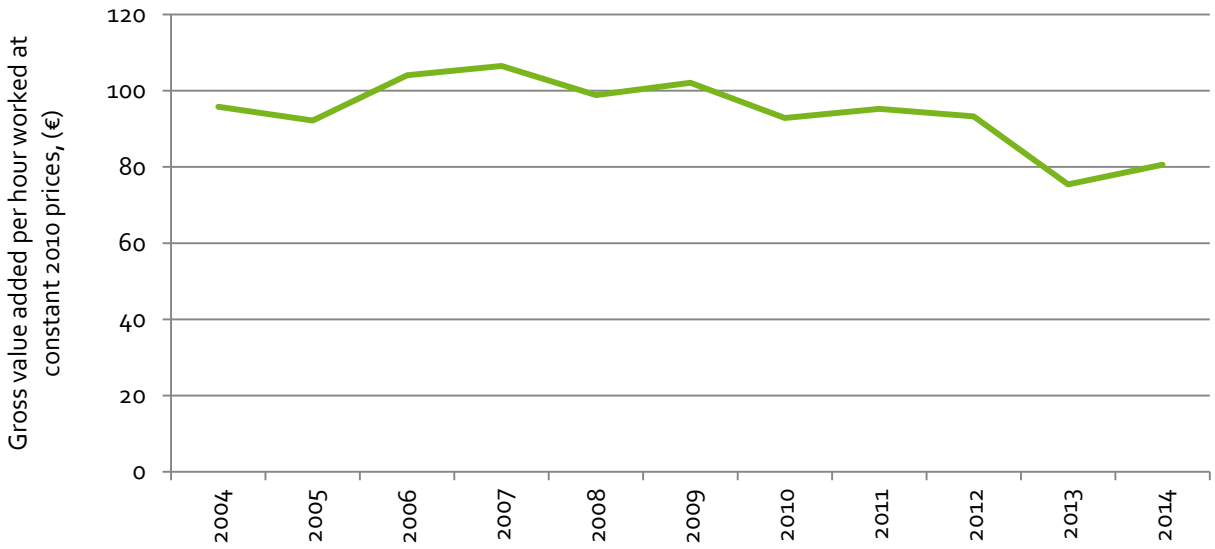
Source OECD

Table 5.6.6.1 shows that over the period 2004-2014 productivity growth in the sector in Ireland ranged from a low of -19.1 per cent in 2013 to a peak of 15.5 per cent in 2014. Over the period as a whole median growth was 1.1 per cent which was similar to the UK but below the Euro area (1.7%) and Danish growth rate (5.3%). Figure

[36] Central Bank of Ireland, Measuring the Value Added of the Financial Sector in Ireland, Quarterly Bulletin 2, 2013
[37] Central Bank of Ireland, CSO, An Alternative Methodology for Measuring Financial Services Sector Output In Ireland, Working Paper for Central Bank of Ireland Statistical Conference, 2014
[38] Central Bank of Ireland, Measuring the Value Added of the Financial Sector in Ireland, Quarterly Bulletin 2, 2013

5.6.6.1 outlines the trend in per-hour productivity in the sector over the period 2004 to 2014. GVAphw has been above the level of the total economy but volatile on annual basis throughout the period. It peaked at €106 in 2007 gross value added per hour worked but stood at €80phw in 2008.

Figure 5.6.6.1 Gross value added per hour worked in Financial Services, 2004-2014



Source OECD

5.6.7 Professional and Administrative Support Services

In presenting annual growth of labour productivity rates the OECD groups together NACE Sector M (Professional and scientific and technical services activities) and NACE Sector N (Administrative and Support Services). NACE sector M is a broad sector, comprised of a number of subsectors at NACE division level. The principal subsectors comprise: Legal, accounting, management, architecture, engineering; Architectural and engineering activities, technical testing and analysis; Scientific research and development; Advertising and market research and other professional, scientific and technical activities. In Ireland and across the OECD, three subsectors dominate the overall level of activity in terms of their contribution to value added. Legal and accounting activities combined with the activity of head offices and of management consultancy activities accounted for approximately 50 per cent of value added in the sector in Ireland in 2014. Architectural, engineering, technical testing and analysis activities and other professional, scientific and technical activities accounts for 23 per cent accounts and 21 per cent of value added respectively. Measured in Gross Value Added at Constant Prices, the sector grew by 30 per cent over the period 2004-2014 and accounted for 5.9 per cent of total economy value added in 2014. Total employment in the sub sector increased by 23 per cent in the period 2004 to 2014 (i.e. from 92,700 in 2004 to 114,000 in 2014).

NACE sector N is also a broad sector, comprised of 6 subsectors: Rental and leasing of goods and services; Office administration; Human resources provision; Travel and tour operations; security; and building services.

The proportion of value added accounted for by the sector also increased significantly from 2.1 per cent to 6.5 per cent. In Ireland and in other countries output in the sector is dominated by the rental and leasing activities. Value added in this sector increased significantly over the period 2004-2014. In 2014 it accounted for approximately 75 per cent of value added in the sector, compared with 49 per cent in 2004. The high level of value added for the rental and leasing subsector reflects the nature of the activity which often involves purchasing capital assets (e.g., property) and generating operating income from these assets. Total

employment in the sector increased by 9.3 per cent in the period 2004-2014, increasing from 58,700 in 2004 to 64,200 in 2014.

Table 5.6.7.1 Annual growth rates GDP per hour worked in Professional Services and Administrative Support services, selected countries, 2004-2014

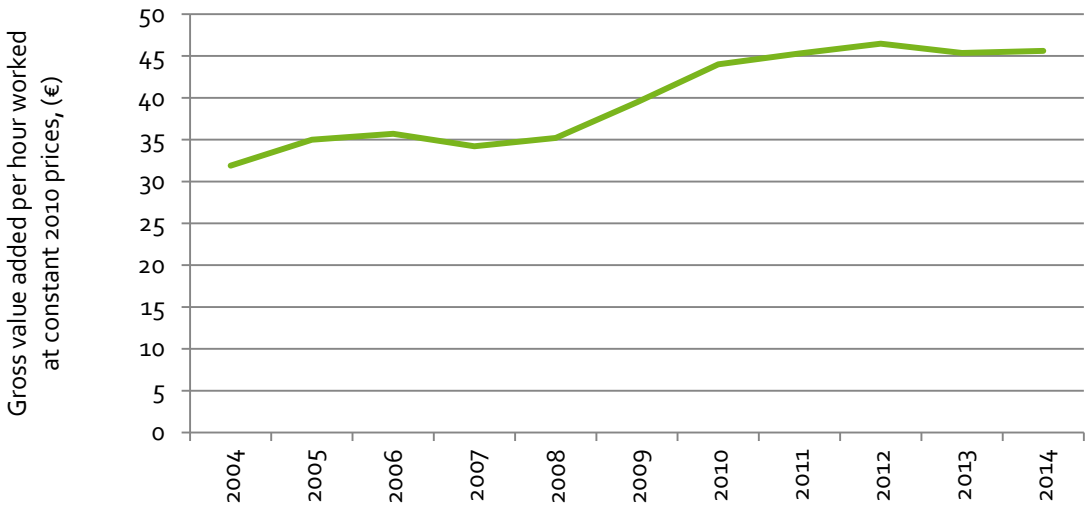
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median
Ireland	-0.4	9.7	2	-4.2	3	12.1	11.5	2.9	2.6	-2.4	0.6	2.6
Denmark	3.3	3.4	-2.7	-6.5	0.3	-2.7	0.6	-1.2	-0.1	-3.1	0.4	-0.1
United Kingdom	1	3.3	4	5.6	0	-4.9	5.5	3.2	0.7	3.9	1.4	3.2
Euro area (19 countries)	-3.5	-0.8	-0.8	-0.3	-1.6	-3.7	-0.2	-0.4	-0.2	1.2	-0.6	-0.6

Source OECD

Table 5.6.7.1 shows that over the period 2004-2014 productivity growth in Ireland in the Professional Services and Administrative Support services sector was positive (median growth of 2.6% per annum). Productivity growth in the sector fluctuated more than in the other selected countries and ranged from a low of -4.2 per cent in 2004 to a peak of 12.1 per cent in 2014. Growth in Ireland was particularly strong in 2009 and 2010.

Over the period as a whole, growth in Ireland was higher than Denmark and the Euro area but behind that of the UK which is among the largest and most specialised Member states in administrative and support service activities. The share of total employment accounted for by Professional Services in Ireland (10.3%) has increased over the decade and is similar to Denmark but lower than the UK (16%) and Euro area (13%).

Figure 5.6.7.1 Gross value added per hour worked in Professional Services and Administrative Support services, 2004-2014



Source OECD

Figure 5.6.7.1 shows that in the period 2004-2014 GVAphw in the Professional and Administrative Services sector increased by 43 per cent from €31.9 in 2004 to €45.6 in 2014. Over the course of the decade, growth in

output per hour in the sector was not uniform. Output per hour increased from €31.9 in 2004 to €34.9 2005 and remained approximately at this level until 2008. In the period 2008-2012, GVAphw increased by 32 per cent, from €35 to €46phw. In 2014 GVAphw in the sector was the same as the level in the total economy.

Box 5.6.8: Public Sector Productivity

"The interdependency between the performance of the public service and the performance of the economy overall cannot be overestimated; a modern, outcome focussed public service will be a key enabler for growth in the private sector and will also underpin the drive for improved competitiveness across the economy". Lansdowne Road Agreement

It is generally accepted that benchmarking public sector output and productivity in a manner that facilitates analysis across sectors and countries is a complex task. Traditionally, public sector productivity has been presumed to amount to zero in the national accounts as the output of the sector has been measured as of the total value of inputs. Clearly, this is of limited benefit in measuring productivity in policy areas and in areas such as education and social welfare.

The Council has for many years emphasised the importance of creating a virtuous circle in both public and private sectors in terms of productivity improvements driving enhanced competitiveness, employment growth and higher incomes and higher standards of living. The productivity of the public sector is as important to the economic performance of a country as the productivity of the private sector. Three reasons are generally identified as to why public sector productivity is important. First, the public sector is a major employer. Second, the public sector is a major provider of services in the economy, particularly business services (affecting costs of inputs) and social services (affecting labour quality). Third, the public sector is a significant consumer of tax resources, particularly payroll. Changes in public sector productivity (which are often linked to reform and pay) can therefore have significant competitiveness implications for the economy.

The Council considers it vital that the possibility of developing metrics to provide objective analysis and agreed data on productivity performance across the public sector is explored. Boyle (2006)** provides a framework for the development of productivity measurement. This framework proposes that action is taken at a number of levels – cross national, national and sectoral, and organisation-based and bottom up – and by a number of organisations to develop information on public sector productivity in Ireland. In this way, a diversity of approaches to productivity measurement can be used to provide a broad picture of productivity developments.

Given the nature, diversity and complexity of the public sector, assessing public sector productivity levels and growth rates is certainly challenging. However, exploring measurement is vital - not only because the public sector is the largest sector in the economy, but also because of the importance of the services it provides to citizens and the enterprise sector. As productivity growth represents the only sustainable way to increase living standards, the Council considers developing metrics for public sector productivity levels and services

- Richard Boyle, Public Sector Management: An Impossible Task?, Forfás, Perspectives on Irish Productivity, 2007

6. Investment and Capital Productivity Trends

6.1 Context

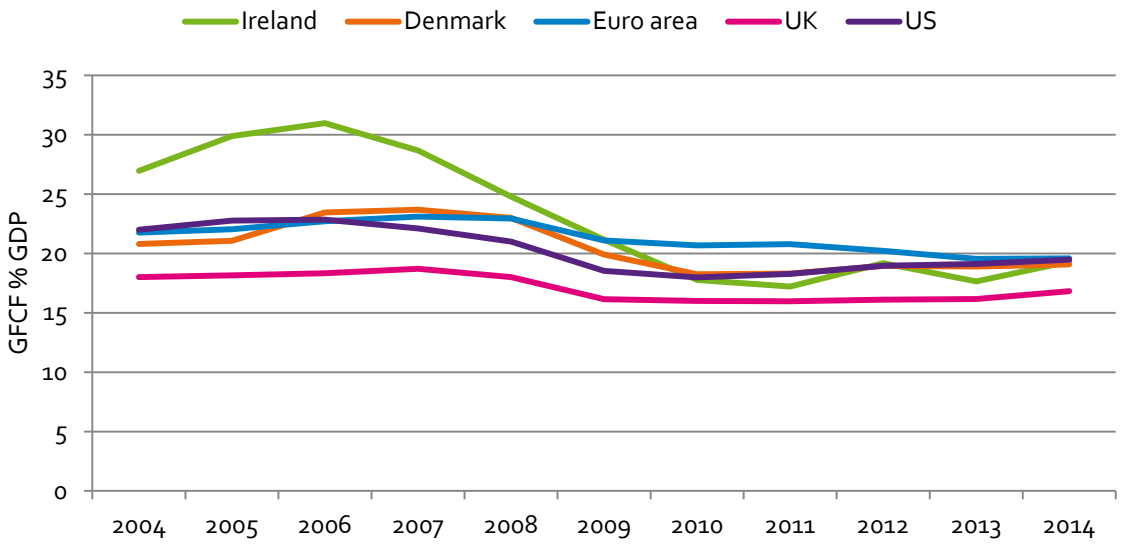
Capital investment is an important driver of productivity. The propensity to which the State invests in infrastructure and the private sector invests in capital is directly related to the medium term productivity performance of the economy. At an economy-wide level, the allocation of capital to different economic activity (sectors) can also influence economy-wide productivity performance. At firm level, labour productivity is affected by both the level of capital stock per worker and the level of multifactor productivity — which measures the efficiency with which this labour and capital is combined to produce goods and services.

However, the direct measurement of the productivity of capital is not a straightforward exercise. While there are estimates of the value of capital assets, these are not always comparable across sectors, countries or time, with for example different treatments of depreciation and even some countries treating certain services as capital assets while other treat them as consumption goods.

6.2 Trends in Investment

Gross fixed capital formation (GFCF) is defined as the acquisition (including purchases of new or second-hand assets) and creation of assets by producers for their own use, minus disposals of produced fixed assets. The relevant assets relate to products that are intended for use in the production of other goods and services for a period of more than a year.

Figure 6.2.1 Investment (GFCF) as a percentage of GDP, Ireland and selected countries, 2004 – 2014

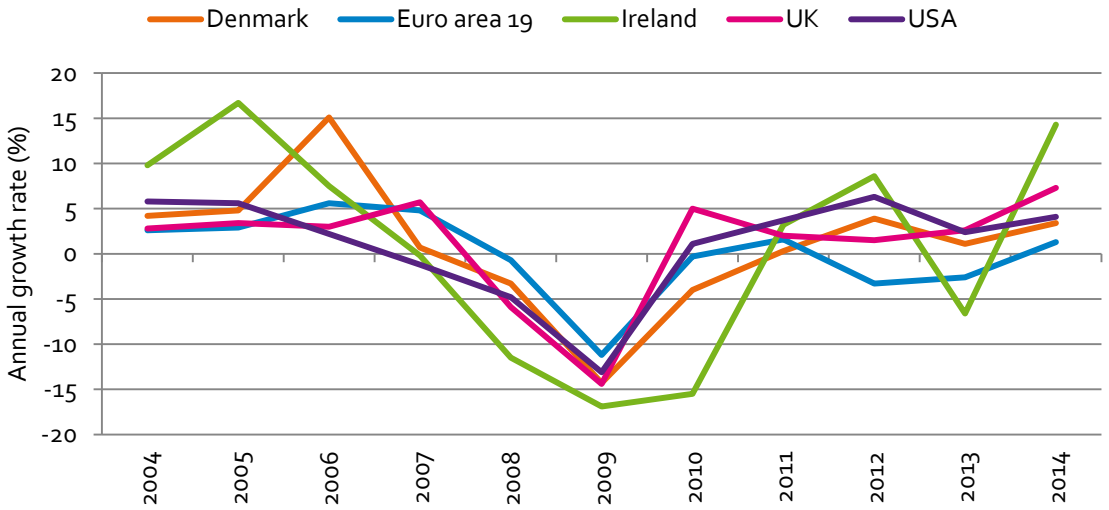


Source World Bank/OECD National Accounts

Figure 6.2.1 shows that between 2004 and 2006, gross fixed capital formation in Ireland rose from 26.9 per cent of GDP to 30.9 per cent, well above the levels seen in the Euro area and other countries such as the UK (18.3%) and US (22%). However, in 2007 the rate of investment began to decline and decreased each year to 2011, well below the EU average of 18 per cent. This drop in investment is linked to the decline in the Construction sector and a significant reduction in public capital expenditure over the course of the economic downturn. In Ireland and the selected countries, investment levels remain below pre crisis levels. In 2014 at

19.3 per cent, Ireland's level was at a similar level to that observed in the Euro area, US and Denmark. UK investment has been below 20 per cent over the period 2004-2014.

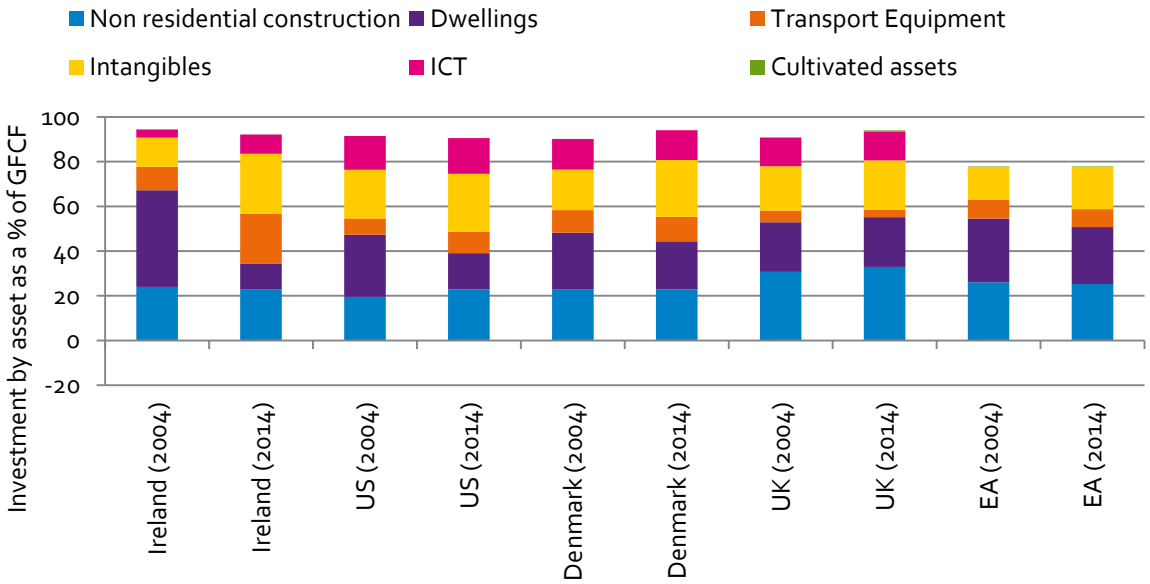
Figure 6.2.2 Investment (GFCF) Total, Annual growth rate, Ireland and selected countries, 2004 – 2014



Source: OECD

Figure 6.2.2 highlights the collapse in investment growth in Ireland over the course of the recession. The annual growth rate in Gross Fixed Capital Formation Ireland declined from +16.7 per cent in 2005 to -16.9 per cent in 2009.

Figure 6.2.3 Investment (GFCF) by asset type as a percentage of total investment, 2004 and 2014



Source: OECD

Figure 6.2.3 shows that while there are still significant differences in the composition of gross fixed capital formation across countries, investment in intangibles products has accounted for an increasing share of total investment in of them over the past ten years. Intangible assets are assets that do not have a physical or financial embodiment. Much of the focus on intangibles has been on R&D, key personnel and software. But

the range of intangible assets is considerably broader. One classification groups intangibles into three types: computerised information (such as software and databases); innovative property (such as scientific and non-scientific R&D, copyrights, designs, trademarks); and economic competencies (including brand equity, firm-specific human capital, networks joining people and institutions, organisational know-how that increases enterprise efficiency, and aspects of advertising and marketing).

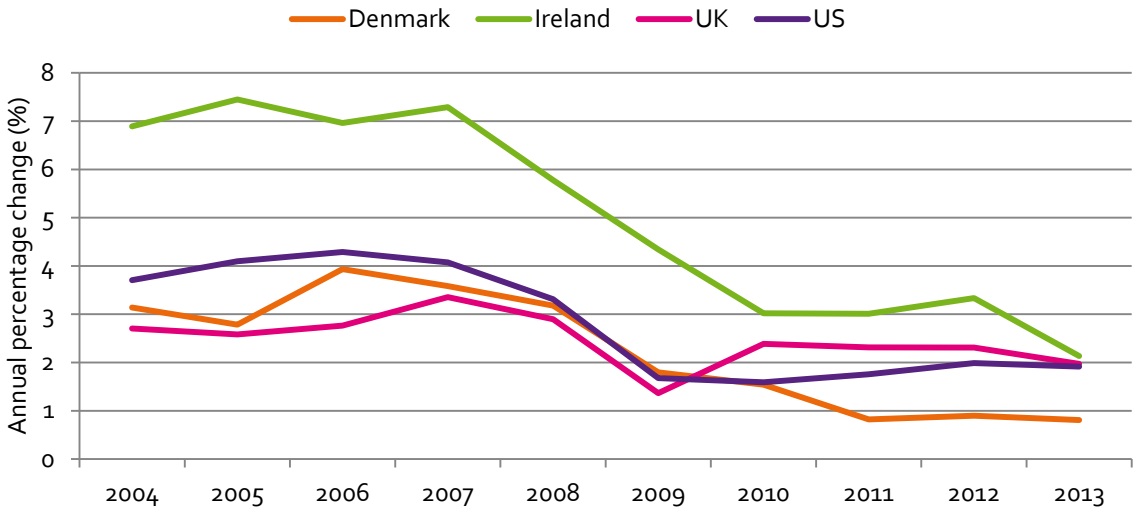
As highlighted in Figure 6.2.3, data shows that across advanced economies, the largest increase in intangible investment over the period 2004-2014 is observed in Ireland. As a percentage of total economy gross fixed capital formation, the share of investment in intellectual property products has increased from 12.6 per cent in 2007 to 26.8 per cent in 2014. The corresponding increases were 16.9 percent to 25.9 per cent in Denmark, 19.2 per cent to 22.2 per cent in the UK and from 22 per cent to 25.9 per cent in the US. The collapse in the Construction sector is also very evident in Ireland with investment in dwellings declining from 42 per cent in 2004 to 11.4 per cent in 2014. It is also striking that the share of ICT investment has increased considerably (8.5% in 2014 compared with 3.7% in 2004) but remains below the other selected countries and is half the level observed in the US (16%).

6.3 Capital Productivity Growth

Capital productivity is a measure of the efficiency in which capital is used to generate output. It reflects the joint influence of labour input per unit of capital used and multifactor productivity (MFP); the latter reflecting the overall efficiency of production. Capital productivity is defined as the ratio between the volume of output, measured as GDP, and the volume of capital input, defined as the flow of productive services that capital delivers in production, i.e. capital services.

For any given type of asset, there is a flow of productive services from the cumulative stock of past investments. This flow of productive services is referred to as the capital services of an asset type and is regarded as the appropriate measure of capital input for production and productivity analysis. Capital services reflect a (physical) quantity, and are considered the appropriate measure of capital input by the OECD[39].

Figure 6.3.1 Capital services Growth, annual change selected countries, 2004-2013

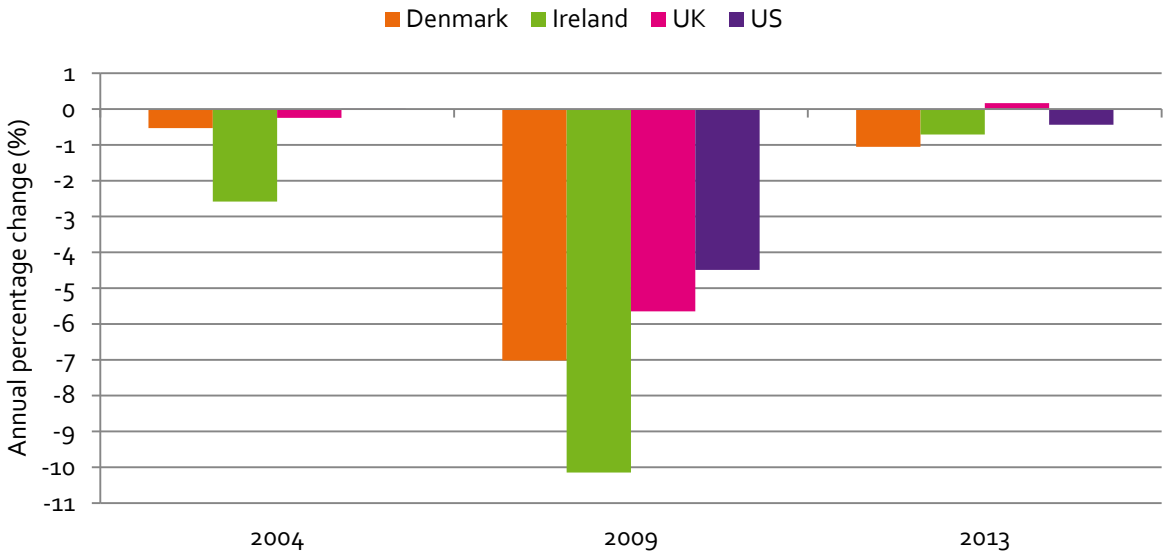


Source OECD

[39] OECD Productivity Manual

Over the past decade, capital services growth has declined in the OECD countries. The flow of capital services has also slowed in most countries, partly reflecting the decline and sluggish recovery of investment, in particular in tangible assets. Figure 6.3.1 shows that over the past decade (the latest data refers to 2013), capital services growth has been in decline. The decline has been particularly pronounced in Ireland falling from 7.3 per cent in 2007 to 2 per cent in 2013.

Figure 6.3.2 Capital Productivity Growth, selected countries, 2004, 2009, 2013



Source OECD

Figure 6.3.2 shows that since 2004, capital productivity growth has been negative or minimal in all of the countries considered in this report. Reflecting the slowdown in investment and capital services growth, the fall was pronounced over the recession, particularly in Ireland where growth declined by 10 per cent in 2009. In Denmark, the UK and US, it declined 7 per cent 5.5 per cent and 4.5 per cent respectively. However, the fall in capital productivity has been less pronounced since 2009 and in 2013 had fallen to below 1 per cent in Ireland and the US and grew by 0.2 per cent in the UK. According to the OECD, declining costs of using capital relative to labour and the resulting fall in the use of labour input per unit of capital services have led to a fall in capital productivity in most countries over the past 20 years[40]. The OECD considers the decline in overall costs of capital may relate to ICT assets where new products' prices have typically fallen very rapidly and which in turn may have spurred the increased use of ICT in production. In fact, the shares of ICT assets in total non-residential investment increased in nearly all countries compared with the second half of the 1990s. However, the fall in capital productivity has been less pronounced after the crisis, partly reflecting the slowdown in capital services. This is attributed to the sluggish recovery of investment, in particular, in tangible assets, as investment in intangibles, particularly, intellectual property products has been more resilient to the crisis, possibly reflecting their less cyclical nature due to the higher sunk costs.

[40] OECD, Compendium of Productivity Indicators, 2016

7. Multifactor Productivity

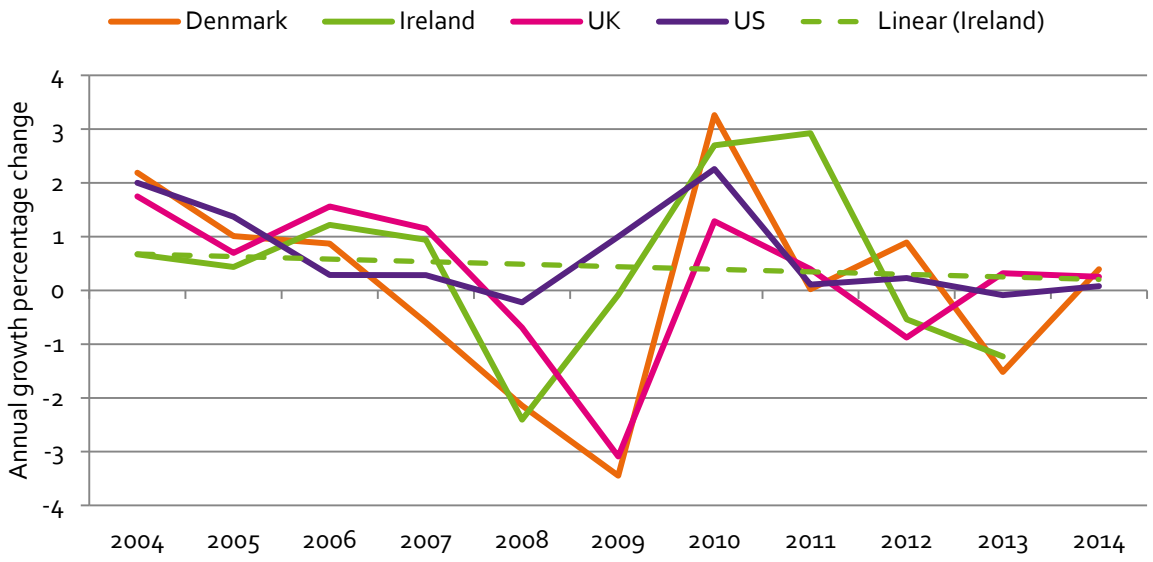
7.1 Context

Multifactor productivity (MFP) reflects the overall efficiency with which labour and capital inputs are used together in the production process Total output growth can be decomposed into a labour input component, a capital input component and MFP growth. Growth in MFP is measured as a residual, i.e. that part of GDP growth that cannot be explained by growth in labour and capital inputs. Changes in MFP reflect the effects of changes in management practices, brand names, organisational change, general knowledge, network effects, spillovers from production factors, adjustment costs, economies of scale, the effects of imperfect competition and measurement errors. In simple terms therefore, if labour and capital inputs remained unchanged between two periods, any changes in output would reflect changes in MFP.

7.2 Trends in MFP Growth

The OECD analysis suggests [41] that the trend in MFP growth tends to be closely related to the economic cycle. Four features explain the cyclical movement. First, growth cycles may relate to imperfect competition and the potential to capitalise on increasing returns to scale during upturns. Second, in downturns labour input tends to adjust in a time lagged manner, as firms retain workers in anticipation of an upturn (labour hoarding). Third, adjustment costs prevent an immediate up- or downsizing of production and capital, resulting in lower utilisation of capital stock. Fourth, the reallocation of resources to production of goods and services with higher or lower marginal productivities may be pro or counter cyclical. In the nineties, reflecting strong export oriented growth, Ireland experienced significant growth in multifactor productivity of approximately 4 per cent per annum (peaking at 7% in 1997) as the economy transitioned from agriculture and relatively low productivity manufacturing towards higher technology sectors and foreign direct investment inflows.

Figure 7.2.1 Annual Growth in Multifactor productivity 2004-2014 [42]

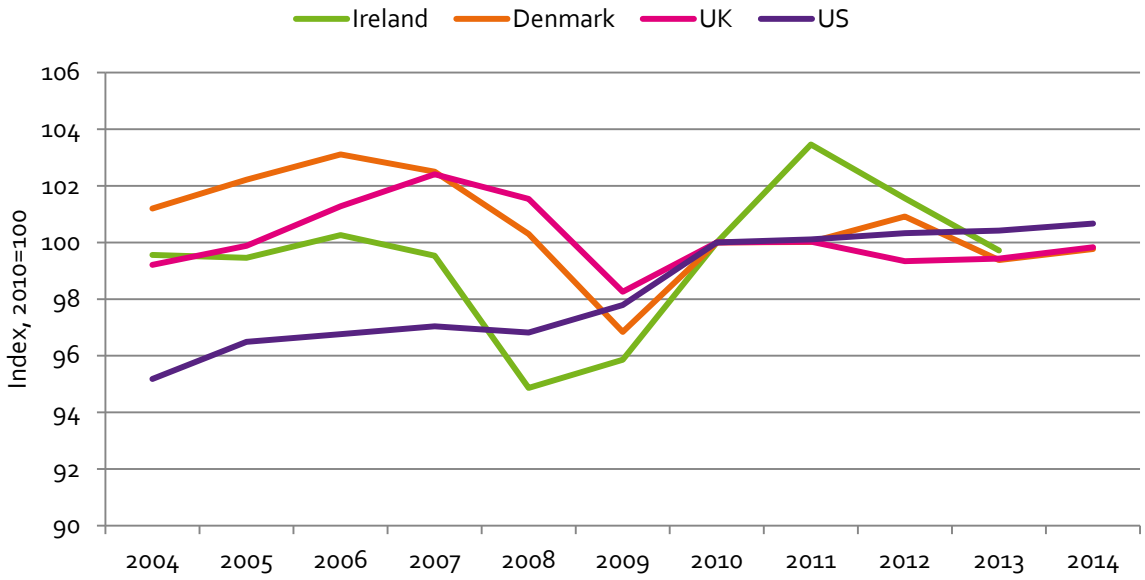


Source OECD

[41] OECD, Compendium of Productivity Indicators, 2016
[42] Euro area data not available and data for Ireland for 2014 is not available.

As highlighted in Figure 7.2.1, from 2004 Ireland's productivity growth started to weaken in line with the experience of many advanced economies, including the US whose technological development is commonly regarded as representing the world frontier. Irish MFP grew by 1 per cent up to 2007 and while growth was strong in some years post 2008, overall it decreased by 0.35 per cent in the years 2007-2013. Prior to the crisis, MFP growth in most OECD countries contributed strongly to productivity growth. In the period 2007-2013 MFP growth decelerated in nearly all countries.

Figure 7.2.2 Multifactor productivity growth index 2004-2014



Source OECD

Figure 7.2.2 highlights how trend growth in multifactor productivity has stagnated. Prior to the crisis, MFP growth in most OECD countries contributed strongly to productivity growth. In the period 2007-2013 MFP growth decelerated in nearly all countries. It has registered almost no improvement since 2012. This is striking as the average growth rate was more than 1 percent from 1999-2006 and 0.5 percent from 2007-2012. The challenge on MFP growth is very widespread across the globe. Prior to the crisis, MFP growth in most OECD countries contributed strongly to productivity growth. In the period 2007-2013 MFP growth decelerated in nearly all countries. Most mature economies including the US and the UK near zero or even negative MFP growth. The OECD consider this trend suggests improvements in the efficiency by which labour and capital are used have stalled and may also be indicative of weak demand and challenges that prevent businesses from maximizing their potential through investments in technology and innovation.

8. Productivity and Firm Level Characteristics

8.1 Context

Productivity growth at firm-level is dependent on a wide range of factors, including sector of activity age and size. Enterprise size classes are defined by the number of persons employed. The main classes by size are:

- Micro firms: with less than 10 persons employed;
- Small firms: with 10 to 49 persons employed;
- Medium-sized firms: with 50 to 249 persons employed;
- Large firms: with 250 or more persons employed.

CSO data[43] shows there were over 238,000 active enterprises in the private business economy in Ireland in 2014, with over 1.3 million persons engaged. 31 per cent of persons engaged are in large firms, 28 per cent in micro firms, 22 per cent in small firms and 19 per cent in medium firms. In most OECD countries, large firms account for a considerable part of the value added of the business sector despite constituting less than 1% of businesses. In Ireland, small and medium enterprises (SMEs) account for 72 per cent of persons engaged and for 99.8 per cent of the total enterprise population. The performance of SMEs and micro enterprises matters in Ireland and across the OECD, where they account for over 95 per cent of firms and 60-70 per cent of employment and generate a large share of new jobs, particularly in the services sector. In terms of international comparisons (latest data available is for 2013), Ireland's largest sector of active firms, the Services sector, at 51 per cent is higher than the EU average (46.5%) but lower than Demark (51%) and the UK (57%).

8.2 Labour Productivity by Firm Size

Productivity generally tends to increase with firm size, as large firms exploit increasing returns to scale. While larger firms are generally found to be more productive, increasingly the OECD find that productivity growth in smaller firms may be spurred by ICT application and competitive advantages in specialty or high intellectual property content activities. New small firms are often found to spur aggregate productivity growth as they enter with new technologies and stimulate productivity-enhancing changes by incumbents. The reallocation of resources across firms, driven by firm dynamics, is also expected to increase aggregate productivity through a process of "creative destruction", whereby innovative firms enter the market and expand while displacing lower productivity firms. Across OECD member states, productivity developments are determined by the diverging performance of three types of firms: the globally most productive (i.e. global frontier firms), the most advanced firms nationally and laggard firms. Productivity growth of the globally most productive firms is strong but the gap between high productivity firms and the rest has increased. The interaction between these three cohorts combines to determine overall productivity performance. Analysing this development, the OECD concludes that "the main source of the productivity slowdown is not so much a slowing of innovation by the most globally advanced firms, but rather a slowing of the pace at which innovations spread throughout the economy: a breakdown of the diffusion machine."[44]

Figure 8.2.1 draws on data published in the OECD's 2016 Entrepreneurship at a Glance report and shows that in most countries compared to large firms there is a significant productivity gap between micro, small and

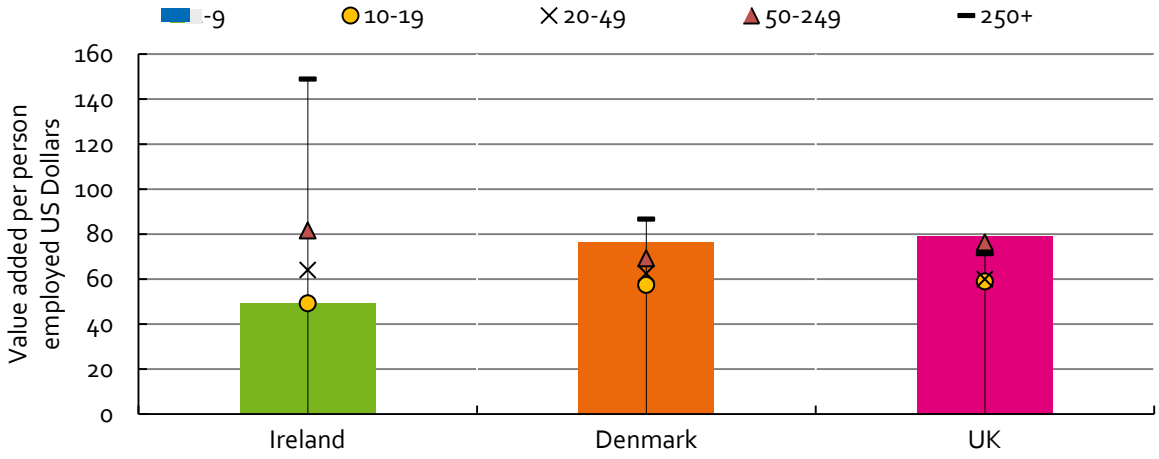
[43] CSO, Business Demography 2014, 2016
[44] OECD, The Future of Productivity, 2015

medium-sized firms. In Ireland, looking at the total business economy there appears to be a strong link between productivity and firm size. The labour productivity gap (measured as value added in USD 000's per person employed) between larger firms and SME and micro firms is particularly wide, reflecting the large contribution to value added by the Foreign-owned sector. The OECD data estimates value added per person employed in Ireland ranges from $149,000 in large firms to $49,000 in small and micro sized firms and $81,600 in medium sized firms.

It is notable that in the UK and Denmark the gap between the large and medium sized firms is less pronounced with micro firm productivity being highest in the UK. Compared to Ireland, output per person employed in large firms is much lower in Denmark ($76,500) and the UK ($78,500). In Ireland and across advanced economies in recent years, labour productivity growth in large firms and SMEs took place in an environment of declining employment and value added. This may indicate that exits of low-performing firms or activities may have played a strong role in the overall increase productivity.

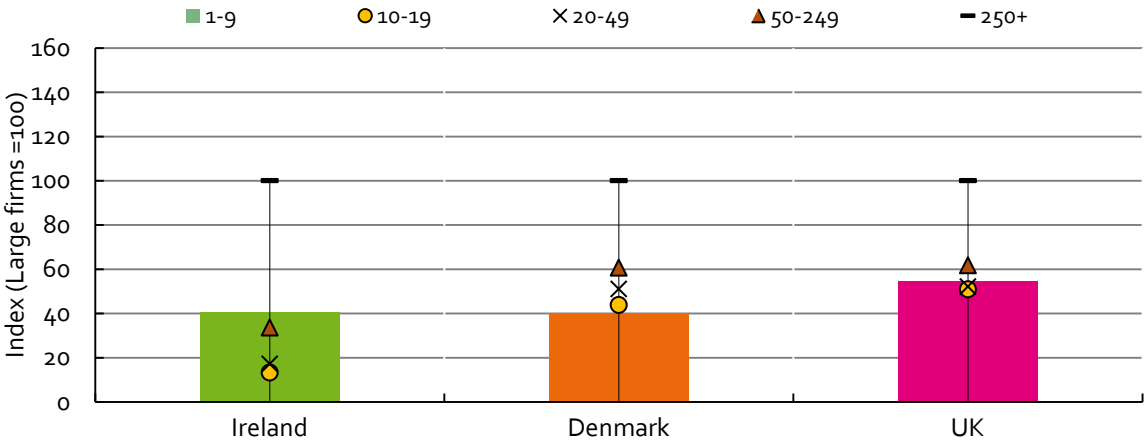
The OECD finds that productivity growth appears to be higher in countries with higher start-up and churn rates, pointing to a possible positive impact of business dynamism (i.e. the entry and exit of firms) on productivity growth. Productivity gaps between large and SME firms tend to remain broadly stable over time, with some variability by country and sector.

Figure 8.2.1 Labour productivity by firm size, Total Business Economy, Value added per person employed, thousands of USD, current PPPs, 2013, or latest available year (Latest data for Ireland is 2011)



Source OECD

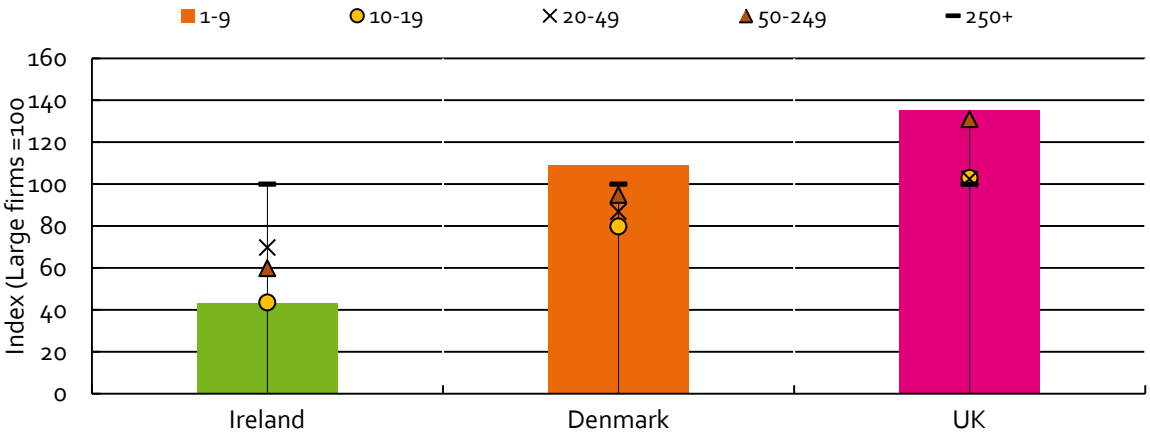
Figure 8.2.2 Labour productivity by firm size, Manufacturing sector, Value added per person employed, index large firms 250+ = 100, 2013, or latest available year (Latest data for Ireland is 2011)



Source OECD

Figure 8.2.2 presents OECD index data that shows in the Manufacturing sector there is considerable variation in labour productivity at firm level depending on firm size. As highlighted by Figure 8.2.1, labour productivity of large manufacturing firms is compared to other countries, significantly higher in Ireland, reflecting in large part the high intellectual property content of output, typically provided by multinational firms. Figure 8.8.2 shows that in Ireland, the labour productivity of micro firms in the sector was 60 per cent less than that of larger firms, with the gap to the largest firms between medium and small firms, 84 per cent and 66 per cent respectively. The relatively poor performance of Irish small and medium sized manufacturing firms in Ireland is striking in an OECD context where the gap is narrower. The OECD consider the relatively strong performance of medium sized firms in other countries may be due competitive advantages in niche, high brand or high intellectual property content activities, as well as the intensive use of affordable ICT can bridge the productivity gap[45].

Figure 8.2.3 Labour productivity by firm size, Services sector, Value added per person employed, index 250+ = 100, 2013, or latest available year (Latest data for Ireland is 2011)



Source OECD

[45] OECD, Productivity Compendium, 2016

In Ireland SME firms are found right across the economy but are particularly prevalent in Wholesale and Retail trade, accommodation and food services, construction, and ICT sectors. Most SME jobs in Ireland are in the service sector. In considering labour productivity by firm size, the OECD find that in general the gap in productivity by firm size is less pronounced in the services sectors[46] , particularly in Wholesale and Retail trade services. Looking at performance in the services sector, Figure 8.2.3 suggests that Ireland bucks this trend in that the productivity gap between Irish service sector SMEs and micro firms relative to larger firms is much wider than most other OECD countries. In particular, relative to the UK and Denmark where the productivity gap in firm size is less pronounced for micro and small firms. The UK is notable in an OECD context in that SME firms and in particular medium sized firms employing 50-249 persons outperform all other firms in the sector. In Ireland, the labour productivity of micro firms in the sector was 60 per cent less than that of larger firms, with the gap to the largest firms between medium and small firms, 40 per cent and 55 per cent respectively.

8.3 Multifactor Productivity at Firm Level

Research on Irish firm level multifactor productivity by the IMF[47] using OECD/Orbis data finds that similar to labour productivity trends, the distribution of productivity among Irish firms and sub-sectors is wide. The evidence suggests that the average level of productivity in services is significantly higher than in the Manufacturing sector. A key factor possibly explaining divergent performance is the prevalence of knowledge-intensive firms in ICT and financial services. Interestingly, the IMF analysis shows that the productivity performance of the median large firm is not significantly different from that of the median small and medium-sized firms. However, the level of productivity of the top small firms is well above that of larger firms in both the Manufacturing and services sectors. Similar to the OECD, the IMF finds that frontier firms are larger and older than laggards and that in the Irish context such frontier firms are 30-50 per cent more productive than laggards. The IMF conclude from their analysis " the productivity growth of SMEs has lagged behind that of large firms, and that productivity growth of medium-sized and large foreign-owned firms outperformed their domestic peers, particularly in the Manufacturing sector". In addition, the analysis suggests that, while there is evidence of diffusion of technologies and innovations from frontier firms towards non-frontier firms, the speed of convergence has decelerated in the post-crisis period (2009-2014), especially among large firms. The IMF analysis suggests that growth is affected by firm-level factors. In particular, the results indicate the following factors are important in terms of productivity growth.

- **Age**. The positive and significant coefficient of Age indicates that younger firms enter the market with relatively lower productivity and, as experience is accumulated over time and production processes becomes more streamlined, gains are realised.
- **Size**. Firm size has a bearing on productivity growth in two contrasting ways. Firstly, larger firms are more likely to be able to benefit from economies of scale and have greater access to capital and technology which can drive faster productivity growth. At the same time, larger firms can be less agile and responsive operationally which can impede productivity. The IMF analysis suggests however, that, other things being equal, productivity declines with size, as measured by both number of employees and total assets. The analysis suggests that the inverse relationship between size and productivity growth is significant only

[46] Financial services activities are excluded. As noted by the OECD "Care is needed when extrapolating the results and drawing conclusions for total market sector activities across countries, in particular those with relatively large financial services activities, such as Luxembourg, Switzerland and the United Kingdom". OECD Entrepreneurship at a Glance 2016

[47] IMF Country Report Ireland, 16/257 2016

among small firms, which may reflect the prevalence of highly productive start-ups. As noted by the IMF "This may suggest that most of the factors, which support higher productivity growth among large firms, are already captured by other variables such as access to finance, innovation, and financial resilience".

- **Innovation.** Consistent with other studies, the IMF conclude that innovation activities, as measured by the ratio of intangible assets-to-total assets have a positive effect on growth.
- **Access to finance and liquidity.** The findings indicate that access to funding contributes to productivity growth. Consistent with this, the results also show that firms with lower cash flow as a share of operating revenue have, on average, lower productivity gains. Firms in financial distress are also impaired from realising productivity gains as profitability is limited, and is primarily used to service debt costs.
- **Ownership.** The IMF suggest that the impact on productivity of ownership (foreign or Irish) is uncertain. Foreign ownership is found to have a positive effect on productivity growth on large and medium-sized firms and a negative effect among small firms. The IMF suggests that Foreign-owned large and medium-sized firms *"are positioned higher in the value chain and thus are more knowledge-intensive compared to foreign-owned small firms".*

8.4 Productivity and Firm Ownership

Ireland's productivity performance (in common with many other countries) is built upon a narrow base of sectors, and indeed, it is likely in some cases, companies. The presence of foreign multinationals in Ireland, particularly in the Pharma and ICT sectors has a significant impact on gross domestic product, value added and accordingly on measures of Irish productivity. Data is not available at OECD level with regard to the productivity performance of firms disaggregated by foreign ownership.

However, the Annual Business Survey of Economic Impact[48] (ABSEI) conducted by the Department of Jobs, Enterprise and Innovation details employment, sales, exports; value added and direct expenditure for Irish-owned and Foreign-owned firms. In the ABSEI, value added is calculated as the total sales of a firm less the cost of materials and services purchased. As a result, it can provide an indication of the specific contribution of firms/sectors in terms of economic activity and an imperfect proxy for productivity as measured by value added per person employed rather than hours worked.

The ABSEI shows that value added by all agency client companies increased over the period 2004-2014 by 24.8 per cent and in 2014 amounted to €59.44 billion. 80 per cent of this value was generated in Foreign-owned firms. Value added by Foreign-owned firms amounted to €47.3 billion of the total in 2014 an increase of 21 per cent on 2004 levels. In terms of the sectoral composition of Foreign-owned value added, the Manufacturing sector accounts for 58 per cent of total Foreign-owned value added. In the foreign sector, the contribution of chemicals to total value added (26%) is particularly significant. ICT accounts for 26 per cent of Foreign-owned value added. Financial services and other services account for the remaining value added. Value added by Irish-owned firms has been on an upward trend since 2004 and was estimated at €12.1 billion in 2014, an increase of 42 per cent on 2004. In 2014 the majority (54.7%) of value added by Irish-owned firms was generated by firms operating in the Manufacturing sector with value added by ICT firms at 13 per cent. Financial services and other services account for the remaining value added.

[48] The Annual Business Survey of Economic Impact is a survey of approximately 4000 client companies of the agencies Enterprise Ireland, IDA Ireland and Údarás na Gaeltachta employing ten or more employees in Ireland. It comprises all the Manufacturing, ICT and Other Services sectors.

In terms of ABSEI employment[49], total employment in agency supported companies increased from 266,334 in 2004 to 286,036 in 2014 (+7.4%). Considering total (Irish and foreign) employment by sectoral share, Manufacturing is the dominant employer with 54.8 per cent of total agency supported employment in 2014. The Medical Devices sector holds 15.3 per cent of employment, with the Chemicals sector the next most significant in terms of employment with 14.1 per cent. In Services, the Information, Communications and Computer Services sector has the highest share of total employment, at 37.7 per cent in 2014. Employment in Foreign-owned firms accounted for 55 per cent of total agency employment in 2004 and 49.9 percent in 2014. Over the period 2004 to 2014, employment in Foreign-owned firms declined by 2.5 per cent from 146,475 to 142,791, with the largest absolute decline witnessed in traditional Manufacturing sectors such as the Computer, Electronic & Optical Products sector. This was offset by a large increase in medical devices employment and by an increase in services employment, particularly computer programming and Financial Services. Total employment in Irish-owned firms increased to 143,248 in 2014 (+19.5%) compared with 119,886 in 2004. Significant increases in employment are evident in the Information, Communications & Other Services sectors where employment increased by 92 per cent in the period 2004-2014. This strong growth accounted for the vast majority of the increase in Irish-owned employment. Employment in Irish-owned manufacturing declined by 4 per cent in the period 2004-2014, with notable declines evident in traditional Manufacturing sectors such as non-metallic minerals and wood products.

Table 8.4.1 Value Added per person employed, €000's, Irish and Foreign-Owned firms 2004 and 2014

ABSEI Sector	Irish 2004	Irish 2014	Foreign 2004	Foreign 2014
Manufacturing & Other Industry (including Primary Production)	€k	€k	€k	€k
Agriculture, Fishing, Forestry, Mining & Quarrying	49.9	59.4	25.7	na
Food, Drink & Tobacco	44.8	71.6	267.4	527.7
Textiles, Clothing, Footwear & Leather	45.2	68	62.5	19.5
Wood & Wood Products	49.6	45.7	106.4	76.6
Paper & Printing	51.3	66.5	118.9	59
Chemicals	47	68	648.9	608.7
Rubber & Plastics	66.4	71	133.9	178.8
Non-Metallic Minerals	70.5	64.4	200	71
Basic & Fabricated Metal Products	51.4	58.3	72.5	108.6
Computer, Electronic & Optical Products	40.4	64.9	246.1	442.1
Electrical equipment	52.9	88.2	50.1	133.5
Machinery & Equipment	48.8	65.5	101.1	113.2
Transport Equipment	48.6	64.9	64.9	85.9
Medical Device Manufacturing	10.4	25.1	133.1	184.9

[49] Employment data is calculated on the basis of data from the ABSEI and are not directly comparable with the results of the DJEI 'Annual Employment Survey'. The DJEI Annual Employment Survey is a census of employment in all agency-assisted companies as at 31st October. The ABSEI is based on a sample of agency-assisted companies with 10+ employees and is undertaken in the first two quarters of the year.

Other Misc. Manufacturing	49.3	62.1	68.6	108.2
Sub Total	50.1	67.3	276.7	349.8
Information, Communications & Other Services				
Publishing, Broadcasting & Telecommunications	63.9	72.3	540.8	126.1
Computer Programming	93	44.8	421.1	414.6
Computer Consultancy	53.8	103.9	75	185.4
Computer Facilities Management	0	39.7	144.3	354.9
Other IT & Computer Services	282.2	59.3	141	368.8
Financial Services	527.9	192.9	483.5	173.3
Business Services	109.5	119.8	44.6	56.6
Education	331.3	307.3	na	na
Other Services	186.1	79.2	24.8	93.3
Sub Total	129	112.1	245.6	309.5
Grand Total - All Sectors	70.9	84.4	266.8	331.6

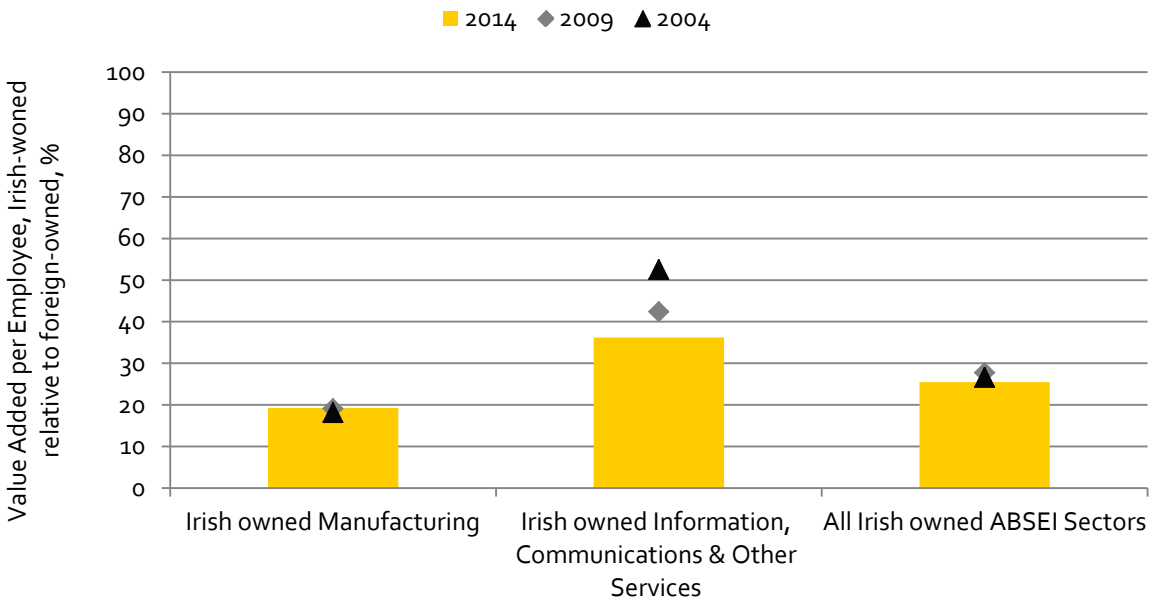
Source Department of Jobs, Enterprise and Innovation

Table 8.4.1 sets out the Total Value Added per person employed in agency assisted firms over the period 2004-2014. It shows that over the decade to 2014 for Irish-owned firms. Value Added per person employed across all sectors of the economy grew by some 19 per cent. In the Manufacturing & Other Industry sector the corresponding average growth was even more impressive at 34 per cent with the productivity levels recorded in the Medical Device Manufacturing sub-sector in 2014 were almost two and a half times those recorded in 2004. Other notable productivity gains were recorded in the Electrical Equipment, Computer, Electronic & Optical Products, and the Food, Drink and Tobacco sectors at 67, 61 and 60 per cents respectively over the decades in question.

For the Foreign-owned sector Value Added per person employed in Manufacturing & Other Industry (26%) exceeded the average across all sectors of the economy (24%) over the period in question. Relative productivity gains in Other Services almost quadrupled and a doubling of Value Added was recorded in the Electrical Equipment, Computer Consultancy, Computer Facilities Management and Other IT & Computer Services sub sectors.

Figure 8.4.2 shows the relative value added per employee of indigenous firms is a fifth of the level of Foreign-owned firms supported by the State's enterprise agencies. The relative gap is particularly pronounced in the ICT and chemicals sectors. Relative productivity across Irish-owned Manufacturing was stationary over the decade to 2014. While minimal reductions were recorded across All Irish-owned ABSEI Sectors between 2004 and 2014, the Value Added per Employee relative to Foreign-owned firms fell by over 25 per cent in the Irish-owned Information, Communications & Other Services sector.

Figure 8.4.2 Relative productivity of Irish-owned firms relative to Foreign-owned firms (Value Added per Employee, %)



Source Department of Jobs, Innovation and Enterprise (2015) Annual Surveys of Business Impact

Box 8. 5: Enhancing Firm Level Productivity

A focus on productivity enhancement should be a core element of each organisation's (public and private) strategy. Simple steps that improve performance, reduce costs, or lead to more efficient processes can have significant impact on the productivity, and ultimately on the success of firms. Examples of such actions are summarised below.

- Investment in ICT (information and communications technologies) can allow a firm to introduce new business models, develop new applications, improve and re-invent business processes and increase efficiencies.
- Investment in more efficient equipment and in technologies that facilitate automation can also have a significant impact on productivity.
- Training can achieve significant productivity growth by investing in skilled providing job-related training. In particular, targeted training designed to address a particular issue can generate significant returns.
- Investment in management development is associated with large increases in both productivity and output - McKinsey & Co. have found that management performance is closely correlated with a range of corporate performance metrics, including labour productivity, sales growth and return on capital employed*.
- Research has shown that process innovation is an increasingly important determinant of innovativeness and competitiveness of individual companies**.
- By adopting innovative HR management policies and practices, companies can make real gains in productivity and performance (e.g. through the use of greater levels of information sharing and consultation with employees; through enhanced performance management and employee retention policies; flexible work arrangements etc.).
- Having an international dimension to business can influence its productivity. Firms that are active in foreign direct investment are more productive than either firms that outsource overseas or are purely domestic. Likewise, exporting firms tend to be more productive than non-exporting companies.
- Using benchmarking tools can drive productivity within a business. Benchmarking provides a 'diagnosis', allowing companies to identify and prioritise productivity-related problems, while world class business tools provide the 'curative' action. For instance, Enterprise Ireland offers a service to client companies wishing to benchmark their company's competitiveness against international standards. This process makes detailed comparisons with like companies and suggests actions to improve performance.

*Management Development Council, Management Development in Ireland, Forfás, 2010

** Hirsch-Kreinsen, H. and D. Jacobson (eds.), Innovation in Low-Tech Firms and Industries, Edward Elgar, Cheltenham, 2008

9. Conclusions and Implications for Policy

Productivity is a multi-dimensional concept; it reflects our ability to produce more output by better combining inputs, thanks to new ideas, technological innovations and new business models. The challenges in improving the quantity and quality of human and productive capital, and enhancing productivity are complex and significant but key to achieving sustainable economic growth, jobs and improved living standards.

Irish labour productivity and multifactor productivity performance is currently positive and above the OECD average and that of the UK, US and Euro area. However, shifts in the composition of employment and the influence of the FDI sector dominate Ireland's performance. Increasing productivity across all sectors and occupations remains a significant challenge in ensuring that the economic recovery underway transitions into sustainable growth. The benchmarking exercise undertaken in this report highlights a relatively overall strong productivity performance for Ireland over the period 2004-2014. However, this masks significant disparity across sectors in terms of productivity performance per hours worked and in terms of output. In particular, performance is heavily influenced by the FDI sector. Even allowing for the impact of Foreign-owned MNC's on certain sectors, adjusted productivity estimates by the NCC (2012) suggest that productivity levels in Ireland are high relative to competitor countries. This report shows the significant variation between sectors and the extent to which national productivity data can mask significant changes at sectoral and firm level.

The OECD study "The Future of Productivity" demonstrates the importance of diffusion of innovations that drive the productivity growth of frontier firms to other firms. The OECD finds that the productivity of frontier industrial firms increased by 3 per cent per annum more than that of other firms in the same sector. That gap increases to 5 per cent in the services sector, where firms have lower levels of skills and productivity, in addition to stricter regulation. Future growth will depend to a large extent on reviving the diffusion machine in each of the national sectors, a factor which propelled a productivity convergence between countries for a large part of the 20th century. The most effective interventions to boost productivity such as skills programmes, technology adoption, business process improvements, and regulatory change are likely to need to be sector specific.

The challenges in improving the quantity and quality of human and productive capital, and enhancing total factor productivity (through technological change, innovation and the application of competition policy) are significant but key to achieving sustainable competitiveness resulting in economic growth, jobs and improved living standards. It is difficult however for policymakers to directly target macro level productivity performance through single policy measures. For example, capital investment provides the infrastructure necessary for enterprise to conduct their operations in a more efficient manner; education and training programmes produce more highly skilled workers who can adapt to the changing needs of employers; and measures to improve credit flows and access to finance ensure that firms have the resources necessary to make investments in technologies to improve their processes, products and services. Innovation is at the heart of the productivity agenda. Innovative economies tend to be more productive, more adaptable and better able to support higher living standards. High levels of innovation require investment in research and development (R&D), by both the public and private sector; the presence of high-quality scientific research personnel and institutions; collaboration between universities and industry; and the application of advanced business processes and practices by enterprise. Competition policy also has a role in driving efficiencies, boosting productivity and stimulating innovation. Recognising that firms do not just compete on price, competition fosters innovation in the form of new products and services and supports economic growth as firms realise they must offer new and improved products and services to stay ahead of their competitors. The narrow base of companies and sectors driving overall productivity performance leaves Ireland vulnerable to external shocks but also serves to highlight the scope for reform.

The OECD's research suggests that a key factor affecting an economy's ability to sustain long term productivity will be participation in global trade and international investment. It has long been recognised that trade can be a spur to productivity growth and there is a vast literature documenting the positive effects of trade on productivity performance. Firms which are more heavily exposed to international competition benefit from a larger market and will have a stronger incentive to innovate and find efficiency improvements than businesses which are more sheltered in domestic markets.

Recognising the importance that productivity plays as the key driver of longer term competitiveness and prosperity is essential. In this regard, the prominence accorded to productivity performance in Enterprise 2025 (EP2025) is to be welcomed. EP2025 sets out a target for Ireland to achieve 2- 2.5 per cent growth in productivity per annum over the next ten years. Taking a whole of enterprise approach, EP2025 sets out a range of actions to improve the operating environment for amongst firms and sectors, boosting internationalisation, fostering emerging sectors, and stimulating innovation are all set out.

The policy mix that best supports robust and broader based productivity growth varies significantly between countries reflecting country-specific conditions such as the composition of their economies and state of economic development[50]. Given the multiple factors that can influence productivity growth, the impact of reforms on productivity growth will vary considerably between countries. As set out in the 2016 Competitiveness Challenge report the Council consider the following factors as particularly important to broadening and deepening Irish productivity growth in the medium term.

- Extending global connectedness, via trade, FDI, and participation in Global Value Chains (GVCs);
- Fostering innovative indigenous start-ups, scaling and improving survival rates;
- Deepening innovation capacity, capability and activity at firm level, particularly in SMEs and Ireland's non-exporting sectors

9.1 Extending Global Connectedness via Trade, FDI, and Participation in Global Value Chains

As a small open economy, Ireland's ability to achieve sustainable growth is dependent on our ability to trade internationally and maintain export trade competitiveness. Trade can facilitate productivity growth in that it drives greater specialisation in activities where a country or a firm has a comparative advantage. Access to a larger market allows firms to benefit from economies of scale, generating larger volumes of activity without increasing the number of people employed or other inputs in the same proportion. Firms which are more heavily exposed to international competition benefit from a larger market and will have a stronger incentive to innovate and find efficiency improvements than businesses which are more sheltered in domestic markets. The empirical evidence suggests strong link between trade, productivity and growth. Long-term evidence from EU countries shows that a 1 per cent increase in the openness of the economy leads to an increase of 0.6 per cent in labour productivity[51]. A recent working paper by the IMF[52] notes that reductions in barriers to trade have been a driver of both output and productivity growth. While barriers to trade in advanced countries have been reduced substantially in recent decades, there is scope for elimination of remaining tariffs and barriers to inward investment which would yield positive productivity gains. This preliminary analysis by the IMF suggests that the scale of the aggregate productivity gain from eliminating barriers to trade is related to sector level tariff rates and each sector's importance nationally. The working paper estimates that Ireland would be one of

[50] See McQuinn, K., and Whelan, K., Europe's Long-Term Growth Prospects: With and Without Structural Reforms, 2015; and IMF, The New Normal: A Sector-Level Perspective on Productivity Trends in Advanced Economies, 2015
[51] European Commission, Raising Productivity Growth: Key Messages from the European Competitiveness Report, 2007
[52] IMF, Reassessing the Productivity Gains from Trade Liberalization, IMF Working Paper, 2016

the biggest beneficiaries of reduced tariffs estimated potential productivity gain for Ireland from eliminating remaining tariff barriers is estimated at 7.7 per cent. Historically, the removal of barriers to trade and enhanced access to new and existing markets has been an important driver of Irish economic development. As well as substantial intra-EU trade, Ireland has significant trading links outside of the EU. Ireland's export destinations, however, are very concentrated and over a third of our goods exports go to two countries: the US and the UK. Multilateral trade agreements improve access to imports with benefits for both enterprise and consumers in Ireland. The EU now has the competence to negotiate agreements and in this context, Ireland needs to continue to ensure its interests are progressed in such negotiations. As set out in the Programme for Government, safeguarding Ireland's defensive and offensive interests in the context of any future international trade negotiations is a key priority. A number of challenges and uncertainties lie ahead given the outcome of the UK Referendum on EU Membership, not least insofar as our trading relationships are concerned. Opportunities arising from negotiated trade agreements need to be utilised, recognising that Ireland's approach to the negotiation of free trade agreements must be informed by the need to acknowledge and address the concerns of stakeholders.

An open trade policy allows firms to fully benefit from international production networks. The ability to learn from the firms with high levels of productivity is stronger in economies that are more connected with the global frontier via trade; are more integrated in GVCs. A key issue for future productivity is how to best capitalise on the benefits of GVC participation. Over 70 per cent of global trade is now in intermediate goods and services and in capital goods. The growth of GVCs has increased the interconnectedness of economies and led to a growing specialisation in specific activities and stages in value chains, rather than in entire industries. Participation in GVCs is, therefore, a critical component of a country's ability to increase productivity and compete internationally. Inward investment brings many benefits such as job creation, increasing tax revenue, competition and boosting trade. OECD data suggests that FDI in Ireland is largely responsible for Ireland's high participation rates in GVCs. GVC participation may boost productivity via a number of channels, including stronger competitive pressures that reduce the cost of intermediate inputs and access to a wider variety of foreign inputs that embody more productive technology. Enhancing exports from indigenous firms and increasing linkages and supporting greater linkages across the FDI and indigenous enterprise sectors offers potential to deepen indigenous firms' links in GVCs and increase productivity.

The international evidence on productivity spillovers from multinationals is somewhat mixed. Research[53] indicates that to benefit from the presence of FDI, firms' absorptive capacity is particularly important (i.e. they must possess certain capabilities before they can usefully apply knowledge gained from a multinational). This suggests that policies which strengthen the absorptive capacity of indigenous firms are central to enhancing productivity levels through knowledge diffusion. In addition, policies which encourage multinationals to generate linkages with the domestic economy and providing new and potential investors with information on the availability sub-suppliers are important. The development of greater linkages between Irish-owned firms and Foreign-owned firms also offers Ireland a potential competitive advantage in terms of attracting FDI and developing Ireland's indigenous enterprise base and should be progressed as a priority. The Council welcomes the ongoing partnership of IDA Ireland with Enterprise Ireland and its indigenous base of companies in identifying synergies, enhancing clusters and participation in site visits. The Enterprise Ireland/IDA Ireland Global Sourcing initiative provides procurement teams of multinational companies, not only in Ireland but also internationally, with access to innovative Irish companies in all sectors. Under the Global Sourcing Initiative, both IDA Ireland and Enterprise Ireland are working together to maximise the opportunity for greater sourcing of materials and services by multinationals from indigenous. The Council considers that the enterprise

[53] See OECD, Interconnected Economies - Benefiting from Global Value Chains, 2013; and Forfás, Perspectives on Irish Productivity, 2007

agencies should continue to work towards deepening the partnership of Irish-owned firms with the multinational sector in Ireland to facilitate productivity growth through technology partnerships, investment or other collaborative engagements.

9.2 Facilitating Start-ups and Scaling of Firms

As noted by the OECD, in most countries there is a divergent productivity performance at sectoral and national level between the most productive enterprises and the long tail of relatively poorly performing firms with low or no productivity growth. Developing a cadre of firms of sufficient scale and capability to make the leap and succeed in international markets is integral to competitiveness. In Ireland and across the OECD, firm size appears to matter in terms of productivity performance. In Ireland as set out in chapter 8, larger firms tend to be on average more productive than smaller ones, particularly in the Services Sector. In the Manufacturing sector, the gap is also pronounced reflecting the presence of high value added multinationals and reflecting gains from returns to scale, for instance through capital-intensive production and intellectual property ownership. In Ireland, small and medium sized enterprises account for 99.8 per cent of the total enterprise population and for 69 per cent of total persons engaged. At the same time, there is evidence that suggests a firm's rate of growth, job creation, and export activity is related more directly to the age of the business than to its size. New firms are however especially relevant for expanding productivity and innovation performance. New start-ups, particularly in ICT, are more inclined to engage in more radical innovations which enhance productivity than incumbents who tend to adopt a more incremental approach. A continuous flow of new business start-ups that can survive and thrive in international markets strengthens the productivity base not only through the creation of new businesses, products and services but also by stimulating improved performance in existing businesses. More than half of productivity growth at the industry level has been attributed to new entrants. From a policy perspective therefore, facilitating entrepreneurship, start-ups and firms of scale must be seen as the dynamo of productivity growth in the long run.

In Ireland, the number of active enterprises and business births remains below pre-crisis levels. CSO data shows there were approximately 238,000 active enterprises in the private business economy in Ireland in 2014, compared to over 244,000 in 2008. The Services sector accounted for 51 per cent of all enterprises in 2014 which is higher than the EU average (46.5%) but lower than the UK (57%) and six other EU member states. The data shows there were 16,257 new enterprise births in 2014, an increase of nearly 18 per cent on 2013. 85 per cent of enterprises created in 2013 were still active in 2014. Of the 17,843 enterprises birthed in 2009, 61 per cent survived to 2014. However, simply measuring the number of individual entrepreneurs or company incorporations is insufficient. Policies that fail to consider the quality of entrepreneurial activity are not likely to succeed. The 5 year survival rate also underlines the importance of policies which support start up activity being accompanied by complementary approaches which facilitate new firms surviving and scaling. To be effective, investment by the State in entrepreneurs must continue to be well targeted, avoid deadweight loss and evaluate the potential quality of entrepreneurial activity, particularly potential to scale. State support to start-ups through Enterprise Ireland in the form of feasibility funding, Competitive Start Funds, HPSU[54] supports and the LEO network is critical.

There are particular and significant challenges in relation to building scale, in areas such as leadership capabilities, strategic focus, and acquisitions strategy and company structure. Scaling interventions may require a variety of different supports at appropriate stages of development. Policy must continue to assist Irish-owned firms to grow to scale and capture new market opportunities, which will increase their

[54] High Potential Start Ups (HPSUs) are start-up businesses with the potential to develop an innovative product or service for sale on international markets and the potential to create 10 jobs and €1m in sales within 3 to 4 years of starting up.

contribution to growth and exports. While no single policy intervention can be expected to generate critical impact on increasing start up levels, various coordinated interventions taken together can combine to create an environment that facilitates the creation of start-ups of scale. This requires institutional arrangements that facilitate efficient firm entry, growth, and exit. While demands on Government finances are intense; investment to stimulate enterprise development must continue be prioritised. In addition, improving the administrative and regulatory environment, increasing the efficiency of the public administration are cost-effective means to stimulate enterprise productivity. Easing the administrative burden that regulations create can improve firm level productivity by reducing costs and minimising the time businesses spend fulfilling regulatory requirements. Well-developed capital markets and markets for seed and early stage finance bankruptcy laws that do not excessively penalise failure, low entry barriers to entrepreneurship are instrumental to increasing productivity through the development of innovative start-ups. The World Bank's annual Doing Business report sheds light on how easy or difficult it is for a local entrepreneur to open and run a small to medium-size business when complying with relevant regulations. In 2016, Ireland achieved an ease of doing business ranking for 2017 of 18th out of 190 economies – a fall of 3 places from the previous year. While Ireland's performance and overall score has improved, other countries have also improved their performance and improved at a faster rate. Ireland is 5th in the Euro Area and performs very strongly in the EU overall, behind Denmark, UK, Finland and Sweden. The UK is ranked 7th, a fall of 1 place from last year. This result for Ireland shows we cannot take business competitiveness for granted. While we are improving our performance other countries continue to reform and we must continue the implementation of high-level reforms to improve business competitiveness environment. It is acknowledged that Ireland's ranking is not just a question of Ireland's absolute deterioration in these categories but rather a matter of other countries improving their position relative to Ireland's. Economies at the upper end of the rankings' scale find it harder to get high impact from their reforms due to their already strong performance (i.e. as a country nears the frontier or limit of best practice, the harder marginal improvements are to achieve).

9.3 Deepening Innovation Capacity, Capability and Activity at Firm Level

While aggregate productivity levels remain subdued the OECD finds that those firms that can combine technological change, organisational and process innovation continue to experience growth. There are many benefits for firms undertaking innovation and these have impacts on productivity including greater responsiveness and understanding of customer demands, faster turnaround times, reduced waste and cost levels, efficiencies from organisational improvements in product design and quality.

Economy-wide productivity and employment gains are generated when innovations are diffused and widely adopted, making strengthening technology diffusion mechanisms a key policy priority. Effective innovation activity facilitates an increase in the productivity and turnover. The extent of innovation activity undertaken and the speed and pervasiveness of innovation diffusion, absorption and use throughout the economy are critically important for productivity growth. From a policy making perspective the key issue is in fostering a supportive environment for investment in innovation and technology adoption. As noted by the OECD in the Future of Productivity, synergic investments in R&D, skills, organisational know-how (i.e. managerial quality) and other forms of knowledge-based capital enable economies to absorb adapt and reap the full benefits of new technologies .

More intensive innovative activity is associated with higher productivity growth. Innovation active enterprises are defined as those which have carried out a product, process, organisational or marketing innovation or exercise an intellectual property right. Recently published results from the Community Innovation Survey

(CIS)[55] show that innovation activity rate for enterprises based in Ireland increased from 59 per cent to 61 per cent in the period 2012-2014. While the increase is relatively small, in a European context Ireland continues to perform strongly and has the 3rd highest innovation rate of all countries for whom data has been published.

While the overall results are positive, the detailed findings suggest significant variation in the level of innovative activity carried out by indigenous and Foreign-owned enterprises and between and within sectors. The Council considers that there is therefore further scope to increase innovation activities in Irish enterprise, particularly in Irish-owned SMEs, particularly in the services sector.

Total expenditure on innovation activities in Irish Industry and Selected Services sectors was almost €3.8bn in 2014, a 4 per cent increase in two years. The main driver for this increase was a 34 per cent increase in the acquisition of machinery, equipment and software which accounted for 31 per cent of total expenditure in 2014. In-house R&D accounted for 50 per cent of all expenditure. External R&D and acquisition of external knowledge represented 10 per cent and 6 percent of expenditure respectively. Innovation active enterprises generated 85 per cent of total turnover in these two sectors. While Foreign-owned enterprises account for only 18 per cent of all relevant enterprises, they account for 61 per cent of all innovation-related expenditure, including €1.3bn on in-house R&D. Innovation spend is dependent on an extremely narrow base of enterprises. Overall, the largest 50 enterprises (1%) of all relevant enterprises accounted for two thirds of innovation expenditure. The most frequent of innovation activity undertaken was product or process (49%) followed by organisational (44%) and marketing innovation (40%).

38 per cent of enterprises had process innovations in the period 2012-2014, while 36 per cent were engaged in product innovations. 27 per cent of enterprises engaged in both. 45 per cent of Industry enterprises were engaged in process innovation compared to 34 per cent of enterprises in Selected Services. Foreign-owned enterprises were more likely to engage in product innovations, process innovations or both compared to Irish-owned enterprises. Almost 23 per cent of the turnover of Foreign-owned enterprises was generated as a result of new to the market and new to firm product innovations which is double the turnover generated by Irish-owned enterprises. The gains associated with new technologies are best realised when firms make complementary investments in organisational change and upskilling. New methods of organising work responsibilities and decision-making (39%) and the introduction of new business practices (38%) were the most cited innovations. An organisational innovation was introduced by 68 per cent of large enterprises, 54 per cent of medium sized enterprises and 41 per cent of small enterprises.

From a productivity perspective, increasing participation on programmes based on productivity programmes such as Lean[56] appears to be an important means of increasing both innovative activity and productivity. The application of Lean principles is designed to build enterprise capability and capacity in people and processes. Enterprise Ireland provides supports for companies to enhance productivity, improve competitiveness and realise transformational change based primarily on Lean principles. Evaluation analysis[57] of the Lean programme has found significant participating firms exhibit considerable productivity gains. The econometric analysis shows Lean delivered positive benefits to participating companies in terms of sales, employment and value added per employee. 77 per cent of participating reported improvements in productivity and/or capacity increases in their final project reports. Lean client companies had an annual productivity value that was of the order of €37,000 per employee higher than companies in the control group uplift of 20 percent. This analysis excludes capacity increases that have yet to impact on sales and future assessments of Lean may show a more pronounced effect on productivity performance over the long run.

[55] CSO, Community Innovation Survey (CIS) 2012-2014, 2016

[56] The application of Lean principles is designed to build enterprise capability and capacity in people and processes. The core idea is to maximize customer value while minimizing waste. Simply, lean means creating more value for customers with fewer resources. See http://www.lean.org/WhatsLean/

[57] Forfás, Evaluation of Enterprise Supports for Start Ups and Entrepreneurship, 2014

In the area of innovation policies, it is important that R&D tax incentives are designed so as to be equally accessible to incumbent, young and new firms. Improving conditions for the creation and growth of new firms increases their direct job-creating potential, and for creating higher productivity at sectoral level. Innovation vouchers are common across the OECD and refer to small lines of credit provided to small and medium-sized enterprises (SMEs) to purchase services from public knowledge providers with a view to introducing innovations (new products, processes or services) in their business operations

The speed and pervasiveness of technology diffusion, absorption and use throughout the economy is particularly important for productivity. OECD research suggests that frontier technologies do not immediately diffuse to all firms. Instead, they are first adopted by national frontier firms, and only diffuse to laggards once they are tested by the leaders and adapted to country specific circumstances. As a technologically advanced economy, domestic innovation as opposed to imitation increases in importance. In Ireland the CIS shows that of those firms undertaking innovative activity, 31 per cent engaged in some co-operative activity when developing their innovations with 23 per cent of cases who engaged in technological innovation working with partners located in Ireland. The CIS results indicate there is potential to further increase levels of collaboration and co-operative activity between firms based in Ireland and also with the public research system.

The Council supports the policy emphasis in recent years which has sought to stimulate collaboration between research institutes and both Foreign-owned and Irish-owned enterprises. Initiatives to increase knowledge transfer, particularly the mobility of personnel between research and enterprise are also welcome. As set out in Innovation 2020[58] a correlation exists between collaboration activities (ranging from Innovation Vouchers and Innovation Partnerships to Technology Centres) and quantifiable increases in company turnover – these can be as much as seven times the investment in these instrumentso. For example, as set out in Innovation 2020, for every €1 invested in Innovation Vouchers and Innovation Partnerships respectively, company turnover increased by €7. In addition, novel initiatives such as the Technology Showcase and Health Innovation Hub Ireland which is designed to drive collaboration between the health system and enterprise leading to the development and commercialisation of new healthcare technologies, products and services, emerging from within the health system and/or enterprise are welcome. Highly proficient leadership, with ambition, vision and strong management teams is critical for establishing the environment that facilitates an innovative culture. Research into management practices across firms and countries suggests that an important factor accounting for differences in productivity is variations in management practices. From a policy perspective, a number of areas are considered relevant to enhancing management quality. Firstly, competitive markets are important in that well managed firms gain greater market share and allocative resources as badly managed less productive firms wither and exit the market. The quality of management education and multinational presence are valuable in improving management practices across the economy. Management skill levels at all levels are an essential element in driving improved productivity performance. At a global level, the available research shows that there is a strong relationship between management practice and business performance. The OECD has found a positive relationship between management development, management practice and the bottom line performance of a firm. Management capability has a direct impact on the innovation performance of firms also. For example, in the Manufacturing sector, managerial quality differs significantly between countries and Ireland scores relatively poorly, particularly when compared to the US, Japan and Germany. Increasing managerial quality in manufacturing in Ireland to the best practice levels observed in the US could boost potentially boost manufacturing productivity by over ten per cent[59].

Private companies already provide most of the funding for management development without recourse to the State and the Council believes this pattern should continue. However, it considers policy needs to focus in the

[58] Innovation 2020 is Ireland's five year strategy on research and development, science and technology.
[59] Bloom, N. et al, Management Practices Across Firms and Countries, National Bureau of Economic Research, 2012

first instance on working with enterprise and maximising existing supports to enhance management capability across the entire enterprise base, so that all firms have the potential to achieve a -step-up to higher performance. Enterprises that have engaged in management development and/or mentoring programmes tend to outperform those that have not. There is now a broad range of options available for enterprises, from leadership programmes to mentor services and/or peer-to peer networks that can assist the CEO and owner/manager at every stage of the company lifecycle. There needs to be a stronger policy emphasis on management development across the enterprise base, and tailored to the scale and stage of the development of the enterprise. Increasing productivity performance requires an increase in the take up of management development amongst firms, and to identify whether elements of existing management development programmes could be tailored to meet the needs of different cohorts of firms. Thereafter, mechanisms to engage with firms (particularly locally trading SMEs) that do not currently participate in management development are required to disseminate relevant modules.