

IBEC submission to the
Department of Finance review
of the R&D tax credit scheme

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1. Executive summary

Introduction

IBEC welcomes the opportunity to present this submission to the review of the R&D tax credit scheme. Given the importance of this scheme to national innovation policy and Ireland's attractiveness as a location for mobile investment, we have undertaken extensive research in order to comprehensively address the review's terms of reference. This has included a detailed survey of almost 250 firms, extensive consultations with IBEC members in all sectors of the economy and a review of the R&D offering in competitor jurisdictions.

International competitiveness of Ireland's R&D tax offering

Ireland's tax incentives for R&D activity have improved considerably over the past decade but the offerings of our main competitors have also been enhanced. An internationally recognised benchmark of tax support for R&D is the B-Index developed by the OECD. It shows that Ireland holds about a mid-table ranking in terms its tax incentives for R&D. The benchmark takes into account both tax incentives for R&D spend and the country's headline corporate tax rate and essentially provides a measure of the tax burden on each marginal unit of R&D expenditure. India holds the top ranking while countries such as France, Denmark and the Netherlands all rank reasonably high. The index's separate measure of tax support for SME R&D activity shows that many jurisdictions offer a significantly preferential regime for smaller firms. The UK's focus on R&D activity in the SME sector is particularly noticeable as it ranks in the top 10 for this measure but doesn't rank in the top 20 for support to larger firms.

Recent developments in competitor countries in the overall corporate tax area and specifically in relation to the tax treatment of intellectual property (IP) and R&D have the potential to undermine Ireland's relative competitiveness ranking. The UK has become particularly competitive in this area with a lower headline corporate tax rate, a lower marginal personal income tax rate, its patent box and enhancements to its R&D tax credit scheme. If Ireland reduces the attractiveness of its R&D tax credit scheme in any way it will provide a further significant competitive advantage to the UK and other jurisdictions.

IBEC survey findings

IBEC, in conjunction with other organisations, undertook an extensive survey of the views of Irish business on the R&D tax credit scheme in March/April 2013. The survey achieved an excellent response from almost 250 firms, 75% of which had used the scheme and 25% had not. This allowed us to explore the attitudes of firms with experience in using the credit and also to examine barriers to the scheme. A subset of about 50 firms provided very detailed quantitative data on financial and R&D activity indicators over the period from 2003 to 2011. This allowed us to measure the overall economic impact of the scheme and to identify the additional benefits to the Exchequer and the wider economy.

The key findings from our survey are:

- Firms using the scheme regard it very positively and see it as a central reason to locate R&D activity in Ireland.
- Barriers to firms not availing of the scheme include its administrative complexity, a lack of historical supporting documentation, high base year R&D expenditure and poor awareness.
- Only 5% of firms are using the 'key employee' element of the scheme. In its current form, it is clearly not fit for purpose and needs to be improved.
- While the majority of total firms surveyed responded positively in relation to the overall administration, audit and other scheme procedures, a significant proportion of companies cited difficulties in relation to this issue. About one-third of larger firms regard the 'certainty that once claimed the tax credit can be retained under Revenue audit' as either poor or very poor. Companies which have been subject to an audit or follow-up queries are also more concerned about the lack of certainty and clarity. Those firms which had used the credit most frequently were also found to be less satisfied with the administrative procedures.
- 42% of firms ranked the availability of qualified staff as the most important factor in their decision to locate R&D investment in Ireland. Tax incentives (24%) were ranked the second most important issue.

- When asked to select the most important areas of improvement needed to the scheme, over 40% identified the need for greater certainty. Outsourcing to third party companies (37%) and agency/contract workers (36%) were identified as the next most important issues. Other changes identified included a simplification of calculation of the credit, a reduction in the audit period and enhancements to the 'key employee' element.

Economic impact of the scheme

The firms in our research which provided detailed financial and R&D activity data on their use of the credit demonstrated substantial additional benefits and significant economic return for the State on its tax related R&D investment. Our econometric estimates show a substantial increase in R&D spend by firms as a result of using the R&D tax credit. We estimate that participation in the scheme by a firm will increase its R&D spend in a given year by between 70% and 90%. When we aggregate these results across the entire economy we find that the R&D tax credit scheme delivers a net benefit (after the cost of the credit) of between €390 and €585 million.

Our findings suggest that participation in the R&D tax credit also has other major additionalities in terms of firms' behaviour, employment, turnover and R&D spending. These include:

- The R&D tax credit is important to employment growth in Ireland as 62% of firms say the credit is important to their firm creating new jobs, while a further 67% said it was important to the retention of jobs in the country
- The credit is important to future investment in Ireland, particularly in terms of FDI. Almost 70% of firms state the credit is important in their decision to invest in R&D in Ireland, while 65% said it is important to overall investment in Ireland
- Participation in the scheme has led to improvement of R&D process in firms. Almost two-thirds of firms saw an improvement in how they planned R&D activities, 70% improved on the recording of their activities, while 69% improved in how they retained their R&D related documentation
- These improvements are important as they may lead not only to greater returns to R&D in the future but also to a better R&D environment developing in Ireland. A stronger R&D environment is crucial to winning future FDI and mobile R&D investment projects

Recommendations for changes to the scheme

Our research has identified the following changes which would enhance the overall effectiveness of the scheme:

- 1. Introduce measures to remove uncertainty:** the current uncertainty surrounding the retention of the credit benefit under audit is damaging the reputation of the scheme. The issue can be addressed by:
 - a. Establishing a structured process (similar to the clearing house model used in other policy areas) whereby Revenue, policy, industry and advisor professionals can address difficulties with the scheme and establish clarity on areas of uncertainty
 - b. Set up a streamlined technical appeals process
 - c. Ensure greater consistency on R&D definitional issues between grants and other SFI policy and the eligibility criteria used in technical assessments of R&D claims by Revenue appointed external experts. Improved guidance is needed for technical experts and SFI should have a role in ensuring that this guidance is consistent with wider innovation policy
 - d. Reduce the current audit period of four years – 25% of companies surveyed identified this as their most important priority for change
 - e. In order to ensure that there is greater clarity and consistency in communication from Revenue officials to industry it should establish a central specialist unit of scheme experts. The current model of non-specialist advice at a district level results in a lack of consistency in rulings and guidance to industry
- 2. Facilitate greater use of agency/contract staff:** the use of on-site agency / contract staff should not be subject to the current outsourcing cap and all such expenditure should be eligible for the credit
- 3. Introduce an innovative solution for the base year problem:** the retention of the arbitrary base year remains a barrier to R&D activity and disadvantages some companies competing internationally for mobile projects. Our research has demonstrated the net economic benefits of the credit and

addressing the base year issue will increase these net benefits. We recommend that some flexibility is required in the base year application through either:

- a. allowing companies the flexibility to choose their base period from a number of years i.e. 2003 to 2005 or to use their average annual R&D spend over the 2003 to 2005 period
 - b. allowing companies to reduce their eligible base year spend by a certain percentage and offsetting the cost to the Exchequer by reducing the value of credit by a corresponding percentage i.e. a firm with a high base year spend might opt to reduce it by 50% and accept a credit value of 12.5% rather 25%. In this way additionality is encouraged and R&D activity would be more likely to increase at a very modest cost to the Exchequer
4. **Launch a 'credit lite' model for SMEs:** despite good progress in recent years, many SMEs are not engaging with the credit due to its complexity and administrative requirements. We recommend that a streamlined or 'credit lite' model should be developed for SMEs which would include the use of pro-forma templates for R&D project management, recording R&D activity and calculation of eligible costs and revenue benefit associated with the credit. Simple on-line calculators demonstrating the benefit and eligibility rules of the credit would be a useful resource for SMEs and would also greatly improve awareness and promotion of the scheme. Our survey identified that about 30% of companies would like to see a simplification of the calculation of the credit
5. **Improve the 'key employee' element:** this aspect of the scheme is currently not fit for purpose and could be enhanced by:
- a. Reducing the audit period for the scheme so that remuneration awarded to staff would not be subject to an audit claw-back for a four year period
 - b. Allowing firms to allocate the credit in a tax efficient manner on a team based approach rather than just to 'key employees'
 - c. Introduce a lower R&D time activity threshold for SMEs – the current 50% requirement remains too high for smaller firms

2. Policy context

2.1 Ireland's innovation policy ambitions

Investment in intellectual capital is one of the key building blocks for sustainable economic growth. According to the Innovation Union Competitiveness Report (June 2011), "Ireland is relatively well diversified and its trend towards a more knowledge and innovation-intensive economy is a realistic prospect". Ireland has made progress over the past decade but continued improvement will largely depend on the ability to maintain favourable framework conditions. Government must continue to invest in research, development and innovation in order to boost its national productivity and economic competitiveness. It is also vital for a small, open economy that Ireland remains an attractive place to conduct research, development and innovation.

Ireland should strive to join the ranks of European innovation leaders. While Ireland had originally signed up to meeting the ambitious European target for total R&D expenditure to reach 3% of GDP by 2020, our present economic circumstance has made this difficult to achieve. Instead we have now committed to a revised R&D investment target of 2.5% GNP (equal to 2.0% of GDP) by 2020. This target will be achieved by both public and industry direct contributions, and it also assumes that industry's total investment will represent approximately two-thirds of total expenditure. This will require more support to facilitate the emergence of technologically-based local firms and encouraging innovative activities in less intensive sectors.

2.2 Recent policy developments

Since the launch of the *Strategy for Science, Technology and Innovation* in 2006, the focus of Government has been on imbedding high-value activity in Ireland and improving the chances of successful commercialisation of R&D conducted in Ireland. This can be seen in the various national strategy documents over the intervening years such as *Building Ireland's Smart Economy*, *A Framework for Sustainable Economic Renewal* and the report of the *Innovation Taskforce*. Ireland's innovation policy has evolved into one that has enterprise firmly at its centre. It incorporates measures for improving our science base, attracting/maintaining FDI, growing indigenous enterprise and focussing on new areas for growth, such as services innovation and green technologies.

Subsequent reforms to the national innovation ecosystem underpin this evolution in policy. For example, the results of the national research prioritisation exercise has established a clear business case for investing in fourteen targeted areas and stressed the importance of maintaining public investment, albeit in a more efficient and targeted manner. Implementing these recommendations can only benefit industry further and ensures that Ireland will be well-positioned to capitalise on the opportunities that will arise as the global economy recovers.

2.3 Changes in innovation activity

It is not just the focus of Ireland's national R&D policy that has changed but also our understanding of R&D has also changed. It has moved away from being confined to manufacturing activities and laboratories into a wider, far-reaching activity that applies to all businesses. The focus of the national strategy is no longer solely on basic, experimental or 'blue-sky' research. Science Foundation Ireland (SFI), which was only in its relative infancy when the R&D tax credit was introduced in 2004, recently published its strategy document *Agenda 2020: Excellence and Impact* which aims to achieve a better balance between basic, applied and near-market research. Grant supports on offer from the enterprise agencies have been either introduced or refined to include new types of research and innovative activities. These include measures to assess scientific, technological and innovative merits, and subsequent impact, of the activities to be funded.

However, the perception is that the R&D tax credit scheme has not kept pace with Government's new understanding of R&D. Derived from the *Frascati* manual the definition used by the Revenue Commissioners restricts eligible activities to scientific or technological advancement and the resolution of scientific or technological uncertainty. The effect is a limitation on activities, affecting the country's competitiveness as a location for innovative activities. For example, Singapore has tax incentives in place for innovative activities in the services sector.

The change in innovation policy has led to the development of a range of innovation-support programmes by national and regional innovation support agencies targeted specifically at industry. These include both direct (e.g. grants) and indirect supports (e.g. taxation). There are over fourteen state and semi-state agencies offering funding for research activities by companies.

This system of supports allows companies to pick an investment strategy that best suits their respective long-term ambitions and management style. According to Forfás, the 'R&D tax credit forms a central part of Ireland's strategy to stimulate innovation and promote R&D activity in Ireland at the firm level' (Making it Happen, 2010). Also, the Advisory Council for Science, Technology and Innovation sees it as an important mechanism for making R&D 'more cost effective' and further improvements should be made (Staying the Course, 2011). The R&D tax credit must maintain pace with the evolving national innovation policy environment.

2.4 Investment in the innovation ecosystem

Significant capital investment has been made in building up of research capacity across the universities and the institutes of technology. It is important that the research infrastructure put in place is fully utilised by academia and industry. Also, changes to the funding landscape has placed new pressures on Ireland's higher education institutions to diversify their income streams and actively pursue contract and consultancy research opportunities from companies. However, eligible expenditure under the R&D tax credit scheme can discourage such collaborative activities. It is important the R&D tax credit scheme incorporates an acknowledgement of changes in the funding landscape, including new requirements of funding agencies, so that the competitiveness of HEI's in securing contracts is not unduly undermined nor should we squander the exchequer investment in building up of research capacity.

Ireland has made progress over the past decade but continued improvement will largely depend on the ability to maintain favourable framework conditions, including attractive tax incentives. The R&D tax credit can play a role in delivering on the objectives of our national innovation policy

3. Rationale for R&D investment

The economic rationale for public support of private R&D investment is two-fold. Firstly, the creation of new knowledge is associated with spill-overs, which mean that firms are not able to fully capture the returns of their R&D investment. As a result, the private returns of R&D will be lower than the social return, leading to a lower level of R&D activity than would be societally optimal.

The second reason for public support of private R&D relates to informational imperfections and asymmetries. Firms reliant on external funding may have difficulty in accessing finance to undertake R&D projects as lenders/investors may have difficulty in identifying viable, worthwhile projects. This effect may be particularly acute for smaller firms and start-ups, which tend to be more reliant on external financing.

Estimating the returns of R&D is not without its challenges, and results may vary significantly depending on the methodology. In particular, Griffith (2000) outlines that the social rate of return will vary depending on the level of measurement. Estimates at firm level capture the social return to that firm, but not beyond. Industry-level estimates include within-industry effects, but not spill-overs to other industries. Finally, estimates at the national level capture within-country social returns, but not cross-country effects.

Despite these challenges, the empirical literature measuring spill-overs and the gap between private and social returns to R&D has built up solid evidence of their existence. In particular, Griliches (1992) and Hall et al (2009) provide extensive reviews of the state of the art, concluding that spill-overs do exist, that they can be quite large and that social returns exceed private returns.

Likewise, an extensive empirical literature has investigated the constraints that firms face in financing R&D and innovation. A number of studies, for example Hall (2002), Hall and Lerner (2009), Czarnitzki and Hottenrott (2011), provide evidence that smaller firms and start-ups in particular face funding constraints for R&D investments. The findings for larger firms are more mixed, but we cannot rule out the existence of funding constraints; Cincera and Ravet (2010), for instance, find evidence that access to external financing constrains R&D investments in large manufacturing companies in the EU but not in the US.

Having established that spill-overs and funding constraints exists, a final question relates to what policy tool should be chosen mitigate for these market failures. The policy objectives can sometimes be contradictory. While it can be desirable to ex ante correct for knowledge spill-overs, this has the ex post effect of inhibiting knowledge diffusion, which is necessary for capturing the full societal benefits of innovative activity. IP protection and patents play an important role in protecting the private return on R&D, but on their own are not enough.

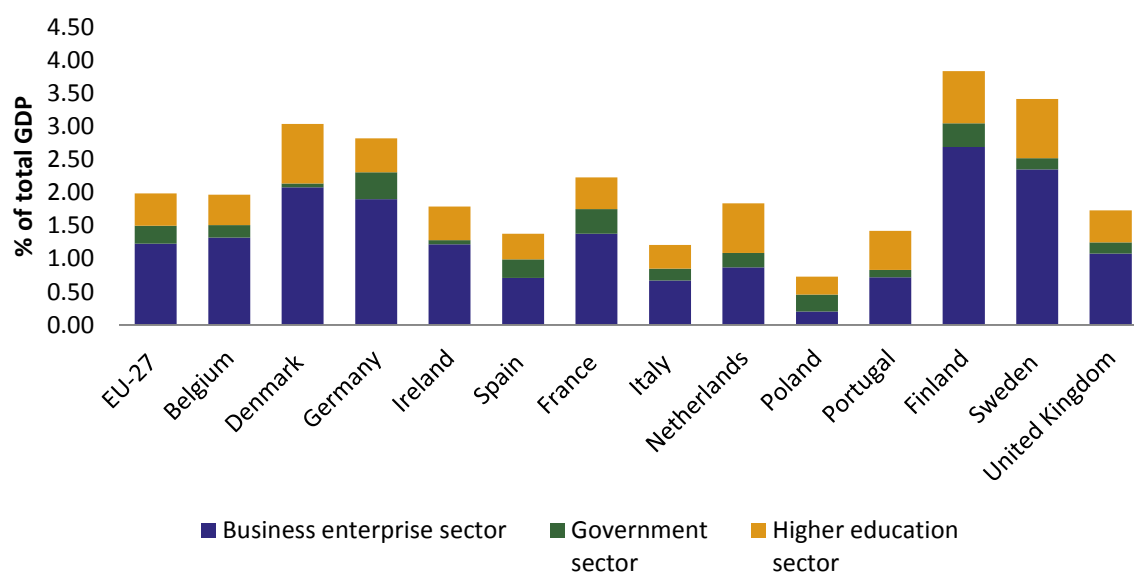
Public financial supports, in the form of fiscal supports or direct grants, narrow the gap between the private and social rates of return by lowering the cost of doing R&D and ensure that the level of R&D performed moves closer to the socially desired optimum. Both grants and tax credits are extensively used, each with their own advantages and drawbacks. Tax credits allow for a market-led allocation of public funding and may therefore be the preferable option if the aim is to increase the level of R&D in a technology-agnostic way. A number of studies, for instance Bloom et al (2002), Czarnitzki et al (2011) and Hall and Van Reenen (2000), have shown that tax credits are effective in increasing the amount of R&D activity firms undertake.

4. R&D activity and spend by Irish business

4.1 Macro-level R&D indicators

This section uses descriptive statistics to place Ireland's R&D system in a broader context by comparing across countries. Ireland's R&D spend in absolute terms R&D spend rose from €1.2 billion in 2001 to €2.7 billion in 2010. As a percentage of GDP, the improvement was from about 1% in 2001 to 1.8% in 2010. This, however, is still below the EU average of 2% which Ireland has adopted as its Europe 2020 target. It is also worth noting that Ireland's spend on R&D is still far below top performers such as Finland, where R&D expenditure amounted to 3.9% of GDP in 2010.

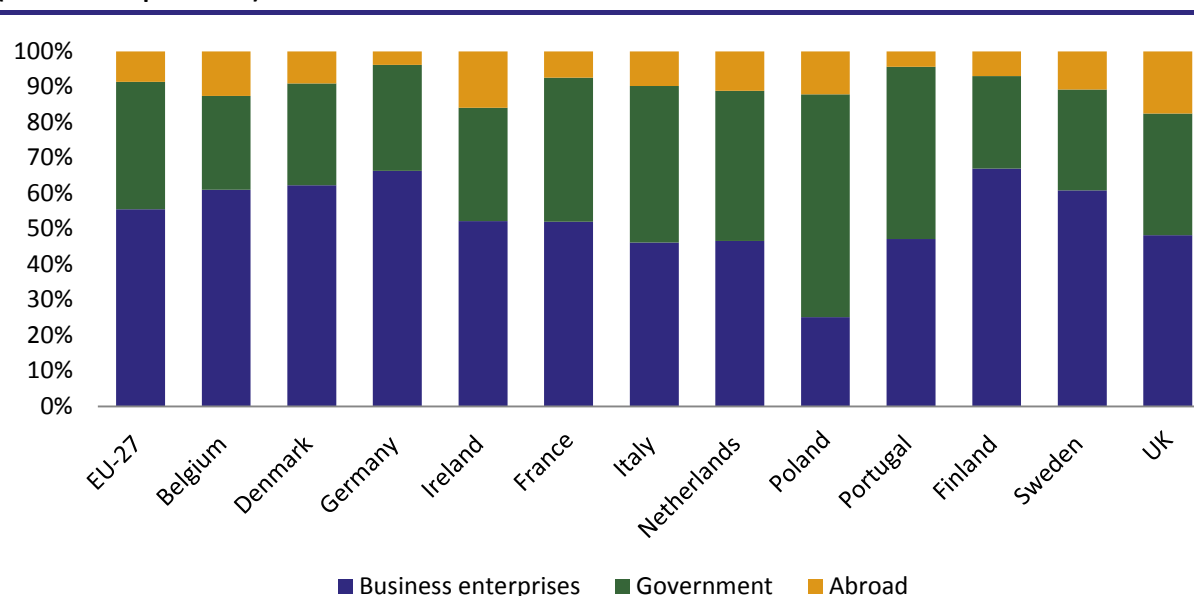
Figure 4.1 Gross domestic expenditure on R&D by sector in selected EU countries in 2010



Source: Eurostat, 2013

Figure 4.1 shows that R&D expenditure took place mainly in the business sector (68%) followed by higher education (29%) and government (3%). R&D funding, however, does not all come from the sectors in which it is spent. For example, a proportion of business spending will be funded by government grants or subsidies. Figure 4.2 shows that the Exchequer accounts 31% of all Irish R&D funding while business contributes over half of the total (51%). To put this in context government funding as a proportion of total R&D spending is four percentage points the European average.

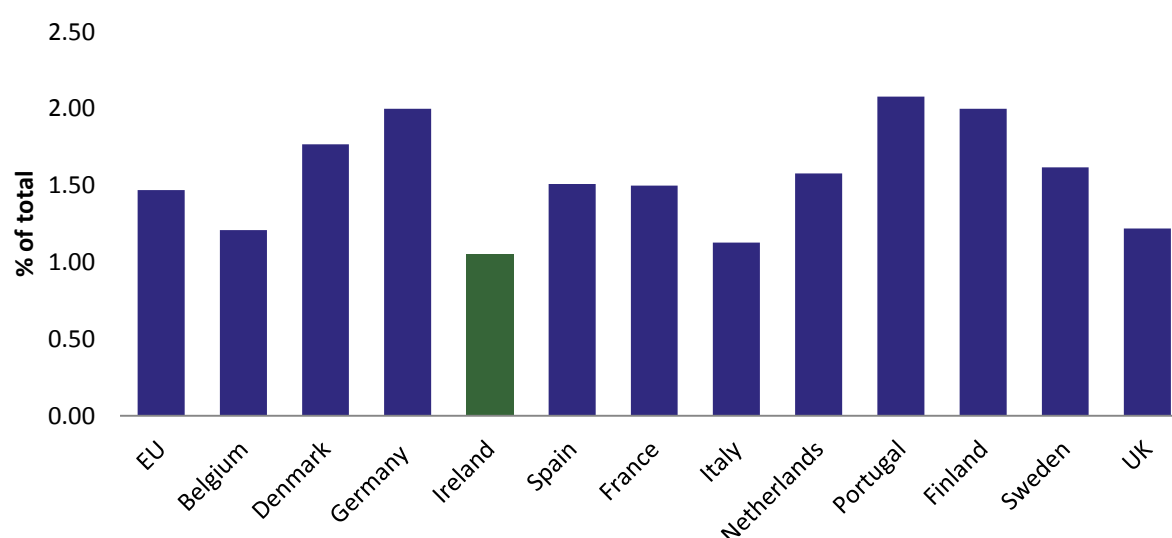
**Figure 4.2 Gross domestic expenditure on R&D by source of funds in selected EU countries in 2010
(% of total expenditure)**



Source: Eurostat, 2013

The data on R&D spend by source of funds include only direct transfers of funding for R&D and exclude funding in the forms of tax rebates and allowances such as the R&D tax credit, so the analysis may not paint a full picture of total government contribution to R&D investment (OECD, 2002). As such GBAORD, which is a measure of budget appropriations for R&D expenditure, may give us a fuller picture, though differences in the methodology for national budgets make it less useful than GERD for comparison across nations. The data do not represent actual spend on R&D but the proportion of the national budget which is earmarked for R&D supports, including tax credits.

Figure 4.3 Government budget appropriations for R&D as a % of total in selected EU countries in 2011



Source: Eurostat, 2013

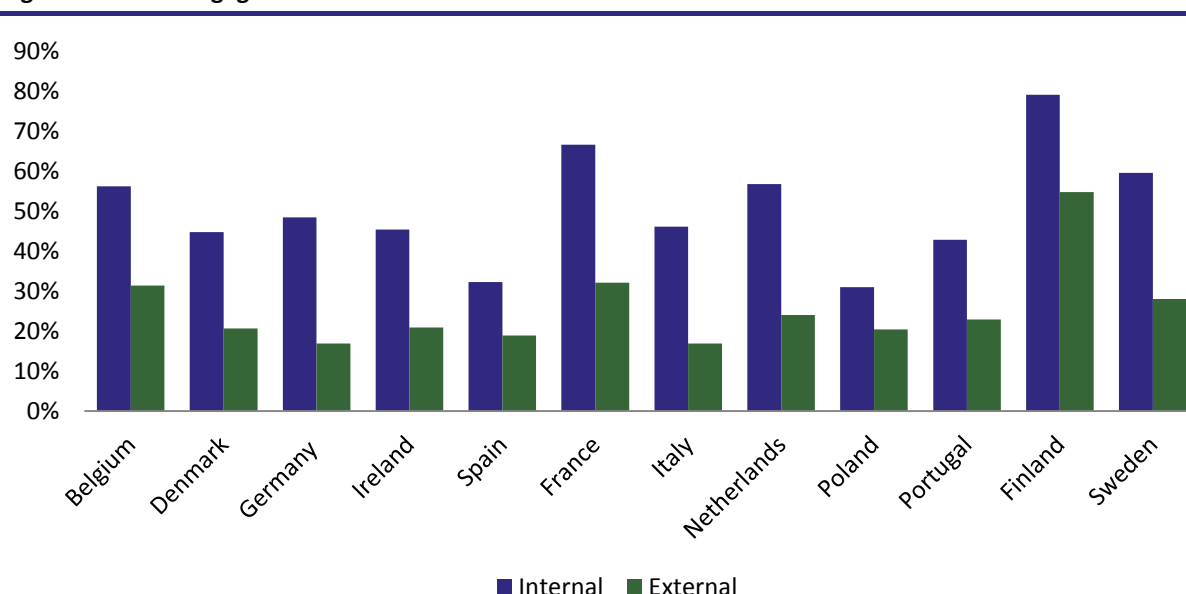
From Figure 4.3 we can see that the Irish government budgeted around 1.1% of total public expenditure for R&D schemes in 2011. This compares to an EU average of 1.5%, while countries such as Germany, Finland and Portugal spend in the region of 2% of total government expenditure on R&D. Budgeted expenditure for R&D in Ireland fell from a pre-crisis level of 1.3% in 2007 to only 0.8% of total expenditure in 2010 before recovering in

2011 to 1.1%. Only Latvia, Malta, Hungary, Romania, Bulgaria and Cyprus had lower spends as a proportion of total expenditure in 2011 and Ireland has been in the bottom ten in the EU in this regards since 2009.

4.2 Micro-level R&D indicators

At a firm level, 45.5% of Irish firms are engaged in internal R&D while only 21% invest in external R&D (Figure 4.4). This is in the mid-range in European terms with higher internal R&D engagement than countries such as Denmark, Spain and Portugal but lower internal R&D participation at a firm level than in the Nordic countries and some of our major European competitors such as the Netherlands.

Figure 4.4 Firms engaged in external and internal R&D in 2010



Source: (Community innovation survey - Eurostat, 2013)

4.3 Conclusion

Overall, Ireland's R&D performance has improved over the past decade. Nonetheless, investment at both business and government level remains below the EU average and substantially behind top performing countries. The R&D tax credit is an important plank of Ireland's R&D and wider innovation strategy, and the introduction of the scheme and subsequent improvements have likely played a significant role in strengthening Ireland's R&D performance over the past decade.

5. International comparison of government R&D supports

5.1 B-index

5.1.1 The B-index

The B-Index is a commonly used measure of the attractiveness of R&D tax policies. It has been used widely by the OECD, policy makers and in academic literature as a measure of R&D tax incentive generosity. Warda (1996) developed the B-Index to give a measure of tax generosity which was comparable across countries. The model is based on the marginal effective tax rate approach. It essentially measures the tax burden on income generated by one extra dollar of R&D expenditure (Atkinson et al, 2012). In more formal terms the B-index is defined as the present value of before-tax income that is necessary to cover the initial cost of R&D investment and to pay the corporate income taxes, so that it becomes profitable to perform research activities (Guellec & Van Pottelsberghe, 2001) or:

$$\text{B-Index} = \frac{(1-x)}{(1-t)}$$

Where x represents the net present discounted value of depreciation allowances, tax credits and other R&D tax incentives available and t represents the headline corporate income tax rate. The more favourable a country's tax treatment of R&D, the lower its B-index. Another popular way of presenting the B-Index is to subtract it from unity thus creating a tax subsidy ratio, or:

$$\text{Tax subsidy Ratio} = (1 - \beta)$$

$$\text{Where: } \beta = \frac{(1-x)}{(1-t)}$$

The tax subsidy ratio is often more intuitive from a policy perspective as it measures the amount of one extra dollar or R&D expenditure which is subsidised through taxation. For example if Ireland's total R&D tax credits and allowances are 25% and its corporate tax rate 12.5% then the figure B-Index will be $\frac{(1-.25)}{(1-.125)} = 0.85$ and its tax subsidy ratio will be 0.15. Therefore, 15 cents in every €1 additional R&D spend is subsidised by taxation or allowances¹.

This measure has been used widely by the OECD (Warda, 2005) in comparing the generosity of R&D regimes across countries and is used in this submission to compare the development of the generosity of Ireland's scheme in an international context at multiple points in time².

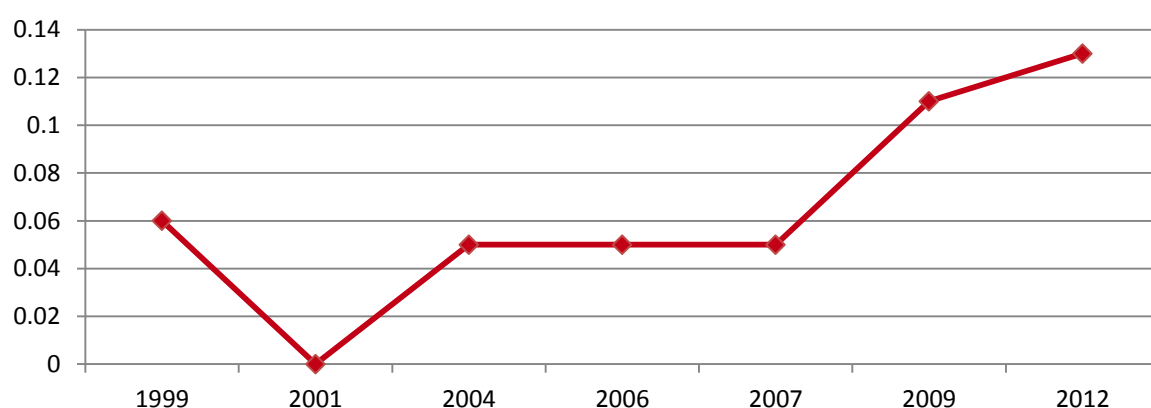
5.1.2 Ireland's R&D tax regime generosity in context

Figure 5.1 displays the development of the Irish R&D offering in terms of generosity during the period 1999-2012. The tax subsidy ratio is calculated as 1-B index. For example, in Ireland one euro of R&D expenditure in 2012 results in before-tax 13 cents of tax relief. During the period 1999-2012 the amount of additional R&D expenditure covered by tax subsidies rose from 6% to 13%; this figure is the same for both SMEs and large firms. This underlines the government's growing commitment to encouraging both additional R&D from indigenous firms but also in retaining and attracting R&D intensive FDI operations in the country.

¹ This is an illustrative example, not Ireland's actual B-index value, which takes account of the net present discounted value of allowances and credits.

² For further insight on the B-Index methodology see Guellec & Van Pottelsberghe (2001), Warda (2005) and Atkinson et al (2012).

Figure 5.1 Irish R&D tax subsidy ratio 1999 – 2012



Source: Data provided by the OECD for 1999 – 2009 and the Information Technology and Innovation Foundation (ITIF) for 2012.

Table 5.1 displays the top 20 most generous tax subsidy ratios for both large firms and SMEs in 2012 from the OECD and eight non-OECD countries³ for which data was available. Ireland's R&D tax incentives for large firms rank 16th out of this group of countries and rank 20th for small and medium sized enterprises. The position of other EU countries such as Portugal, Spain, Denmark and France at the top of both lists serves as a reminder of the medium-term challenge Ireland has in terms of its FDI offering. The ranking of countries with developing human and infrastructural capital such as India and Brazil should provide further food for thought on the increasingly competitive international arena in which Ireland's R&D tax regime competes.

Table 5.1: Rate of tax subsidies for \$1 USD of R&D by firms size 2012

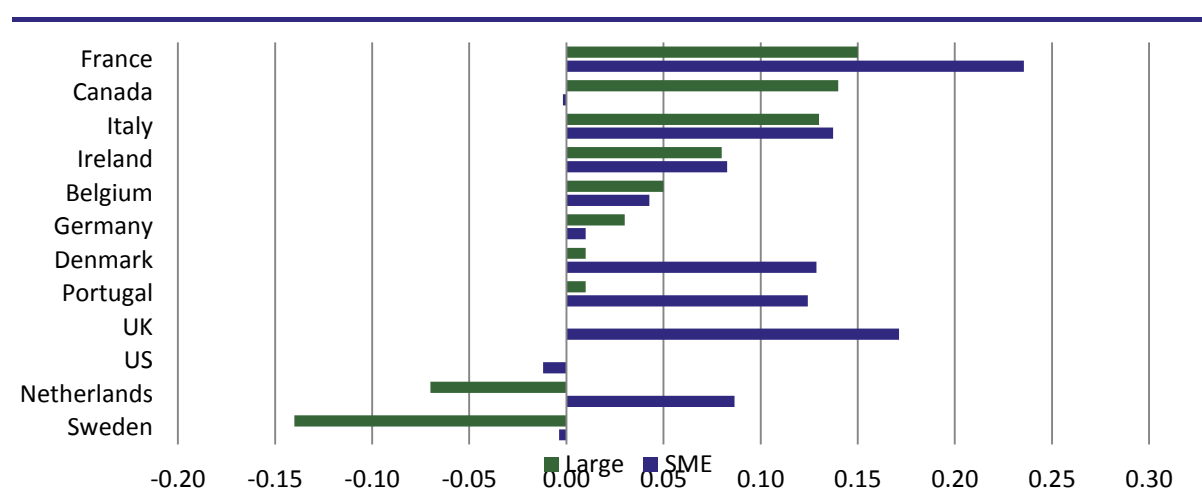
Position	Large Firms		SMEs	
	Country	Tax subsidy ratio	Country	Tax subsidy ratio
1	India	0.44	India	0.44
2	Portugal	0.41	France	0.43
3	Spain	0.35	Portugal	0.41
4	France	0.34	Spain	0.35
5	Denmark	0.29	Canada	0.33
6	Brazil	0.26	Netherlands	0.33
7	Hungary	0.22	Denmark	0.29
8	Norway	0.22	UK	0.28
9	Turkey	0.22	Brazil	0.26
10	South Africa	0.22	Korea	0.26
11	Czech R.	0.2	Norway	0.25
12	Canada	0.18	Hungary	0.22
13	Belgium	0.14	South Africa	0.22
14	Netherlands	0.14	Turkey	0.22
15	China	0.14	Czech R.	0.20
16	Ireland	0.13	Australia	0.17
17	Japan	0.13	Japan	0.16
18	Austria	0.12	China	0.14
19	Italy	0.12	Belgium	0.13
20	Australia	0.11	Ireland	0.13

Source: Information Technology and Innovation Foundation (ITIF)

³ Brazil, Chile, China, India, Israel, Russia, South Africa and Singapore.

Figure 5.2 outlines changes in the R&D tax subsidy ratio in OECD countries during the period 2007-2012. It is evident that many major OECD countries have been improving their incentives for R&D. This is true both of incentives for SMEs and larger firms. Countries such as France, Italy, Norway and Canada have improved incentives for larger firms with the UK, France, Denmark and Portugal improving credits to smaller firms. France is a particular standout with regards to its improvement of R&D tax incentives for smaller firms, improving its tax incentives by 23 cents per euro to 43. This means that the subsidy for firms has effectively increased from 20 cents of every euro of R&D spend to 43 cents of every euro. France has also improved its tax incentives to large firms by 15 cent to 34 cent per euro.

Figure 5.2 Change in the R&D tax subsidy ratio 2007 - 2012⁴



Source: Authors' calculations from data provided by the Information Technology and Innovation Foundation (ITIF)

Ireland has increased the generosity of its R&D tax breaks in the years since the R&D tax credit was introduced in 2004, and the subsidy ratio has improved by 8 cents per euro since 2007. However, other countries have had strong starting levels and have introduced on-going improvements, and Figure 5.3 shows that Ireland has not ranked in the top ten OECD countries in terms of R&D tax supports in any year since 2001.

Figure 5.3 Irish R&D tax credits generosity ranking among OECD countries 1999-2012



Source: Authors' calculations from data provided by the Information Technology and Innovation Foundation (ITIF)

⁴ Data for 2007 only available for OECD countries

5.2 Overview of some of Ireland's main competitors

Table 5.4 sets out a scoreboard of indicators which reflect the attractiveness of Ireland's offering for R&D investment relative to some of our most significant competitor jurisdictions. While Ireland doesn't rank particularly high in the B-Index it compares favourably against our main competitors. India tops the B-Index ranking with ease but Ireland compares well against both the UK and the Netherlands, although the UK provides a much more attractive R&D tax support regime for SMEs. Ireland ranks quite poorly when it comes to total (tax, grants and research) government support for R&D. The GBOARD at just 1.1% of total government expenditure is about half of that in Finland and much lower than both the UK and the Netherlands. Ireland performs strongly on skills availability for graduates with technical skills but less well in relation to dedicated R&D personnel. Finland, in particular, performs very strongly on the skills agenda. Ireland's relative labour costs have clearly improved in recent years but we still have a labour cost disadvantage against the UK, which is increasingly emerging as our strongest competitor for mobile innovation based investments. It is somewhat worrying to see that Ireland's World Bank 'ease of doing business' ranking has fallen in 2013 and we are now ranked behind the UK, Netherlands, US, Singapore and Finland.

In summary, the scoreboard table demonstrates that while Ireland retains many advantages as a location for R&D investment, competitor locations are continuously improving their offerings and on many indicators rank well ahead of Ireland. There is clearly no room for complacency in relation to the relative attractiveness of Ireland's R&D offering and any reduction would have a significantly negative impact on our ability to win mobile investment projects.

Table 5.4 Ireland and its main competitors for R&D

	Ireland	UK	Netherlands	Singapore	US	Finland	India
Tax support for R&D (B-Index ranking large firms)	0.13	0.09	0.14	0.09	0.06	-0.01	0.44
Government spending on R&D (GBAORD as % of total gov't spend)	1.05	1.22	1.58	N/A	N/A	2	N/A
Skills availability⁵ (% of graduates in science, engineering, manufacturing & construction)	23%	22%	14%	n/a	15%	32%	n/a
Specialist skills⁶ (R&D personnel per mn pop, FTE)	4,500	5,200	5,900	7,300	n/a	10,500	350
Labour cost⁷ (Total economy compensation cost, € per annum)	45,700	41,400	52,400	n/a	53,700	45,100	n/a
Ease of doing business⁸ (World Bank ranking)	15	7	31	1	4	11	132

Source: Skills data from UNESCO data centre, labour costs from European Commissions AMECA database

5.3 Recent developments in other jurisdictions

Finland

Finland does not operate schemes to directly incentivise R&D activities through taxation-based schemes. Like Germany, Finland offers a range of non-repayable cash grants to companies for research projects. This is reflected in its high level of government spending on R&D compared to other competitor locations.

⁵ Data for 2010

⁶ Data for 2010, except for Singapore (2009) and India (2005)

⁷ Data for 2012, using 2012 exchange rates for GBP and USD

⁸ World Bank Doing Business Report 2013

Ireland

- **Summary:** Incremental credit of 25% of expenses exceeding base; deductible in year incurred; credit of 25% for R&D facilities; key employee relief; unused credits can be carried back to preceding period or carried forward indefinitely, also refund procedure in place.
- **Eligible activities:** No restriction on industries but restricted to systematic, investigative or experimental activities in science and technology; expenditure includes wage, physical inputs and royalties; outsourced activities limited to the greater of €100K or 10% for external companies and 5% to HEIs; R&D can be conducted anywhere in EEA but cannot be claimed if corresponding credit exists in country where R&D performed.
- **Key improvements:** Qualifying expenditure doubled to first €200K to benefit from the 25% R&D tax credit on a volume basis. Incremental credit to remain in excess of €200K.

India

- **Summary:** Credits not subject to a cap; 200% super deduction for in-house R&D activities in bio-tech and certain manufacturing sectors (set conditions); 100% reduction for expenses falling outside super deduction; 125% to 200% for certain entities conducting R&D in India; Salary and material costs for three years prior to business commencement.
- **Eligible activities:** R&D must be carried out in India; wages & physical input costs (no overheads); CAPEX (excluding land/buildings); clinical trials (pre-approval required).
- **Key improvements:** Tax code under review but super deduction set to continue.

Netherlands

- **Summary:** 3 schemes in place, WBSO reduces wage and social security contributions for R&D staff (38% on 1st €200K & 14% on remainder to max €14m; start-ups get 50% on 1st €200K); Super deduction of 154% on non-wage costs; Innovation box offsets development costs against income.
- **Eligible activities:** open to all industries, activities must be in the EU and staff on Dutch payroll; intangible asset must be of benefit to Dutch company (research can be contracted abroad).
- **Key improvements:** Additional tax benefit to new patented and non-patented income from activities eligible under WBSO.

Singapore

- **Summary:** 100% base deduction together with enhanced deduction of 250% (Singapore-based R&D) or 300% (non-Singapore) on €400K p.a. till 2015; further qualifying expenditures eligible for super deduction of 200%.
- **Eligible activities:** Wages and physical inputs (CAPEX excluded).
- **Key improvements:** Some changes to definition to better incorporate software; Singapore locations schemes 2009-2015: include certain expenditures (e.g. staff, physical inputs) may qualify for additional 50% relief; also R&D activities need not be directly relevant to core business.

UK

- **Summary:** Large companies get 130% super deduction (No cap); SMEs (<500 staff) get 225% super deduction (loss making SMEs can claim 24.75% cash credit).
- **Eligible activities:** clinical trials; R&D staff; external staff provision (65% of costs); physical inputs; 65% of outsourced costs for SMEs (large companies - only activities with HEIs or designated bodies); large companies can claim relief on outsourced work to them by other large company or person not subject to UK tax.
- **Key improvements:** 'Patent box' for patent royalties (10%); 'above the line' mechanism to be introduced.

US

- **Summary:** Credits not subject to a cap - traditional credit of 20% exceeding base and alternative simplified credit of 14% on excess expenditure over 50% of prior three-year average, also special credits for basic research.
- **Eligible activities:** open to all industries; direct salary costs and physical inputs (CAPEX & overheads excluded); 65% of contract labour; activities must be performed in US and costs accrued by US taxpayer (may be reimbursed by foreign affiliate).
- **Key improvements:** Budget 2014 expected to reform and institutionalise the credit.

6. IBEC survey results

6.1 Overview and sample characteristics

In March and April 2013 IBEC, in conjunction with a number of other organisations, conducted a survey of Irish firms regarding their use (or not) of the R&D tax credit scheme. The following section presents a profile of these firms, their attitudes and experiences of the R&D tax credit and the lessons for policymakers which can be drawn from this. Firstly, we present the characteristics of the sample, followed by an overview of reasons companies did not claim the credit. The next section presents the firms' experiences of the use of the credit including the key employee element, administration and audit procedures. We then show the self-rated importance and impact of the scheme to companies before finally exploring what improvements firms would like to see to the scheme.

Our survey received an excellent response from a broad range and representative pool of businesses. The sample consists of 247 firms. These firms had a total of 67,410 employees of whom 8,194 are involved in R&D activities. Given that the CSO had a headcount of 19,068 R&D employees in the country as of 2011 this means our sample accounts for approximately 43% of all R&D employees in the country. A subset of about 50 companies was able to provide detailed R&D expenditure and activity details over a number of years. This group of companies reported total R&D spending of about €250 million in 2011 or almost 15% of total BERD in 2011.

Table 6.1 displays the main descriptive statistics of the sample. About 40% of the firms in our sample are Irish owned with 60% foreign owned? Some 28% of the firms have less than 50 employees while one-quarter employ more than 250. Comparing this to national data this sample is skewed towards larger and more multinational firms, but this is not surprising given that larger firms are more likely to be engaged in R&D. It would be fair to say this sample is representative of R&D intensive firms but not necessarily of firms in general.

Table 6.1: Descriptive statistics of sample

Variable	Measure	Total (%)
Company size	Not stated	9
	<50 employees	28
	50 - 99 employees	19
	100 - 249 employees	19
	250 - 499 employees	11
	500+ employees	13
Company Ownership	Irish	37
	Foreign	53
	Not stated	9
Sector	Hi-tech Manufacturing	34
	Retail/wholesale distribution	3
	Services	30
	Other Manufacturing	23
	Not stated	13.0
Company age	<1950	8.1
	1951-1980	11.3
	1981-1990	15.8
	1991-2000	29.1
	2001-2007	13.4
	2008+	9.3

In terms of sectoral breakdown, 34% of firms in the sample are in the high-tech manufacturing sectors, 30% in services and on 3% in retail and wholesale. Given the firms who are likely to engage heavily in R&D this is not

unexpected. Within this medical devices (13%) and pharma-chem (13%) companies make up over one-quarter of our sample. This is followed by food and drink manufacturers and electronics manufacturers (including IT) at about 8% each.

Exactly 75% of our sample has used the R&D tax credit at some point, whereas 25% have not. As outlined above this again gives us a large snapshot of 185 firms who have used the credit. It also allows us to understand the reasons firms have not taken up the credit and the barriers to doing this. The expansion of the use of the credit over time can be clearly seen from our respondents. In 2004 the first year of the credit only 17% of companies used it. This figure had expanded to 44% by 2008 and risen to 79% by 2011. This figure fell to 64% in 2012, likely as a result of firms not having filed claims for that year yet.

Table 6.2 R&D tax credit claims

Year(s) in which R&D tax credit was claimed	% of companies which have claimed
2012	64%
2011	79%
2010	71%
2009	57%
2008	44%
2007	36%
2006	30%
2005	24%
2004	17%

There is a pattern of firms using the credit in multiple years - 16% of firms used the credit for only one year. Some 45% used it between 1 and 3 years, 25% used it between 4 and 6 years while 27% used it for 7 to 9 years. This suggests that firms who use the credit value its use enough to re-apply multiple times.

6.2 R&D and financial data

As well as qualitative data on the firms views of the R&D tax credit firms were also asked for company details for the base year 2003 and years 2007 and 2011. In all almost 80 firms answered this part of the survey with to varying degrees. This data is analysed in more detail in Section 7.

Table 6.3 R&D data

	2003	2007	2011
Total number of R&D projects	145	322	775
Total number of R&D tax credit supported projects	60	182	575
Total R&D spend	€21.1 mn	€328 mn	€339 mn
Total R&D tax credit eligible spend	€11.7 mn	€113 mn	€248 mn
Total R&D jobs	355	1,129	2,990
Total R&D tax credit related jobs	279	894	2,523

Table 6.3 displays the R&D data which firms provided in the survey. The number of R&D projects increased from 145 in 2003 to 775 in 2011. While R&D spend increased from €21 million before the introduction of the credit to €338 million in 2011. In the same period the amount of this spend eligible for the credit rose to €248 million about 25% of which could be claimed back in any one year.

Table 6.4 Employment data

	2003	2007	2011
Total R&D jobs	355	1,129	2,990
Total R&D tax credit related jobs	279	894	2,523
Total number of employees allocating all/some of their time to R&D	375	1,270	3,016
Total number of employees	13,558	24,560	33,898
Average employment growth since previous year	8.5%	17.4%	10.7%

Table 6.4 shows that dedicated R&D employment in the firms increased during the period from 355 to 2,990, while total employees using some part of their time for R&D rose to 3,016. The difference between the two readings is likely because many companies perform R&D in cross-functional teams rather than having specific R&D positions, so there are usually more people in R&D-related jobs than dedicated R&D jobs. Total employment in the firms increased from 13,558 in 2003 to 33,898 in 2011.

Table 6.5 Financial data

	2003	2007	2011
Total turnover (million)	€3,647	€9,456	€9,407
Average turnover growth since previous year	24.4%	20.2%	10.7%
Average number of new products/services as a % of sales in each year	8.0%	11.6%	13.9%

Table 6.5 shows financial data for the sample. Turnover has increased from 3.6 billion in 2003 to over €9 billion in 2011. Although turnover growth slowed in 2011 compared to previous years, this is likely owing to the economic crisis. Since the introduction of the credit the percentage of sales taken from new products and services has risen by almost 75% to 14% of total sales since the introduction of the credit.

6.3 Reasons for companies not claiming the credit

The 25% of companies surveyed which had not availed of the credit provided reasons for this. The SMEs in our sample were less likely to use the credit, with 41% reporting that they had not done so. Table 6.6 sets out the reasons why firms have not used the credit.

Table 6.6 Reasons for not claiming the R&D tax credit

	Major barrier	Minor barrier	Not a barrier	Not stated
Administrative burden of credit	21%	16%	26%	37%
Base year R&D spend too high	11%	7%	42%	40%
Company R&D does not qualify	16%	8%	32%	43%
Do not conduct R&D	29%	8%	34%	29%
Difficulty in accessing due to lapse in time	2%	13%	37%	48%
Lack of information on the qualifying criteria	10%	21%	26%	43%
Lack the supporting documentation	11%	15%	29%	45%
Other	7%	-	31%	63%

The major deterrent for R&D active companies to using the credit is its administrative burden. About 37% of companies cited this as a barrier to the credit. Smaller companies were more likely to see the administrative burden as an obstacle and it is likely that a more accessible credit would increase take-up and R&D activity, particularly in the SME sector. While the base year issue is not an obstacle for the majority of firms – both

those using and not using the credit – it still represents a major barrier to the credit for a number of firms. Almost one in five non-users of the credit cited the base year as a barrier.

Almost one in three firms cited poor awareness of the credit as a reason for not using it. While awareness of the scheme has improved considerably in recent years it is clear that a promotional challenge remains. A further 26% of firms report that their lack of supporting documentation was a barrier to take-up.

While the number of companies using the scheme has increased significantly since its launch in 2004 it is clear from our research that there are a number of barriers to uptake which need to be addressed. The administration associated with the credit needs to be improved, particularly for SMEs and enhanced promotion of the scheme is also needed for smaller firms, in particular. The base year issue is still a barrier for a number of companies and an innovative solution to this issue is required.

6.4 Use of the ‘key employee’ element

The ‘key employee’ element of the scheme which was introduced in Budget 2012 has as yet to gain any traction. Only 5% of respondents stated that they had availed of this element of the credit. The main comments provided as reasons for not using the credit could be summarised as follows:

1) Fairness

A large number of firms felt that the introduction of this element of the credit would be unworkable from a HR perspective. It would create tensions in the workplace and complicate remuneration processes within the firm. Others said it was against their HR policies and/or against corporate guidelines. Many identified that their R&D function is administered by cross functional teams and that to advantage one member of the team would create an unequal, negative culture which would create disincentives for other workers. Additionally many felt it would lead to claims from other employees at a similar level of seniority for higher gross pay to close the difference the credit made to a colleague.

2) Uncertainty

Comments focused on the scheme being too difficult to predict and plan as part of an overall compensation package. Many felt that the prospect of the claim being rescinded under Revenue audit created a great amount of uncertainty for the firm and employees regarding remuneration.

3) Use of time requirement

The criterion of 75% of time having to be spent on R&D was a major problem, particularly for smaller firms without a dedicated R&D function. Again much of their R&D was done in cross functional teams or working groups and it would be impractical to divert people solely to R&D when their work was necessary elsewhere as well. Companies welcomed changes to this element in the most recent Finance Bill.

4) Lack of information

A number of firms were unsure how it would work for them or were concerned that it would be too complicated to administer.

5) Companies not yet in profit

A number of companies cited the fact that they were currently loss making as the main reason for not using this element of the credit.

When asked to rank the factors which most influenced their R&D investment location decisions, respondents identified the availability of quality staff as the most important issue. Some 42% of the firms surveyed gave this factor a top ranking, followed by 24% citing tax treatment. Some 83% of firms included the skills issue in their top three ranked factors and 67% included tax. It is clear therefore that Ireland’s future success in building a knowledge-based economy will be largely determined by the availability of suitable skills and the provision of competitive tax incentives. It is therefore essential that the shortcomings identified in the ‘key employee’ element of the scheme are addressed in order to assist Irish R&D performing companies to overcome their skills shortages challenges.

6.5 Administration, audit and procedures

IBEC has received growing feedback in recent years of firms experiencing difficulties in relation to audit procedures and practices associated with the scheme. In particular, companies have cited the lack of certainty in relation to the credit and issues in relation to the definition of R&D activity used by Revenue and its technical experts. The survey sought to explore these issues through asking companies their views on the administration, audit and other procedures associated with the scheme. The survey results show that while the majority of companies are pleased with the administration of the scheme, a significant percentage of companies have experienced difficulties. A large number of companies also provided qualitative feedback on the difficulties which they have experienced and a summary of these comments is set out in Annex 1.

The survey results show that some 22% of all firms regarded the ‘certainty that once claimed the tax credit can be retained under Revenue audit’ as either poor or very poor. The level of concern in relation to certainty increased significantly with company size. About one-third of firms with more than 250 employees rated the certainty of the credit as either poor or very poor. Similar results were recorded in relation to the ‘clarity about the type of activities that can qualify for the credit’. While 21% of the total sample regarded this as either poor or very poor, the level of dissatisfaction increased significantly amongst larger firms. Some 37% of firms employing more than 500 employees had concerns in this area while 30% of firms employing between 250 and 499 employees rated it as either poor or very poor.

This pattern was also evident in relation to the ‘experience of administration, auditing and processing of claims’. While just 14% of smaller companies rated this as poor or very poor some 30% of larger companies gave it a negative rating. Our survey analysis also identified that those companies which had been either subject to a full audit, a desk audit or follow-up queries were less satisfied with the administration of the scheme. Just under one-third of companies which were subject to audit or query regarded the certainty as poor or very poor, compared to just 16% of companies which had not been subject to this process. Similarly, the concern over clarity of eligibility increased from 11% to 33% amongst those firms which had experienced some form of audit. The dissatisfaction of the ‘experience of administration, auditing and processing of claims’ almost doubled from 15% to 27% among the audited or reviewed sample of firms.

The survey also found those companies which had availed of the credit most frequently were least satisfied with its administration and audit procedures. While 15% of companies which has availed of the credit on between one and three occasions regarded certainty as an issue some 24% of companies which used between seven and nine years reported that certainty was either poor or very poor. It is somewhat surprising to find that despite greater experience of the credit and how it operates that, those companies using it over a longer time period are becoming less certain that the credit can be retained under Revenue audit.

6.6 Improving the scheme

The scheme has been improved significantly since it was first introduced in 2004 and it is now both an essential part of Ireland’s offering for FDI and a key driver of R&D activity right across all sectors of the economy. It is therefore not surprising that our survey provides strong evidence of overall satisfaction and approval from Irish business for the scheme. Some 98% of the survey respondents indicated that the scheme was either very good or good in terms of its ‘overall usefulness’ – almost three-quarters of firms indicated that it was very good. The vast majority of respondents also believe that the scheme has been ‘significantly improved in recent years’ – 14% strongly agree with this view and 65% agree. A significant minority of 21% feel that scheme has not been improved, however. This sentiment was expressed most strongly in the ‘traditional manufacturing’ sector with 37% of these firms disagreeing with view that the scheme had been significantly improved. Those companies which had been subject to audit or queries were also somewhat less satisfied with how the scheme has evolved and 26% of them disagreed that the scheme had improved. This is likely to reflect the concerns which audited firms have expressed in relation to issues such as certainty and clarity. Both our survey research and other consultation with our members also indicate that this concern around the certainty of the credit has grown in more recent years.

It is clear from our research that Irish business believes that this scheme is a good one and has made a very positive contribution to R&D activity and business growth and viability. It is also evident, however, that the impact of the scheme could be increased through some improvements. We have used both the quantitative and qualitative responses to our survey to identify the following changes which respondents want to see to scheme. We have set out our specific recommendations for each issue in Section 8 of the submission.

1. **Greater certainty:** about one-third of larger firms regard the certainty of the credit as either poor or very poor. A similar proportion is also concerned about the lack of clarity in relation to the type of activities which can qualify for the credit. Companies which have been subject to an audit or follow-up queries are also more concerned about the lack of certainty and clarity. A similar pattern emerged from those firms which had used the credit most often. This issue also emerged in our consultations with members and it came out strongly in the qualitative comments in the survey. The issue is of particular concern for MNCs as the certainty of the credit is crucial in terms of financial planning and communication of benefits within global corporates. Some 40% of firms cited that increased guidance would be useful but is clear from our in-depth discussions with businesses that their greatest priority is for a more effective mechanism through which uncertainty can be removed.
2. **Outsourcing and use of agency/contractor workers:** skills availability is the single most important factor in the R&D investment location decision for firms. The respondents identified the issues of outsourcing to third parties (37%) and agency/contract workers (36%) as the second and third ranked most important changes needed to the scheme. R&D active companies in Ireland are clearly constrained by the availability of specialist skills in the Irish economy and the current rules of the tax credit scheme are exacerbating this problem. The use of agency workers is an essential element of the planning process for modern business. It is even more important in the context of R&D activity, given the lumpy nature of how it is carried out. The scheme needs to more adequately reflect the reality of business and R&D activity and rules in relation to agency workers should be amended.
3. **Base year:** the base year issue remains a problem for both users of the scheme and is also a barrier for those companies which do not use the scheme. Although it remains a difficulty for a relatively small proportion of all firms, for those firms which are affected it is a major drawback of the scheme. It could therefore be regarded as a reasonably low frequency but very high impact issue with the scheme. About 20% of companies which have not used the scheme identified the base year issue as a barrier. The qualitative comments received in the survey also highlighted the importance of this issue to a number of firms. Ireland is out of line with similar regimes in other countries by retaining an arbitrary base year for the scheme and an innovative and cost effective solution is now required to the issue. Our research panel data indicates that total credit related spend in the base year was just 10% of that in 2007 and 5% of that carried out in 2011. The cost to the Exchequer in addressing the problem may therefore not be as substantial as previously suggested.
4. **Tackling the barriers for SMEs:** while the number of SMEs using the scheme has increased significantly in recent years, its administrative burden and complexity remains a barrier to take-up. Lack of awareness amongst SMEs is also a difficulty, although this has become less so in recent years. Ireland is also out of line with many of its competitors by not having a significantly more attractive tax credit regime for SMEs. We urge that the issue of SME take-up is addressed in this review and, as with the other requirements for improvement identified in our research, we set out the detail of our recommended changes in Section 8.
5. **Fixing the 'key employee' element:** with only 5% of firms using this element of the scheme, the current rules are clearly not fit for purpose. Given the importance of the sufficient availability of skills to the success of Ireland's innovation policy targets and the difficulties currently posed by the very high marginal income tax rate which specialist staff face, it is essential that this issue is addressed. Our research has identified in detail the shortcomings of this aspect of the scheme and points towards a number of possible improvements.

7. Economic impact of the credit

7.1 Introduction

One of the key advantages of the survey is that it allows us to better estimate the additionality of the R&D tax credit scheme to the Irish economy, although this is not an easy task to perform fully. The benefits of the scheme are potentially numerous and some benefits such as the social return are notoriously difficult to measure or cost in a meaningful way. In the evaluation of the Norwegian R&D tax credit scheme Cappelen et al (2010) used a detailed panel dataset on firms who have applied for the scheme to divide the benefits of the R&D tax credit scheme into three broad parts: input additionality, output additionality and behavioural additionality.

- Input additionality assesses whether firms spend more on R&D as a result of using the tax credit.
- Output additionalities measures the extra outputs derived from R&D as a result of the scheme such as additional innovation, productivity, sales, profits and turnover.
- Finally, behavioural additionality is concerned with improved behaviours within the firm as a result of participating in the R&D tax credit scheme.

These three types of additionality go some way in assessing the overall benefit of the R&D tax credit scheme, but do not present a complete picture. For instance, the analysis does not include social benefits of R&D, such as higher levels of human capital and personal benefits derived from use of the outputs of R&D. They also fail to account for the many spill-over effects from R&D in the broader economy, which are better captured in macroeconomic studies which have tended to show positive economic spill-overs (Guellec & Van Potterie, 2000).

The question of positive output additionalities of R&D has been addressed multiple times in Ireland (Jordan and O'Leary, 2008; Roper, Du and Love, 2008). R&D is a driver of innovation and productivity at firm level. We provide some cursory evidence of this relationship from our sample. We also provide evidence for both the behavioural additionalities and particularly the input additionalities from the R&D tax credit for which there is less evidence in the Irish case. We use a mix of quantitative and qualitative methods to investigate the additionality of the R&D tax credit on both of these fronts. We begin the discussion with output additionality, moving on the behavioural additionality before concluding with a statistical and econometric analysis of input additionality.

7.2 Output additionality

Previous studies in Ireland have found R&D to be an important driver of innovation and productivity at a firm level (Jordan and O'Leary, 2008; Roper, Du and Love, 2008, Doran and Jordan, 2011, Crowley & McCann, 2012). In this section we investigate the potential output additionality in our sample. We concentrate specifically on the within-firm effects of the R&D tax credit scheme on employment and turnover.

Table 7.1 Output additionality of the R&D tax credit

	2007	2011
Total number of employees	1,798	6,152
Total number of employees allocating all/ some of their time to R&D	40	226
Average employment growth since previous year	14.8%	7.4%
Total turnover	€266 mn	€684 mn
Average turnover growth since previous year	20.5%	7.3%

Table 7.1 displays the outputs in terms of employment and turnover of firms for which we have data from both periods and which did not use the R&D tax credit in 2007 but did in 2011. This group of firms have grown employment by over 4,000 jobs in the intervening period. Firms who took up the tax credit in 2011 employed over five times as many research and development staff. Employment growth in 2011 was slower than in 2007, but this is likely due to external economic conditions. Total turnover in the intervening period has increased in

firms that have used the credit; while turnover in 2011 was lower than in 2007, this is nonetheless a remarkable performance given the challenging economic climate. These results suggest that the R&D tax credit has a significant impact in terms of employment growth both in R&D and in the firms at large. Companies using the R&D tax credit have also undertaken extensive capital investment in Ireland with considerable economic spin-offs for a wide range of business in local communities (see company case study in Annex 2).

Table 7.2 How important is the R&D tax credit in your company's decisions around locating each of the following in Ireland? (% of firms)

	Very important	Important	Unimportant	No importance at all	Not applicable/not stated
Creation of new jobs	37	25	11	4	22
Retention of jobs in Ireland	44	23	9	3	21

The results in table 7.2 suggest that the R&D tax credit plays an important role in the creation of new employment and the retention of existing jobs in Ireland. Some 37% of firms say that the credit is very important to job creation, with a further 25% saying it is important. Only 15% on the other hand think the scheme is unimportant to their company creating jobs in the country. Some 44% say the tax credit is very important for jobs retention, while a further 23% state it is an important factor.

7.3 Behavioural additionally

Assessing behavioural additionally is in many ways a complicated process and begs the question what we mean by 'better behaviour'. Falk (2007) argues behavioural additionally is represented by changes in the conduct of a company, possibly mirrored in a more formal approach to R&D-activities. In the case of an FDI-intensive economy such as Ireland much of the behavioural additionalities may be seen not only through changes to R&D processes within the firm but also commitment to investment from the firm into the country. In that sense, table 7.2 above may capture behavioural additionality as well as output additionality, and the findings are therefore included in table 7.4 along with other related findings.

R&D is an increasingly mobile investment for firms; which face increasingly competitive incentives for their R&D activity from a range of countries. As such, we look at the behavioural additionally of the R&D tax credit from two perspectives: its effect on the internal processes of the firms and the commitment to investment in projects and employment in Ireland which is influenced by the R&D tax credit.

Table 7.3 Has the use of the R&D tax credit driven improvements within your company, in relation to how each of the following R&D activities are carried out?

	Significant improvement	Slight improvement	No change	Disimprovement	Not stated
Application process for patents	4	14	61	0	22
Planning of R&D activities	28	35	18	0	20
Recording of R&D activities	42	28	9	0	21
Retention of R&D related documentation	41	28	10	1	21

Table 7.3 displays the breakdown of firms' perceptions of the R&D tax credit to a number of internal R&D processes. Firms that participated in the credit associated improvements in a number of R&D related areas as a result of participating in the scheme. Some 63% of firms saw an improvement in how they planned R&D activities, 70% improved on the recording of their activities, while 69% saw an improvement in how they retained their R&D related documentation. These are tangible improvements in the R&D process which firms have implemented as a result of participating in the credit and are important in terms of creating a first-class

business research environment in Ireland. It is possible that the planning and record keeping associated with claiming the R&D tax credit has resulted in more formalised processes in participating firms, though the data does not provide sufficient detail to conclude whether this is the case.

Table 7.4 How important is the R&D tax credit in your company's decisions around locating each of the following in Ireland? (% of firms)

	Very important	Important	Unimportant	No importance at all	Not applicable/not stated
Creation of new jobs	37	25	11	4	22
Retention of jobs in Ireland	44	23	9	3	21
Investment in R&D in Ireland	44	24	7	3	22
Overall investment in Ireland	32	33	10	3	21

Firms were also asked how important the R&D tax credit was to their investment behaviour in Ireland. Particular focus was paid to the creation and retention of employment as well as overall R&D investment. Annex 1 which contains summaries of qualitative comments from firms in the sample shows that many firms see the R&D credit as crucial to competing for investment and employment not only with other firms but also crucially within their own firms. These observations are in line with Table 7.4. Some 62% of firms say the credit is important to their firm creating new jobs in Ireland, while a further 67% said it was important to the retention of jobs in the country. This underlines the credit as not only driving positive behaviour in terms of commitment to employment growth but also to retaining employment in the country. Considering that respondents to the survey currently employ 67,400 people in the Irish economy this is an important point to take on board for policy makers.

Table 7.4 also shows that 68% of firms think the R&D tax credit is important in their decisions to invest in R&D in Ireland, while 65% said it is important to overall investment in Ireland. Given the globally competitive nature of R&D across sectors this is substantial evidence of the importance of the R&D tax credit.

Table 7.5 In deciding to locate R&D in Ireland, please choose the top three issues for your company from the list below

Ranking	1	2	3
Access to existing markets	12%	4%	9%
Access to new markets	7%	11%	6%
Availability of qualified staff	42%	16%	25%
Quality of infrastructure	1%	5%	3%
Calibre of local universities	2%	9%	7%
Cost of doing business	9%	14%	18%
Business friendly intellectual property	1%	6%	3%
Tax incentives	24%	27%	16%
Other government support	2%	7%	14%

Finally, when asked what the most important factor was when deciding to locate their R&D function in Ireland 51% of firms rated tax incentives either first or second on that list. Interestingly availability of staff was the largest factor at play when firms decided to invest in Ireland. Competition for R&D exists on many dimensions of which tax incentives are only one, the results of this survey should focus stakeholders' minds on the importance of human capital as well as a competitive tax environment to encourage and retain investment in Ireland.

7.4 Input additionality

7.4.1 Statistics on additionality

Assessing the input additionalities of R&D tax credits has been the focus of a large amount of research in the past decade. Hall and Van Reenen (2000) show that the majority of studies find that tax incentives have a positive effect in increasing the amount of R&D activity firms undertake to differing degrees. As yet robust empirical investigation of this question in the Irish case has not taken place due to lack of appropriate data at a firm level.

Companies were asked a series of questions relating to their company accounts in 2003 (the base year for the credit), 2007 and 2011. Using this data we provide some evidence of the input additionality of the Irish R&D tax credit at a firm level and seek to give an estimate of the impact of the R&D tax credit scheme.

Table 7.6 R&D tax credit user intensity and R&D spend

Years R&D tax credit claimed	Total R&D spend (€m) 2003	Total R&D spend (€m) 2007	Total R&D spend (€m) 2011
1 - 3	1	1.5	18.8
4 - 6	3.2	205.7	58
7 - 9	12.6	90.42	169
Total	16.8	297.7	245.9

Table 7.6 assesses the frequency of use of the R&D tax credit against total R&D spend in the years 2003, 2007 and 2011. Firms that used the credit for 7-9 years saw their R&D spend increase by €77.6 million in the period 2003-2011. Users with 4-6 claimed years increased R&D spend by €54.8 million, whereas firms who only used the credit for 1-3 years only increased spend by €17.8 million, from a very low base. The years 2007 and 2011 span the crisis years for the Irish economy, and it is noteworthy that active users of the R&D tax credit have increased R&D spend from the 2007 level, while those with 4-6 claimed years have reduced R&D investment relative to 2007. In addition, companies with only 1-3 claimed years have substantially increased investment from the 2007 level; it may be that these firms have newly begun R&D activities.

Table 7.7 R&D details for R&D claimants in 2011 who did not claim in 2007

	2007	2011
Total number of R&D projects	20	186
Total number of R&D tax credit supported projects	0	56
Total R&D spend	€5.6 mn	€37 mn
Total R&D-tax-credit related spend	0	€ 24 mn
Total R&D jobs	56	341
Total R&D tax-credit-related jobs	0	274

We have detailed for 22 firms that in 2007 and 2011 that claimed the credit in 2011 but did not claim it in 2007. Table 7.7 shows that in the year in which firms claimed the credit there are clear additional investments in R&D-related projects. These firms increased their R&D spend by over €31.5 million or around €1.4 million per firm relative to 2007. R&D spend covered by the credit amounted to €23.7 million of this, leaving in the region of €7 million not covered by the scheme funded solely by the firm. From this we can say firms who took up the credit in 2011 spent in the region of 30% more on R&D activities.

7.4.2 Econometric analysis

To further analyse our panel of firms accounts econometric models were ran on the 48 firms who gave financial data for all three years. Our baseline model is:

$$RD_{it} = \alpha_0 + \beta TC_{it} + \sigma Z_{it} + \varepsilon_i$$

RD is the natural log of R&D spend in firm i in period t, TC is a binary indicator of whether a firm received a tax credit or not, Z is a vector of firm specific variables such as sector, size, turnover growth, ownership and export orientation. β is out coefficient of interest. If β is positive there is positive additionality and R&D tax incentives causes firms to invest more in R&D. The magnitude of the coefficient will tell us the level of input additionality. If β is negative, subsidies partly crowd out private capital; firms use the subsidy to finance some of the R&D activity that would also have been carried out without the subsidy. A zero coefficient implies full crowding out. An insignificant coefficient implies that the tax credit has no effect on R&D spend in the firms. Pooled OLS, fixed effects and random effects models were run along with a Hausman test to find the appropriate model of best fit between fixed and random effects. Our total sample size (firms who answered our questions across all years) was 48 firms leading to 144 observations on which to perform our analysis. Our results of interest are presented in table 7.8.

Table 7.8 The effect of the R&D tax credit on business R&D spend

	Pooled OLS	Fixed effects	Random Effects
B coefficient	.73***	1.04**	.93***
* indicates significance at 90% level, ** represents significance at 95% level and *** represents significance at 99% level			

The results from Table 7.8 display the results of interest in terms of output additionality. As the dependent variable is in its natural log the results can be interpreted as indicating participation in the R&D tax credit scheme increases the R&D spend of firms in our sample by between 73% and 104%. This suggests that the scheme has positive additionality. The Hausman test suggests that random effects may be a better indicator of the overall effect than our fixed effects model. These results are broadly indicative of the impact of the R&D tax credit scheme however should be interpreted with some caution as the relationship between R&D tax credit take up and R&D spend may be in some way endogenous. Due to time constraints we do not attempt to correct for this here but this should be an avenue for further work from stakeholders.

Our econometric estimates shows a substantial increase in R&D spend in firms due to the R&D tax credit. Our estimates are that participation in the R&D tax credit scheme for firm i will increase its R&D spend in the given year by between 70% and 90%. Given that similar previous studies such as Huang et al (2012) have found estimates between 50% and 90% this estimation is well within reason.

Firms in our sample for which we have financial data spent €246 million on R&D in 2011, or about €5.1 million per firm. If we assume that firms spent 70-90% more on R&D as a result of the credit, we can assess the counterfactual scenario where there was no R&D tax credit. In the absence of the credit, firm investment on R&D would have been €129-144 million and R&D spend in Ireland would have been €125-101 million lower in 2011 than had the credit existed.

Given that our sample received in the region of €50 million from the credit in 2011 this means that the net benefit of the credit to the economy was €50-75 million in 2011. Hall and Van Reenen (2000) in their survey of the evidence have shown that the majority of studies find about a one to one relationship (with deviations to either side) between R&D tax credits and additional outputs. Our figures again are within these boundaries. Assuming our sample is representative of total R&D spend in the country we can gross this figure up to business spend on R&D which in 2010 was €1.9 billion – this would mean the net benefit of the credit (after exchequer cost) in 2011 would be €390-585 million.

7.5 Summary of additionalities

Our findings suggest that participation in the R&D tax credit has major additionalities in terms of firm's behaviour, employment, turnover and R&D spending.

- Our estimates suggest that the R&D tax credit leads to a net benefit of €390-585 million in terms of additional R&D spend
- The R&D tax credit is important to employment growth in Ireland: 62% of firms say the credit is important to their firm creating new jobs in Ireland, while a further 67% said it was important to the retention of jobs in the country.
- Respondees to the survey currently employ 67,410 people in the Irish economy.
- The credit is important to future investment in Ireland, particularly in terms of FDI. Some 68% of firms think the R&D tax credit is important in their decisions to invest in R&D in Ireland, while 65% said it is important to overall investment in Ireland.
- Participation in the scheme has led to the improvement of R&D process in firms. Some 63% of firms saw and improvement in how they planned R&D activities, 70% improved the recording of their activities, while 69% saw in improvement of how they retained their R&D related documentation
- These improvements are important as they may lead not only to greater returns to R&D in the future but also to a better R&D environment developing in Ireland. In a high value sector where reputation is king the importance of this cannot be underestimated.

8. Summary of recommendations

Building on survey findings, extensive consultations and the review of developments in competitor countries, IBEC's recommendations for the R&D tax credit scheme review are summarised as follows:

1. **Maintain a comparatively attractive R&D tax credit scheme as a central element of Ireland's offering for R&D and mobile investment:** The B-Index which calculates the tax subsidy for R&D in a range of countries shows that Ireland holds about a mid-table ranking. Ireland's competitors, most noticeably the UK, are continuously improving their offerings and any reduction by Ireland in the attractiveness of the R&D tax credit scheme would result in lost FDI and mobile R&D activity. Our economic impact assessment has shown that
2. **Introduce measures to remove uncertainty:** the current uncertainty surrounding the retention of the credit benefit under audit is damaging the reputation of the scheme. The issue can be addressed by:
 - a. Establishing a structured process (similar to the clearing house model used in other policy areas) whereby Revenue, policy, industry and advisor professionals can address difficulties with the scheme and establish clarity on areas of uncertainty
 - b. Set up a streamlined technical appeals process
 - c. Ensure greater consistency on R&D definitional issues between grants and other SFI policy and the eligibility criteria used in technical assessments of R&D claims by Revenue appointed external experts. Improved guidance is needed for technical experts and SFI should have a role in ensuring that this guidance is consistent with wider innovation policy
 - d. Reduce the current audit period of four years
 - e. In order to ensure that there is greater clarity and consistency in communication from Revenue officials to industry it should establish a central specialist unit of scheme experts. The current model of non-specialist advice at a district level results in a lack of consistency in rulings and guidance to industry
3. **Facilitate greater use of agency/contract staff:** the use of on-site agency / contract staff should not be subject to the current outsourcing cap and all such expenditure should be eligible for the credit
4. **Introduce an innovative solution for the base year problem:** the retention of the arbitrary base year remains a barrier to R&D activity and disadvantages some companies competing internationally for mobile projects. Our research has demonstrated the net economic benefits of the credit and addressing the base year issue will increase these net benefits. We recommend that some flexibility is required in the base year application through either:
 - a. allowing companies the flexibility to choose their base period from a number of years i.e. 2003 to 2005 or to use their average annual R&D spend over the 2003 to 2005 period
 - b. allowing companies to reduce their eligible base year spend by a certain percentage and offsetting the cost to the Exchequer by reducing the value of credit by a corresponding percentage i.e. a firm with a high base year spend might opt to reduce it by 50% and accept a credit value of 12.5% rather 25%. In this way additionality is encouraged and R&D activity would be more likely to increase at a very modest cost to the Exchequer
5. **Launch a 'credit lite' model for SMEs:** despite good progress in recent years, many SMEs are not engaging with the credit due to its complexity and administrative requirements. We recommend that a streamlined or 'credit lite' model should be developed for SMEs which would include the use of pro-forma templates for R&D project management, recording R&D activity and calculation of eligible costs and revenue benefit associated with the credit. Simple on-line calculators demonstrating the benefit and eligibility rules of the credit would be a useful resource for SMEs and would also greatly improve awareness and promotion of the scheme
6. **Improve the 'key employee' element:** this aspect of the scheme is currently not fit for purpose and could be enhanced by:
 - a. Reducing the audit period for the scheme so that remuneration awarded to staff would not be subject to an audit claw-back for a four year period
 - b. Allowing firms to allocate the credit in a tax efficient manner on a team based approach rather than just to 'key employees'
 - c. Introduce a lower R&D time activity threshold for SMEs – the current 50% requirement remains too high for smaller firms

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Annex 1 Solicited qualitative feedback from the R&D tax credit survey

SECTION 1-

DETAILS OF WHY COMPANIES HAVE NOT AVAILED OF THE KEY EMPLOYEE ELEMENT OF THE R&D TAX CREDIT (where provided)

Participating companies were asked to briefly provide details of the reasons why they have not availed of the key employee element of the R&D tax credit. 120 companies responded, for reasons of confidentiality the main points given are summarised below.

This question got a relatively high response rate. There were several themes which were almost universal among the comments. A majority of firms which gave further detail on this question were of the opinion that implementation of the key employee element in its current format was unworkable.

Their reasons for thinking this came under 4 main headings:

1) Fairness

A large number of firms felt that the introduction of this element of the credit would be unworkable from a HR perspective. It would create tensions in the workplace and complicate remuneration processes within the firm. Others said it was against their HR policies and/or against corporate guidelines. Many identified that their R&D function is administered by cross functional teams and that to advantage one member of the team would create an unequal, negative culture which would create disincentives for other workers. Additionally many felt it would lead to claims from other employees at a similar level of seniority to claim for greater gross pay to close the difference the credit made to a colleague.

2) Uncertainty

Comments focused on the scheme being too difficult to predict and plan as part of an overall compensation package. Many felt that the prospect of the claim being rescinded under Revenue audit created a great amount of uncertainty for the firm and employee regarding remuneration.

3) Use of time requirement

The criterion of 75% of time having to be spent on R&D was a major problem, particularly for smaller firms without a dedicated R&D function. Again much of their R&D was done in cross functional teams or working groups and it would be impractical to divert people solely to R&D when their work was necessary elsewhere as well. For small companies many identified not being able to afford full-time in house R&D but sub-contractors not being eligible for this element is an issue. Companies welcomed changes to this element in the most recent Finance Bill.

4) Lack of information

A number of firms were unsure how it would work for them or were concerned that it would be too complicated to administer.

5) Companies not yet in profit

A number of companies cited the fact that they were currently loss making as the main reason for not using this element of the credit.

SECTION 2-

DETAILS OF BARRIERS TO UNDERTAKING R&D (where provided)

Participating companies were asked to briefly provide details of the other barriers to the R&D tax credit in addition to those listed in question 11. For reasons of confidentiality the main points given are summarised below.

- 1) A number of start-up firms were unsure of the potential barriers they may face and experience capacity issues in undertaking R&D.
- 2) Some firms which did participate in R&D activities felt their R&D activities fell outside the scope of the existing credit. This was particularly true of firms in the IT sector.
- 3) A number of firms did not participate in R&D activities.
- 4) A number of firms were investigating the implications of the credit for them and had yet to make a decision on its applicability.

SECTION 3 –

DETAILS BY PARTICIPATING COMPANIES, OF HOW REVENUE SOUGHT TO VERIFY ANY ASPECTS OF COMPANIES R&D TAX CREDIT CLAIM IN THE LAST TWO YEARS BY WAY OF AUDIT, QUESTIONNAIRE, QUERIES OR ANY OTHER MEANS (where provided)

Participating companies were asked to briefly provide details of how Revenue sought to verify any aspects of their R&D tax credits in the last two years. For reasons of confidentiality the main points given are summarised below:

There were three main types of interaction with revenue.

- 1) Most firms were subject to a revenue questionnaire
- 2) Further to this a large number of firms were subject to a desk audit comprising of follow-up queries
- 3) Additionally a number of firms had site inspections, discussions with revenue, visits from experts, physical inspections of their place of business and verifications of the financial calculations which supported their claim.

Two generic comments which arose in a number of cases were that Revenue's questionnaire placed a large burden for a small document and in a more positive note that an audit was useful to some firms in encouraging better discipline with regards documentation for the credit in later years.

SECTION 4-

ANY OTHER COMMENTS REGARDING THE R&D TAX CREDIT

Participating companies were asked to briefly provide further comments and suggestions on the R&D tax credit in its current form. This elicited a large number of comments, some of which went into great detail. For reasons of confidentiality the main points given are summarised below.

1) The importance of the R&D tax credit:

- Comments on the impact of the scheme were almost wholly positive. It is seen among the majority of firms to be a key element in their decision to invest in Ireland. In a number of cases it was noted that the R&D function would be under threat within the country without it. SMEs and multinationals said it was an essential part of them increasing their productivity, improving offerings for customers and increasing employment.
- Firms who were part of multi-plant groups noted that they had come up against increasing competition with other plants within their organisation during recent years. The US, UK, Holland, Israel and Asian countries were mentioned as bases which were either more cost competitive or going in that direction. Many have used the R&D tax credit as an argument against relocating operations to other jurisdictions in the past but several noted increased competition in recent years.
- It was mentioned by multiple firms that the credit was a 'fixed feature' of Ireland's offering in attracting FDI and that scaling back of the credit would be seen as a major retrograde step by firms who have located here.

2) Suggestions for improvement:

There were a number of detailed notes on improvements firms would like to see to the scheme, including firm specific experiences. Recurring themes included:

- 1) The effect of the base year on the scheme's competitiveness internationally (esp. for firms with high base year spends)
- 2) Conflict between the manner in which the regime is promoted and how revenue audit once the company bases itself in Ireland
- 3) Overly restrictive on agency workers which form large parts of some firms R&D functions
- 4) Lack of better IP regime – innovation box
- 5) Negative effect of changes in 3rd party expenses
- 6) Uncertainty around future audit period is unwelcome
- 7) Key employee credit flawed – should be allowed for all employees, even at same overall cost
- 8) Changes around clinical trials
- 9) R&D definitions and revenue expertise in some areas – especially the IT industry
- 10) Alignment with Enterprise Ireland grant aid rules

Annex 2 Company case study

Background

This case study represents the experiences of a US multinational company, operating in Ireland for over 30 years with almost 1,000 employees as it relates to the current R&D tax credit scheme operated by the Department of Finance. The strategic vision for the site is to become more than just a manufacturing facility, with emphasis placed on increased development activity leading to accelerated speed to market of new products. The Development & Manufacturing (D&M) model is being advanced by the company in accordance with the strategic vision for the Irish operation and the current R&D credits scheme has become a key enabler to this strategy.

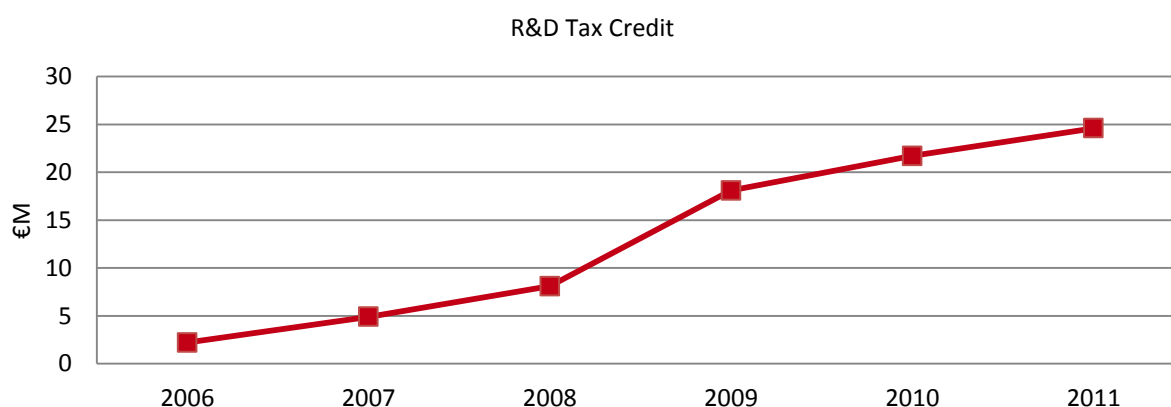
The site aims to both protect and expand on the current “core” manufacturing technologies while enhancing other activities. Such activities include a global stability testing centre, the supply of clinical trial material, involvement with corporate R&D in biologics and pharma development projects from phase I through phase III in certain instances and a shared financial service centre. The evolution of the D&M model has led to the creation of a dedicated Technical Operations function at the site, to focus on development from a process, product and analytical perspective. The group aims to bring development activities closer to the manufacturing site in order to benefit from site knowledge and expertise. This has become an integral part of the R&D process from development through the full life cycle of the product. Technical Operations aims to be regarded as the centre of excellence and location of choice for late-stage development within the corporation, adding significant increased value to the organization and end customer. The ultimate goal is speed to market for our products to better service our customers’ needs.

The site continues to secure significant investment from the corporate office. The facility has seen an increased level of up-skilling of employees and academically-qualified recruitment with over 70% of the employee population now holding a third-level qualification. The future for the campus is very bright – continued investment in its infrastructure and people and endorsements received from corporate headquarters will help to deliver our vision into the future. This, in addition to the support from government bodies such as the IDA and the availability of innovative government schemes will ensure that the company continues to grow and expand here in Ireland.

R&D Tax Credit Claims to Date

Per the graph below the cumulative scale of claims made by the company under this scheme can be seen to have increased year over year since 2006. In the coming years it is projected that the base claims will be approximately €3 million per annum, driven by current development activities, with the potential to increase further as additional R&D projects are secured by the site.

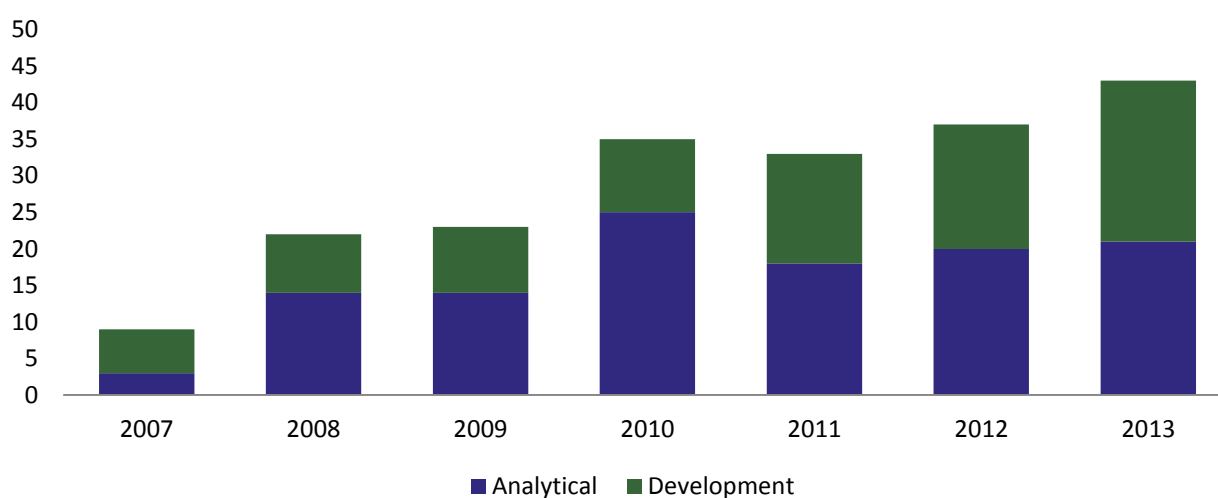
Figure A2.1: R&D tax credit claims 2006 – 2011



Employment impact

Overall employment for the Irish operation has increased by approximately 5% in the last 4 years. The contribution of dedicated R&D positions to this growth can be seen in the figure overleaf. Of note within this group is in the area of the analytical method development function which first commenced in 2007 with 3 technicians and has since grown to over 20 highly skilled technicians, including individuals with PhD and masters qualifications. This is a prime example of an R&D function previously conducted at the corporate HQ and now undertaken here at the site to support all commercial facilities with dedicated funding from the annual R&D budget.

Figure A2.2: R&D employment 2007 - 2013



The company directly supports over 900 jobs in Ireland and many more indirectly.

- A new construction project will support over 200 construction jobs at its peak.
- On any given day there is an average of 120 contractors / service providers on the site.
- The company invests over \$100M annually in the Irish economy purchasing goods & services.

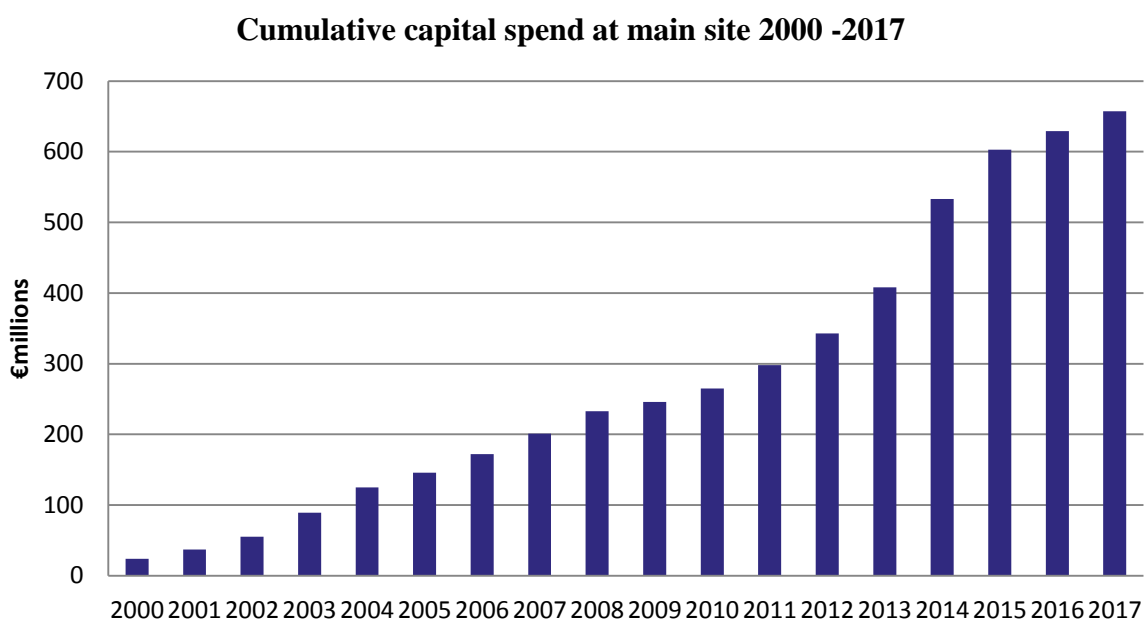
Key R&D Projects Secured

In addition to the detail provided above in the analytical area there is also a specific example related to development of next generation biological products at the site. In 2007 a corporate review was undertaken in relation to the build of a GMP fill/finish pilot facility to support the companies growing portfolio of biologics products in development. Timing of this review coincided with the availability of a small commercial production area coming to end of life due to capacity addition at the Ireland site. With minimum retrofit this area was identified and agreed as an ideal facility for development activities, taking into account its co-location with commercial operations. R&D tax credits formed a key part of the economic analysis undertaken at the time vs. the cost of a new build at corporate HQ or the utilization of a CMO. Since being established in 2007 the function has evolved from working with one molecule and two people to its current status of more than 20 employees and four molecules in various stages of development from pre-clinical to Phase III. In addition through leveraging this knowledge, capability and the relationships with corporate HQ, the Irish site was recently successful in securing a new fill/finish biologics commercial facility which is currently in construction. The scale of this investment is \$150 million and up to 100 additional permanent positions when it achieves full utilization. This build will secure the commercialization of future biologics products at this campus.

Ratio between grant and spend

The Site recently secured a multi-million euro capital investment for a new fill finish plant which is supported by the IDA. The IDA actively promoted the availability of the 25% R&D credit funding as well as their grant contribution as part of the Irish Governments investment in supporting the project. The projections for the project indicate that the Grant to R&D credit ratio will be approximately 50:50. This has been the only IDA support that the company has secured in the past 5 years however the company has been investing heavily in the site as can be seen from the chart below. In many cases the contribution of the R&D credit has helped secure this investment.

Figure A2.3 Cumulative capital spend at main site 2000 - 2017



Annex 3 B – Index scores

Table 1: Rate of tax subsidies for \$1 USD of R&D in Large firms. 1999 – 2012

OECD	1999	2001	2004	2006	2007	2009	2012
Australia	0.11	0.12	0.12	0.12	0.12	0.12	0.11
Austria	0.07	0.11	0.11	0.09	0.09	0.09	0.12
Belgium	-0.01	-0.01	-0.01	0.09	0.09	0.09	0.14
Canada	0.17	0.17	0.17	0.17	0.18	0.18	0.18
Czech R.	.	.	.	0.27	0.27	0.23	0.2
Denmark	0.13	0.11	0.18	0.16	0.16	0.14	0.29
Finland	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
France	0.09	0.06	0.13	0.19	0.19	0.34	0.34
Germany	-0.04	-0.02	-0.02	-0.03	-0.03	-0.02	-0.02
Greece	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	0.01
Hungary	.	.	0.16	0.16	0.16	0.16	0.22
Iceland	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Ireland	0.06	0	0.05	0.05	0.05	0.11	0.13
Italy	-0.03	-0.03	-0.03	-0.02	-0.02	0.12	0.12
Japan	0.02	0.01	0.14	0.12	0.12	0.12	0.13
Korea	0.13	0.13	0.19	0.18	0.16	0.18	0.1
Luxembourg	.	.	.	.	-0.01	-0.01	-0.01
Mexico	0.03	0.03	0.39	0.37	0.38	-0.01	-0.01
Netherlands	0.05	0.06	0.07	0.07	0.07	0.07	0.14
New Zealand	-0.13	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Norway	-0.02	-0.02	0.21	0.21	0.21	0.21	0.22
Poland	.	.	.	0.01	0.01	-0.01	-0.01
Portugal	0.15	0.3	-0.01	0.29	0.29	0.28	0.41
Slovak Rep.					-0.01	-0.01	-0.01
Spain	0.31	0.44	0.44	0.44	0.39	0.35	0.35
Sweden	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01
Switzerland	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Turkey	.	.	.	.	0.14	0.22	0.22
UK	0	0.1	0.1	0.1	0.1	0.11	0.09
US	0.07	0.07	0.07	0.07	0.07	0.06	0.06
Non-OECD							
Brazil	.	.	.	.	0.25	0.25	0.26
Chile	.	.	.	.	-0.01	-0.01	-0.01
China	.	.	.	.	0.34	0.14	0.14
India	.	.	.	.	0.27	0.27	0.44
Israel	.	.	.	.	-0.01	-0.01	-0.01
Russia	.	.	.	.	-0.02	-0.01	0.1
South Africa	.	.	.	.	0.17	0.16	0.22
Singapore	.	.	.	.	0.23	0.09	0.09

1. Tax subsidies are calculated as 1-B-index. For example, in Ireland one dollar of R&D expenditure in 2012 results in before-tax 13 cents of tax relief.
2. Data provided by the OECD for 1999 – 2009 and The Information Technology and Innovation Foundation for 2012.

Table 2: Rate of tax subsidies for \$1 USD of R&D in SMEs 1999 - 2012

OECD	1999	2001	2004	2006	2007	2009	2012
Australia	0.11	0.12	0.12	0.12	0.12	0.12	0.17
Austria	0.07	0.11	0.11	0.09	0.09	0.09	0.12
Belgium	-0.01	-0.01	-0.01	0.09	0.09	0.09	0.13
Canada	0.32	0.32	0.32	0.32	0.33	0.33	0.33
Czech R.	.	.	.	0.27	0.27	0.23	0.20
Denmark	0.13	0.11	0.18	0.16	0.16	0.14	0.29
Finland	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
France	0.09	0.06	0.13	0.19	0.19	0.43	0.43
Germany	-0.04	-0.02	-0.02	-0.03	-0.03	-0.02	-0.02
Greece	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	0.01
Hungary	.	.	0.16	0.16	0.16	0.16	0.22
Iceland	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Ireland	0.06	0.00	0.05	0.05	0.05	0.11	0.13
Italy	0.45	0.44	0.45	0.43	-0.02	0.12	0.12
Japan	0.06	0.12	0.19	0.16	0.16	0.16	0.16
Korea	0.16	0.16	0.16	0.16	0.18	0.16	0.26
Luxembourg	.	.	.	.	-0.01	-0.01	-0.01
Mexico	0.03	0.03	0.39	0.37	0.38	-0.01	-0.01
Netherlands		0.22	0.24	0.24	0.24	0.24	0.33
New Zealand	-0.13	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Norway	-0.02	0.23	0.23	0.23	0.23	0.23	0.25
Poland	.	.	.	0.02	0.02	-0.01	-0.01
Portugal	0.15	0.30	-0.01	0.29	0.29	0.28	0.41
Slovak Rep.	.	.	.	.	-0.01	-0.01	-0.01
Spain	0.31	0.44	0.44	0.44	0.39	0.35	0.35
Sweden	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01
Switzerland	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Turkey	.	.	.	.	0.14	0.22	0.22
UK	0.11	0.11	0.11	0.11	0.11	0.18	0.28
US	0.07	0.07	0.07	0.07	0.07	0.06	0.06
Non-OECD							
Brazil	.	.	.	.	0.25	0.25	0.26
Chile	.	.	.	.	-0.01	-0.01	-0.01
China	.	.	.	.	0.34	0.14	0.14
India	.	.	.	.	0.27	0.27	0.44
Israel	-0.01	-0.01	-0.01
Russia	-0.02	-0.01	0.10
South Africa	0.17	0.16	0.22
Singapore	0.23	0.09	0.09

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