

REVIEW
OF IRELAND'S RESEARCH
AND DEVELOPMENT (R&D)
TAX CREDIT 2013



An Roinn Airgeadais
Department of Finance

Foreword from the Minister for Finance



As part of last year's Budget process, I announced a review of the R&D Tax Credit, a regime which has been in place since 2004.

Given that the R&D Tax Credit regime is fast approaching its tenth birthday, and given that the scheme has a very significant annual Exchequer cost, I believe it was the right time to take a step back and review its impact to date to see are there any lessons that can be learnt to improve its effectiveness going forward.

This review of the R&D Tax Credit regime is just the latest in a series of rolling reviews of tax expenditure schemes I have initiated since becoming Minister for Finance, all aimed at improving evidence based policy making.

In 2011, I instructed my Department to carry out a review of legacy property tax relief schemes, and in 2012, I commissioned a review of the film tax relief scheme.

Both reviews resulted in significant legislative change.

In a time of difficult budget tightening for the country and for individual citizens it is right to ask if tax relief schemes remain fit for purpose.

I am pleased to be able to publish the results of the review of the R&D Tax Credit regime now as part of Budget 2014. The review process has been extensive with around 1,000 companies canvassed and approximately 100 consulted directly. I would like to thank all of those businesses throughout the country who took the time to take part in the review process.

The results of the review are clear. The Irish R&D Tax Credit regime has been a significant driver for increasing R&D spend in Ireland over the last decade, the scheme itself continues to be 'best in class' internationally, and it remains a significant aspect of Ireland's successful formula for attracting foreign direct investment, which is jobs rich.

Of course, things can always be made better, and the review highlights a number of areas where improvements can be made, and I am committed to acting on the recommendations of the review as part of Budget 2014.

Michael Noonan TD
15 October 2013

Preface

This review was conducted by a team of economists and tax policy specialists in the Economic and Fiscal Divisions in the Department of Finance.

The authors would like to acknowledge the valuable input and assistance from Department of Finance colleagues and colleagues in the Revenue Commissioners, Forfás, the IDA and Enterprise Ireland.

Organisations and individuals were invited to submit their views as part of a public consultation process which ran from 13th February to 12th April 2013. Over 20 responses were received. This high level of engagement by members of the public and a variety of organisations is gratefully acknowledged.

The work of Crowe Horwath, who were appointed following a competitive tendering process to carry out a separate and independent survey of R&D active companies, is gratefully acknowledged. The work of Crowe Horwath is referred to throughout this report and their full Report on the Survey of R&D Active Companies is published separately alongside this Review.

Contact Details

Department of Finance | Government Buildings | Upper Merrion Street | Dublin 2
Website: <http://taxpolicy.gov.ie/>

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CHAPTER 1

EXECUTIVE SUMMARY, FINDINGS & POLICY CONCLUSIONS

Background

- 1.1 A tax credit regime for Research and Development (R&D) was introduced in Ireland in Finance Act 2004.
- 1.2 The number of companies benefiting from the credit has increased from less than 75 in 2004 to almost 1,500 in 2011. The annual cost of the scheme is estimated to have risen from €71 million to approximately €261 million over the same period¹.
- 1.3 The Minister for Finance announced this review of the R&D Tax Credit as part of Budget 2013. The goal of the review is to ensure that the R&D Tax Credit remains 'best in class' internationally and represents value for money for taxpayers.

The Review

- 1.4 The review had 5 key pillars:
 - Economic analysis: A detailed review of the economic literature on R&D and R&D incentives was undertaken. This was augmented with an analysis of data from the Revenue Commissioners as well as company level data from annual reports and financial statements.
 - Analysis of Revenue Data on R&D Tax Credit Claims: Confidential company level data was provided by Revenue to the Department under an authorisation procedure. The data was not disseminated to any other parties within or outside the Department and is only presented in high level aggregated format in this report.
 - Public Consultation: A consultation process with interested parties was initiated following the publication of a consultation paper on 13th February 2013. Over 20 parties responded to the paper by making submissions to the Department.² The Department also met with around 100 individual companies during the course of the consultation during site visits, round table discussions and industry seminars. The views expressed during the consultation have helped the Department's understanding of the issues.
 - Survey of R&D Active Companies: Following a competitive tender the Department appointed Crowe Horwath to conduct an independent survey of R&D active companies. The data collected by Crowe Horwath and issues raised by respondents is represented throughout this report.
 - International review: A detailed comparison of the tax incentives available in other jurisdictions in respect of business expenditure on R&D was undertaken. A high level summary of this work is presented in this report.

¹ It should be noted that these figures reflect the most up-to-date data available to the Department at this time, and are different from the amounts that were published in the consultation documents in February 2013.

² All responses to the consultation process are being published on the Department of Finance's tax policy website www.taxpolicy.gov.ie

Key Findings of the Review

Policy Framework for R&D and Trends in R&D Investment

- 1.5 Ireland's R&D policy framework is governed by the overarching Europe 2020 target of achieving a level of expenditure on R&D of 3% of EU-wide GDP by 2020. Within this framework Ireland has a target of 2.5% of GDP. The R&D Tax Credit is focused on business expenditure on R&D and complements a range of grant and funding to the business and higher level education sectors as part of the State's Strategy for Science, Technology and Innovation 2006-2013.
- 1.6 The primary objective of the tax credit is to incentivise Business Expenditure on Research and Development (BERD). Ireland now invests 1.17% of GDP on BERD, a level that has grown from 0.78% in 2003 the year before the introduction of the credit. In EU terms Ireland's level of BERD as a share of GDP is just below the EU average, a significant improvement since the 2003 outcome. Ireland's level of BERD in 2011 exceeded that of the UK, however, a significant gap still exists between Ireland and the highest investing country, Finland.
- 1.7 In total, estimated expenditure for firms in Ireland in 2012 was €1.96 billion. Of this, approximately 88% of expenditure on R&D by businesses was incurred on current expenditure (such as wages of R&D staff) and 12% incurred on capital expenditure (such as buildings, equipment, licence payments). The level of current expenditure has grown consistently since 2007 when the share of current expenditure was 83%.
- 1.8 Expenditure by small companies accounted for 26% of total business expenditure in 2011 having risen from 17% in 2007. As a share of the number of companies that were active in R&D small companies accounted for 69% in 2011, a share that grew from 58% in 2007.

The Economic Literature

- 1.9 There are myriad ways Governments influence the degree of innovation in an economy. These range from the more direct and commonly known methods such as grants and tax credits for R&D; to the legal, regulatory and competitive environment fostered in a country through patent law, competition, tax, and immigration policy; and the efficiency of public administration. In addition, the ability of a country to supply highly educated staff through its higher education system is critical.
- 1.10 Tax incentives are a market-orientated means of delivering an increase in private R&D expenditures which also allows the support offered by the credit flexibility to respond to market demand. Tax credits allow expenditure to be directed by market aware firms rather than a centralised authority. While the flexibility of a credit to respond to market demand is useful it may also create an uncertain and potentially open-ended demand on the exchequer.
- 1.11 The economic literature considered R&D in terms of its contribution to GDP growth, through multi-factor productivity, to firm level productivity improvements from in-house R&D and from spillover effects.
- 1.12 The literature refers to the existence of a number of market failures that result in less R&D expenditure by the private sector relative to a societal optimum. This is because the social return from R&D is higher than the private return: in other words,

there exists a positive externality that the private sector does not take into account. This suggests a role may exist for the State to remedy the market failure.

- 1.13 A significant concern with regard to government supports for R&D is their efficacy in eliciting additional R&D expenditure from firms. The danger is that firms may just be substituting the government funds for funds they would have otherwise invested themselves. There is a large body of literature which attempts to evaluate the additionality of R&D tax credits by calculating a benefit-to-cost ratio. This ratio gives a measure of the amount of firm R&D expenditure induced for a given amount of tax foregone. A review of the literature on the benefit to cost ratios has identified a number of evaluations where the benefits exceeded the costs.

Costs and Take-up of the R&D Tax Credit

- 1.14 The State directly supported the R&D expenditure of private companies in 2011 by around €379 million. €261 million of this support was delivered via the tax system through the R&D Tax Credit in 2011 with the remaining €118 million delivered through grants.
- 1.15 The tax credit supports over 1,400 companies that, between them, employ nearly 150,000 people and have turnover of nearly €100 billion.
- 1.16 The take-up and corresponding cost of the credit have increased from €70.5 million in respect of nearly 75 beneficiaries in 2004 to €261 million in respect of just under 1,500 beneficiaries in 2011. Over the same period, BERD has increased from €1.2 billion to €1.86 billion.
- 1.17 €106 million of the 2011 costs related to payments of payable credit in respect of current and prior-year claims. The remaining €155 million represented corporation tax foregone.
- 1.18 R&D expenditure by companies eligible for the tax credit is estimated to be at around €1.36 billion in 2011.
- 1.19 BERD was €1.86 billion in 2011 which indicates that the tax credit supports over 70% of BERD.
- 1.20 376 of the companies availing of the payable credit in 2011 were profit-making according to their accounts.

Findings from the Consultation Process and Survey

- 1.21 The majority of the submissions and feedback received from the consultation process and survey were very positive about the R&D Tax Credit in terms of its impact on companies availing of it.
- 1.22 The importance of the R&D Tax Credit in attracting mobile Foreign Direct Investment (FDI) into Ireland was highlighted extensively in the public consultation with companies.
- 1.23 In FDI terms, the principal benefit of the R&D Tax Credit is that it reduces the costs of undertaking R&D in Ireland by 25%. The payable credit can effectively be treated as a grant for accounting purposes – this allows a company to account for the credit as income ‘above the line’ in their annual accounts.

- 1.24 Feedback from the consultation indicated that this feature is crucial to the success of Irish subsidiaries of MultiNational Companies (MNCs) in competing to win R&D projects against subsidiaries in other jurisdictions. Because the value of the credit can be accounted for 'above the line', it allows the Irish subsidiary to pitch for R&D projects on the basis of 75% of actual cost per head of conducting R&D in Ireland.
- 1.25 This helps to mitigate a natural bias whereby MNCs may otherwise tend to locate high-cost activities (such as R&D) in high-tax jurisdictions in order to benefit to the greatest possible extent from the associated expense deductions.
- 1.26 There is qualitative evidence that the R&D Tax Credit has assisted some traditional manufacturing companies in 'moving up the value chain' and winning R&D investment from parent companies which can, in turn, act to further embed the manufacturing activity in Ireland.
- 1.27 While the R&D Tax Credit is important in FDI terms, it is notable that, of the survey respondents who use the R&D Tax Credit, 60% were indigenous companies and 40% were MNCs. Of the total numbers employed by R&D active companies who responded to the survey, 76% were employed in MNCs and 24% by indigenous companies.
- 1.28 The breakdown of respondents to the survey indicated that the dominant economic sectors in which R&D claimant companies operate are manufacturing (46.1%) and Information and Communications Technology (23%).
- 1.29 The survey indicates that the type of R&D conducted differs between the MNC and indigenous firms – more indigenous firms are doing basic and applied research.
- 1.30 Smaller indigenous firms reported that the tax credit plays an important role in mitigating some of the financial risks involved in carrying out R&D. In the survey, smaller firms indicated that they would have undertaken less risky R&D activity in the absence of the R&D Tax Credit. In particular, the payable credit element of the tax credit was identified as important in assisting cash-flow of smaller, typically indigenous, companies.
- 1.31 82% of survey respondents who claimed the tax credit in 2011 were also in receipt of government grants.
- 1.32 86.9% of firms who responded said expenditure on R&D had increased since they started claiming the tax credit.
- 1.33 The survey shows the breakdown of responses from companies when they were asked what would have happened in the absence of the tax credit:
- 60% of those who answered indicated that they would have invested less in R&D, and
 - 27.1% of those who answered indicated that they would have lost R&D projects to other locations.
- 1.34 Where an Irish subsidiary of an MNC had competed and won an R&D project, 84.6% of respondents said that the R&D Tax Credit had played a part in the win.
- 1.35 The survey indicates a very high level of export activity among firms active in R&D.
- 1.36 The main policy areas identified by companies, in the consultation and the survey, for possible enhancement were:

- Base year
 - Outsourcing / Sub-contracting
 - Key Employee Provision
- 1.37 The survey identified that, of the relatively small number of companies with expenditure in the 2003 base year, 52% had expenditure of less than €200,000. This would suggest that the base year issue has been addressed for the majority of companies by the recent changes to the tax credit which allow the first €200,000 of R&D expenditure to qualify without reference to the base year.
- 1.38 The analysis of Revenue data and the survey data indicate that the base year and outsourcing / subcontracting issues affect only a small percentage of R&D companies – 10% had expenditure in the base year and 14% have expenditure on outsourced R&D.
- 1.39 The introduction of the payable credit in 2009 has significantly increased the attractiveness of the regime as it allowed recipients to monetise unused credits (due to insufficiency of profits, subject to certain limits) over a 3-year period.
- 1.40 According to the survey, companies are primarily becoming aware of the tax credit through tax advisers.

Findings from the International Review

- 1.41 The research identified that there is no such thing as a perfect one-size-fits-all tax incentive for R&D that would suit all countries and all firms.
- 1.42 In terms of the competitiveness of the regime, the Irish R&D Tax Credit at least matches the international benchmarks, and is among the most favourable in respect of certain elements.
- 1.43 The fact that the Irish tax credit is available to all corporate taxpayers operating in the State, regardless of the size of the firm or sector in which they operate is an asset for a small nation with an open economy.
- 1.44 The international comparison shows that most developed countries that have an R&D tax credit rely broadly on the definition of 'Research and Development' contained in the OECD Frascati Manual to determine what expenditure qualifies for tax relief. Differences can, however, arise in how countries interpret and apply these definitions.
- 1.45 Even within the OECD Frascati framework, all countries and regimes encounter complications and challenges when trying to manage the parameters of where science and technology meet tax legislation.
- 1.46 There is a considerable variation in the rate given for R&D Tax Credits in the jurisdictions examined: from 7% to 50%. Most countries have a general rate within the 10 - 30% range but these are typically qualified by additional restrictions / eligibility criteria. Only two countries have a single rate applied with no restrictions.
- 1.47 The combination of the 25% rate in Ireland, the flexibility afforded by the payable credit and the relative simplicity of the Irish regime confirms previous independent research that the Irish R&D Tax Credit is among the 'best in class' internationally.

Policy Conclusions

- 1.48 The R&D Tax Credit plays an important role in assisting Ireland in meeting its Europe 2020 target of achieving a level of expenditure on R&D of 2.5% of GDP.
- 1.49 It is clear from the consultation that the R&D Tax Credit is of significant importance to the R&D investment decisions of claimant companies and that, by encouraging firms to invest in R&D, the tax credit is contributing to national and EU policy goals.
- 1.50 The international comparison with R&D tax incentives in other jurisdictions demonstrates that the Irish regime stands up well in terms of international best practice.
- 1.51 The consultation, in particular, identified that the tax credit is viewed as a very important element of Ireland's Corporation Tax regime in terms of attracting foreign direct investment to Ireland.
- 1.52 The generally positive findings of this review indicate that a major overhaul of the R&D Tax Credit is not required. However, the review proposes a number of policy recommendations to ensure the continued efficacy of the tax credit and that it is aligned with the State's broader policies on science, technology and innovation.

Recommendations

- 1.53 The consultation would suggest that the base year threshold which was introduced in 2003 creates a significant administrative burden for companies as its existence requires companies to maintain records for more than 10 years in order to support claims. It is recommended that consideration be given to phasing out the base year threshold when resources allow.
- 1.54 The consultation also suggests that the outsourcing limits are negatively impacting a number of companies. It is recommended that the outsourcing limits be relaxed and the operation and impact of the outsourcing limits should be reviewed on an on-going basis as business processes change.
- 1.55 Given the significant overlap in State support for R&D by companies in terms of grants and the tax credit, the Department of Finance, Department of Public Expenditure and Reform and Department of Jobs, Enterprise and Innovation should work closely to ensure that the policy outcomes of each of the different government supports are aligned.
- 1.56 The Revenue data indicates that the take-up and corresponding cost of the tax credit have escalated considerably since the introduction of the payable credit in 2009. It is recommended that the Exchequer cost of the tax credit be kept under constant review.
- 1.57 The 'key employee' provision, which was introduced in Finance Act 2012 should be kept under review and barriers to take up should be addressed where appropriate.

CHAPTER 2

INTRODUCTION

- 2.1 Ireland has a tax credit regime for Research and Development (R&D) which was introduced in Finance Act 2004. The key features of the regime include:
- A tax credit of 25% on R&D expenditure – in addition to the normal 12.5% trading deduction.
 - The regime is based on incremental spend and provides for expenditure on R&D that is in excess of that company's R&D expenditure in the base year of 2003 to qualify for the credit.
 - The base year has been permanently set at 2003, making it effectively volume based for new entrants.
 - In line with the Programme for Government commitment, Finance Act 2012 provided that the first €100,000 spend on R&D can qualify for the credit on a full volume basis and Finance Act 2013 increased this to €200,000.
 - There is no ceiling to the level of eligible expenditure over the 2003 base year level.
 - Unused tax credits can be carried back for set-off against a company's prior year corporation tax liabilities thus generating a tax refund.
 - Where there is insufficient current or prior year Corporation Tax liabilities, the company can claim unused tax credits in cash over three years (in three instalments over 33 months from the end of the accounting period in which the expenditure is incurred).
 - Expenditure includes direct and indirect costs so long as they are incurred in the carrying on of R&D in addition to capital expenditure on related plant and machinery.
 - A feature also exists in respect of buildings or structures used for R&D and operates on a fully volume-based approach (i.e. expenditure does not need to exceed a level of expenditure in a base year).
 - Since Finance Act 2012, a company may surrender part of its R&D Tax Credit to 'key employees'. Subject to certain conditions, the employee can use the benefit of the tax credit to reduce their own income tax liability.
- 2.2 Tax credits available as cash refunds are particularly attractive to start-up companies or SMEs which are not making profits as the credit can effectively part-fund the R&D activity and acts as a valuable source of cash-flow.
- 2.3 The regime has been enhanced in most Budgets and Finance Acts since its introduction.
- 2.4 The cost of the regime including value of tax credit claimed, administration costs and compliance costs is estimated to have risen from €70.5m in 2004 to approximately €261m in 2011.
- 2.5 Over the same period the number of companies benefiting from the credit has increased from less than 75 to nearly 1,500.
- 2.6 Given the level of costs associated with the regime and that it is now four years since the last major change in 2009 which introduced the payable element it was decided that a review of the R&D Tax Credit would be carried out by the Department of Finance in 2013.

- 2.7 The last internal review of the regime by the central expenditure evaluation unit of the Department of Public Expenditure and Reform predated the introduction of payable tax credits. The 2013 review has been conducted by the Department's Economics and Fiscal Divisions.
- 2.8 The terms of reference for this review and an invitation for submissions were published on the Department's website on February 13th this year³.
- 2.9 Over 20 written responses were received from various bodies including individuals, companies, representative bodies, advisory firms, political parties and others. This high level of engagement by members of the public and a variety of organisations is gratefully acknowledged.
- 2.10 The Department's analysis benefited greatly from access provided on a confidential basis by the Revenue Commissioners to its case files and tax receipt data.
- 2.11 The independent survey conducted by Crowe Horwath was designed to elicit a body of information that would be of relevance in determining the take-up and effectiveness of the R&D Tax Credit among Irish industry.
- 2.12 This Report contains the conclusions and recommendations that have emerged following this review.

³ This can be viewed at <http://taxpolicy.gov.ie/wp-content/uploads/downloads/2013/04/Invitation-for-Submissions-for-Consultation-on-RD-Tax-Credit.pdf>

CHAPTER 3

GOVERNMENT SUPPORT FOR R&D

- 3.1 This chapter looks at the overall policy framework for R&D for enterprise, at an Irish and European level, and looks at recent trends and developments in terms of levels of Business Expenditure on R&D (“BERD”). The chapter includes a description of the main policy supports for BERD in Ireland, namely the R&D Tax Credit and various R&D grants provided by the enterprise development agencies.

European Policy Framework

- 3.2 The ‘Lisbon Strategy’ was developed by the EU in 2000 with the aim of making Europe both more competitive and innovative on the world stage. As part of this the European Council in Barcelona in 2002⁴ concluded that as a goal Europe in total should spend 3% of GDP on R&D by 2010, and with two thirds of this spend to come from industry.⁵
- 3.3 Europe 2020 was adopted by the European Council in June 2010 as a ten year policy strategy to succeed the Lisbon Strategy which covered the period 2000 – 2010. The strategy’s objectives according to the European Commission are to deal with the failings of our current growth model and to create the environment for a different kind of growth that is smarter, more sustainable and more inclusive. The strategy is broken down into five key targets which are complemented by seven “flagship initiatives”. The five key targets apply to the EU as a whole and are as follows:
1. Employment: 75% of 20 to 64 year olds to be employed,
 2. R&D: 3% of EU GDP to be invested in R&D. Under this heading Ireland has been given a 2020 target of 2.5% of GDP⁶,
 3. Climate change and energy sustainability greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990, 20% of energy from renewables, 20% increase in energy efficiency,
 4. Education: reducing the rates of early school leaving below 10%, and at least 40% of 30-34-year-olds completing third level education,
 5. Fighting Poverty and Social Exclusion: at least 20 million fewer people in or at risk of poverty and social exclusion.
- 3.4 According to the European Commission these targets are “interrelated and mutually reinforcing” so that increased R&D and the related innovation in the EU economy will result in increased competitiveness and more jobs. The Europe 2020 targets are translated into national targets for each Member State which can then gauge its progress.
- 3.5 The European Framework programme is the means by which the EU funds international cooperative research projects. The framework programs run concurrently with the EU budget cycle and we are at present in the Seventh

⁴ http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/71025.pdf

⁵ http://ec.europa.eu/education/focus/focus479_en.htm

⁶ http://ec.europa.eu/europe2020/europe-2020-in-your-country/ireland/progress-towards-2020-targets/index_en.htm

Framework Program 2007 to 2013. At present preparations are on-going for the Eight Framework Program which will be known as Horizon 2020. According to the preliminary Irish paper on the Eighth European Framework Programme for Research and Technological Development (FP8), researchers from Ireland have been actively involved in the framework process.⁷

The Policy Framework for Incentivising R&D

- 3.6 According to DJEI's Statement of Strategy 2011 – 2014 Ireland has trebled the level of investment in R&D in the last decade. The high importance that policymakers place on innovation dates from the early 2000s when the first export-led growth phase of the Celtic Tiger appeared to have slowed (Doran, Jordan, & O'Leary (2012).⁸ However there was also some government attention to this area during the 1990s. The Indecon Value for Money review of Science Foundation Ireland states that Ireland historically underperformed in relation to R&D funding and activity relative to international counterparts but since the late 1990s this has changed due to a transformation in the funding landscape. In response to the Report of the Science, Technology and Innovation Advisory Council published in 1995 (known as the Tierney report) the government set up a task force to examine the area. This task force led to the Travers report which formed the basis for the first ever Government White Paper on Science, Technology and Innovation in 1998.
- 3.7 The current overarching policy document relating to R&D in Ireland is the Strategy for Science, Technology, and Innovation 2006-2013 (SSTI). This "road map" for R&D and Innovation policy in Ireland was developed by the Interdepartmental Committee on Science, Technology and Innovation (STI) which operated under the authority of the Cabinet Sub Committee on STI and was launched in 2006. The lead departments/agencies in this area are the Department of Education and Skills, the Higher Education Authority, the Department of Jobs, Enterprise, and Innovation; which operates in conjunction with Forfás (its policy advisory board) and its agencies namely: Enterprise Ireland (which provides support to indigenous Irish industry), the Industrial Development Agency Ireland (IDA) (which provides similar support to foreign companies locating in or based in Ireland) and Science Foundation Ireland (which was established as a separate legal entity under the Industrial Development (Science Foundation Ireland) Act 2003.) These agencies are complemented by a number of other smaller government agencies who also incentivise R&D activity in particular areas or sectors.
- 3.8 The most recent policy document in this area was the Report of the Research Prioritisation Steering Group⁹ in November 2011. The focus of this report was on research in HEIs and public research organisations excluding the block grant provided to HEIs for research and funding for in-firm R&D. This report identifies 14 areas for prioritisation, and then provides advice on the positioning of these areas within the wider STI context. It also outlines 13 recommendations to improve the efficiency and effectiveness of the STI system. The report calls for the majority of competitive State funding of in R&D to be directed towards these priority areas, or research in direct support of them.

⁷ <http://www.djei.ie/publications/science/2010/PreliminaryIrishFP8Position.pdf>

⁸ Doran, Jordan, O'Leary, 2012. "Effects of R&D spending on Innovation by Irish and Foreign-owned Businesses" University College Cork.

⁹ http://www.djei.ie/publications/science/2012/research_prioritisation.pdf

- 3.9 More recently Section 6.1 in the Action Plan for Jobs 2013 contains 37 action points that the Government states will “accelerate the economic and societal returns from Government investment in research”. This follows up on similar commitments in the Action Plan for Jobs 2012 with the principal objective being to increase employment in these identified areas.
- 3.10 R&D Expenditure can be broken down between Business Expenditure on R&D (BERD); Higher Education Expenditure on R&D (HERD); and Government Expenditure on R&D. The total combined gives us Gross Expenditure on R&D (GERD). The government incentivises BERD through both direct supports in the form of grants (and horizontal aid from the business development agencies) and also through the R&D Tax Credit.

Institutional Framework

Department of Jobs Enterprise and Innovation

- 3.11 Within DJEI the Office of Science, Technology, and Innovation (OSTI) has responsibility for “the development, promotion and co-ordination of Ireland’s Science, Technology and Innovation policy” as well as the EU and international aspects of this policy. The policy rationale behind the creation of this office is the widespread acceptance of the importance of research, development, and innovation to the economy generally. OSTI is advised by both Forfás and the Chief Science Advisor to the Government the separate Office of the Chief Scientific Adviser has been abolished and the CSA duties have been conferred on the current Director General of Science Foundation Ireland, co-terminus with his tenure as Director General of SFI). The OSTI is responsible for providing funding to Science Foundation Ireland and Enterprise Ireland.

Forfás

- 3.12 Forfás is DJEI’s policy advisory board for enterprise, trade, science, technology, and innovation. Forfás’ advice covers five main policy areas: competitiveness; enterprise; knowledge; people; and sustainability. In the knowledge area, Forfás’ aim is to provide policy advice that assists enterprise in maximising science and technology through R&D and innovation.
- 3.13 Forfás provided research and policy advice for the Report of the Research Prioritisation Steering Group Earlier Forfás provided advice to the multi-departmental team that prepared the Government’s overarching R&D strategy: the Strategy for Science, Technology, and Innovation 2006 to 2013. In addition Forfás manages the work of the Advisory Council for Science, Technology, and Innovation.

Enterprise Ireland

- 3.14 Enterprise Ireland (EI) is the government agency that assists the development of Irish companies that are exporting, or have the potential to do so, by providing a range of support services. In relation to R&D, EI provides direct R&D supports to companies and also promotes industry and higher education institutes collaboration. EI do this by providing a variety of grants including innovation partnerships, R&D fund grants, technical feasibility grants, and innovation vouchers.

EI also highlight the availability of the R&D Tax Credit by providing a guide to client companies on the R&D Tax Credit.¹⁰

IDA Ireland

- 3.15 IDA Ireland (Industrial Development Agency) is responsible for the attraction and development of foreign investment in Ireland. The IDA's strategy for 2010 to 2014 is encapsulated in the document "Horizon 2020" which sets out the IDA's strategy for attracting investment in the next few years. IDA Ireland plays a role in RD&I development by providing funding support for suitable projects and by identifying other supports available from partner organisations such as Enterprise Ireland (EI), Science Foundation Ireland (SFI) and Sustainable Energy Authority Ireland (SEAI).
- 3.16 Similar to EI the IDA also produce a tax brochure¹¹ in which they outline the advantages associated with investing in Ireland. In this way they assist in incentivising R&D through a combination of both direct supports, facilitating access to Ireland's research base and indirect supports by informing companies about the tax advantages of investing in R&D.

Science Foundation Ireland (SFI)

- 3.17 In 1998 the Technology Foresight Ireland Report concluded that biotechnology and information and communications technology were "the engines of future growth in the global economy.... A world class research capability in selected niches of these two enabling technologies is an essential foundation for future growth." In response to this report the Government set up the Technology Foresight Fund and in 2000 Science Foundation Ireland was founded under the auspices of Forfás to administer this fund. SFI was then established as a separate organisation on a statutory basis in 2003.
- 3.18 In November 2012 the Minister for Jobs, Enterprise, and Innovation, launched the SFI eight year strategic plan named Agenda 2020. This document outlines a number of key targets for the agency that aim to make it best in class as a science agency internationally. The plan also sets out four high level objectives which are: to become the best science funding agency in the world; to be 'the exemplar' in making partnerships which fund science; to promote the 'most engaged and scientifically informed public'; and also to become 'the ideal public sector organisation'.
- 3.19 Unlike to the other agencies referred to above SFI's focus is primarily on supporting HERD. SFI also provides grants to researchers to locate in in Ireland from around the world as well as to Irish based researchers. Furthermore it provides grants for collaboration with industry thereby also incentivising BERD.

Other Bodies

- 3.20 There are a number of other government agencies that assist in incentivising R&D in Ireland. The Higher Education Authority administers the Programme for Research in Third Level Institutions (PRTLTI) which has provided €1.22 billion in exchequer

¹⁰ http://www.enterprise-ireland.com/EI_Corporate/en/Research-Innovation/Companies/R-D-Funding/R-and-D-Tax-Credit-Guide.pdf

¹¹ <http://www.idaireland.com/news-media/publications/library-publications/ida-ireland-publications/investing-in-ireland/IDA-Tax-brochure-2013-final.pdf>

and private matching funding since it was launched in 1998.¹² Teagasc is the Agriculture and Food Development Authority which provides research, training and advisory services to the agriculture and food industry and to rural communities. The Environmental Protection Agency (EPA) has a research program for 2007-2013 entitled Science, Technology, Research, and Innovation for the Environment (STRIVE). The purpose of this program according to the EPA is to protect the environment by dealing with environmental management issues through the provision of world class research. The EPA supports this research through the provision of grants.

- 3.21 In conclusion it can be seen that there is a wide-ranging policy framework in Ireland which consists of direct support in the form of grants for both BERD and HERD from a number of government agencies as well as indirect support in the form of tax expenditures such as the R&D Tax Credit. Doran, Jordan, and O'Leary¹³ describe BERD and HERD as the 'two main strands' to policy in this area and come to the conclusion that the Irish Government has played a vital role in increasing the level of funding for R&D.

R&D Grants

- 3.22 In 2011, total public expenditure on R&D amounted to approximately €912 million. The following table provides a breakdown of estimated public R&D spending by the main government departments and agencies. These figures include funding received by the State from all sources, including international sources.

	2011 (€m)	% of Total
Total Research & Development Budget	912	100%
Funding Department/Agency		
Higher Education Authority	309.2	33.9%
Science Foundation Ireland	160.8	17.6%
Enterprise Ireland	95.9	10.5%
IDA Ireland	83.1	9.1%
Teagasc	50	5.5%
Health Research Board	40.7	4.5%
Dept. of Agriculture, Food and the Marine	32.3	3.5%
Irish Research Council for Science Engineering and Technology	22.7	2.5%
Sustainable Energy Authority of Ireland	18.3	2.0%
Dept. of Jobs, Enterprise and Innovation	15.5	1.7%
Environmental Protection Agency	13	1.4%
Irish Research Council Humanities & Social Science	10.4	1.1%
Others	60.2	6.6%
Total	912.1	100.0%
Table 1 Source: Forfás (2012) The Science Budget 2010-2011		

- 3.23 The largest R&D agency budget in 2011 is that of Higher Education Authority (HEA), which allocated an estimated €309.2m to R&D activities (or 34 % of the total

¹² <http://www.hea.ie/en/funding/research-funding/programme-for-research-in-third-level-institutions>

¹³ *Supra* note 5

State spending on R&D). This spending includes expenditure on R&D programmes, including direct funding via the Programme for Research in Third-Level Institutions (PRTLII) and also indirect funding via the HEA block grant to supported institutions.

- 3.24 Enterprise Ireland, IDA Ireland and Science Foundation Ireland are the enterprise agencies primarily responsible for supporting and promoting R&D within the enterprise base in Ireland. In 2011, they accounted for €340 million (37 %) of total public expenditure on Research and Development of €912 million. Of this €340 million, approximately €263million relates to programmes directed at stimulating R&D within the enterprise base.¹⁴ The programmes are administered by the enterprise agencies under the auspices of DJEI.
- 3.25 Supports range from direct financial supports to enterprises, through to programmes delivered by the HEI's which stimulate collaboration and commercialisation, to supports aimed broadening the base of enterprises engaged in R&D through networks and partnerships.
- 3.26 For enterprises in receipt of direct financial support by the enterprise agencies, these supports are subject to State Aid Guidelines with grant intensities dependent upon the nature of the R&D (how close to market) and the size of the company (with higher grant intensities permissible to SMEs). Actual grants are determined on a case by case basis, taking into account technological, commercial and strategic criteria, as well as the R&D Tax Credit available.
- 3.27 The supports provided by the enterprise agencies are in addition to the indirect support provided to businesses in the form of the R&D Tax Credit. Whether or not a business can claim the tax credit is one of the factors considered by the enterprise agencies when providing grant aid with 82.5% of tax credit claimants in receipt of a grant.¹⁵
- 3.28 The various programmes outlined below are the main programmes provided by the State that are directly aimed at increasing the quantity and quality of BERD in Ireland. These programmes relate to the €263m in expenditure in 2011 referred to above and in some instances the programmes may have evolved or changed in the interim. Expenditure figures quotes are from the Forfás Science Budget 2011.¹⁶ The programmes are categorised according to the three pillars of the 2006-2013 Strategy for Science, Technology and Innovation:
- Direct supports for in-company R&D;
 - HEI Commercialisation Supports; and
 - Supports for Enterprise-Higher Education Collaboration.

¹⁴ The remainder of 2011 expenditure primarily relates to SFI funding to Principal Investigators, other SFI programmes and a small number of Enterprise Ireland programmes supporting networks and international collaboration, and basic research programmes

¹⁵ Crowe Horwath (2013) "Final Report to Department of Finance in respect of a survey of R&D Active Companies", Dublin, page 21

¹⁶ Forfás (2012) The Science Budget 2010-2011: State Expenditure on Science, Technology, Research and Development

Breakdown of Interventions

Direct Supports for In-Company R&D

IDA Ireland R&D Fund (€82 million, 2011)

- 3.29 The IDA Research, Development & Innovation (RD&I) Support programme is designed to support companies at all stages of RD&I and enable them to move from start-up R&D, through developing capacity and adding competence, to a fully integrated RD&I function. Support levels are tied to an assessment of strategic objectives, in conjunction with commercial and technical assessments. Support for other activities that would enable a company to undertake the RD&I project is also available which could include support for feasibility studies.

Enterprise Ireland R&D Fund (€58m, 2011)

- 3.30 EI provides assistance for significant investment in R&D initiatives which arise as part of a company's strategic development. The R&D Fund is designed to provide support for research, development and technological innovation relevant at all stages of company development, and to enable companies to progress from undertaking an initial research project to high level innovation and R&D activity. (€58m, 2011).

HEI Commercialisation Supports

- 3.31 The HEI Commercialisation programs can be broken up into three main areas. These are:
- the Enterprise Ireland Commercialisation Fund,
 - Technology Transfer Strengthening
 - Enterprise Ireland Campus Incubation Facilities.

Enterprise Ireland Commercialisation Fund (€25m, 2011)

- 3.32 The programme supports academic researchers to take the outputs of research with commercial potential and bring it to a point where it can be transferred into industry. This program began in 2003, and supports research in Higher Education Institutions (HEIs), and research performing organisations, aimed at developing technology that could either generate spin-out companies or the licensing of the technology to businesses in order to bring products / services to the market.

3.33 Technology Transfer Strengthening (€6.2m, 2011)

This programme supports a network of commercial experts in Irish Universities who ensure that research outputs with commercial potential are identified, protected and transferred to industry where they can be fully utilised.

Enterprise Ireland Campus Incubation Facilities (1.6m, 2011)

- 3.34 Through this programme, EI invests in on-campus space for start-up companies, including specialised biotech facilities (Wet Labs). This is a capital expenditure programme that began in 1998 and has led to the development of 22 business incubation centres on various institutes of technology or university campuses.

Collaboration between Enterprise and Higher Education Institutes

- 3.35 Supports for collaboration between Enterprise and HEIs can be broken up into six main areas. These are:

- Centres for Science, Engineering and Technology (CSET),
- Strategic Research Clusters,
- Innovation Partnerships,
- Technology Centres
- Innovation Vouchers, and
- Technology Gateways.

Centres for Science, Engineering, and Technology (CSET) (€32.1m, 2011)

- 3.36 The Centres for Science, Engineering and Technology programme is administered by SFI. This programme assists joint academic-industry research centres located within universities and the strategic aim is to assist Ireland in moving towards a knowledge based economy. It is the only program available that encourages medium/long term collaboration rather than project collaboration. Science Foundation Ireland has since decided to replace this programme with a new Research Centres 'hub and spoke' programme.

Strategic Research Clusters (SRCs) (€29.1m, 2011)

- 3.37 Again this programme, launched in 2007, is administered by SFI and provides funding support for joint research for projects that are larger than those supported by the individual EI commercialisation grant scheme and smaller than projects in the CSET programme. The majority of SRCs are targeted at biotechnology and ICT. This program is also being replaced by the Research Centres 'hub and spoke' program.

Enterprise Ireland Innovation Partnerships (€7.8m, 2011)

- 3.38 This began in 2000 to encourage Irish companies to collaborate with research institutes on particular projects. The programme is aimed at harnessing the strengths of the third level sector to work in partnership with companies on specific R&D projects.

Innovation Vouchers (€3.7m, 2011)

- 3.39 Innovation Vouchers support small companies to engage with higher level researchers in order to explore a business opportunity or solve problems. The programme encourages small businesses and public knowledge providers to work in partnership on particular innovation questions with the aim of encouraging knowledge transfer between HEIs and small businesses.

Technology Centres (€13.8m, 2011)

- 3.40 EI supports the establishment and maintenance of centres where the research agenda is industry-led and directed by groups of companies who work together with higher level researchers to perform medium term commercially relevant research.

Technology Gateways (€3.6m, 2011)

- 3.41 This programme has evolved from the Applied Research Enhancement (ARE) programme which had the objective of encouraging the Institutes of Technology to carry out industry relevant applied research and increase interaction with industry.

Funding for the AREs concludes between 2012 and 2013 when it will be replaced by Technology Gateways.

Summary

- 3.42 This section has provided an overview of the main government interventions relevant to the enterprise R&D environment and the relative scale of those programmes. As can be seen there is a variety of programmes available, each with different objectives but all aimed at contributing to the national innovation system. The programmes have evolved in response to changes in the economic environment and business needs and are informed by periodic reviews and evaluations.¹⁷

Overall Business Expenditure on R&D

- 3.43 The preceding discussion described the range of tax and grant based incentives for BERD and the overall policy framework at the domestic and European level. The following paragraphs look at Ireland's recent performance in terms of BERD.
- 3.44 The discussion looks at Ireland in a European context and looks at some key issues within Ireland's performance. It is useful to consider the analysis in the context of Ireland and Europe's commitments under Europe 2020. The relevant target under Europe 2020 of 3% of GDP for Europe as a whole and 2.5% for Ireland is in respect of GERD and is the sum of Business Expenditure on R&D (BERD), Government Expenditure on R&D (GvERD) and HERD. As the R&D Tax Credit relates to BERD, the analysis below focuses on this measure.
- 3.45 The biennial BERD Survey 2011/2012 is jointly conducted by the Central Statistics Office (CSO) and Forfás and the most recent data was released by the CSO in February 2013. An analysis of the data was published by Forfás in August 2013.¹⁸
- 3.46 Business expenditure on in-house R&D activities reached €1.96 billion in 2012, an increase of 5.5% on the 2011 level of €1.86 billion, itself a 1.3% increase in the 2010 level. The 2012 BERD level has grown by nearly 80% since the level of €1.1bn recorded in 2003, the year before the introduction of the R&D Tax Credit.

¹⁷ Forfás has undertaken evaluations of the main enterprise supports for R&D which will further inform future development of R&D supports for enterprise.

¹⁸ Business Expenditure on Research and Development, BERD 2011/2012 Analysis, Forfás, 2013

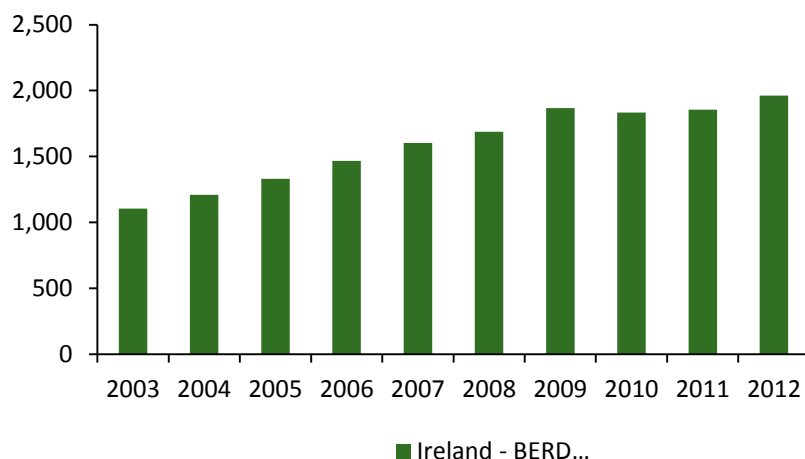


Figure 1: Business expenditure on R&D, € billion 2003-2012
Source: Eurostat

- 3.47 BERD was mostly concentrated in experimental development, accounting for 71% of all expenditure, with the balance accounted for by experimental and applied research.
- 3.48 Business R&D intensity (BERD as a percentage of GDP) reached 1.17% in 2011 (1.46% of GNP). This has risen from 0.78% in 2003 and compares with a Euro-area average of 1.31% and an EU-28 average of 1.26%. Finland had the highest BERD intensity in the EU with 2.67% of GDP.

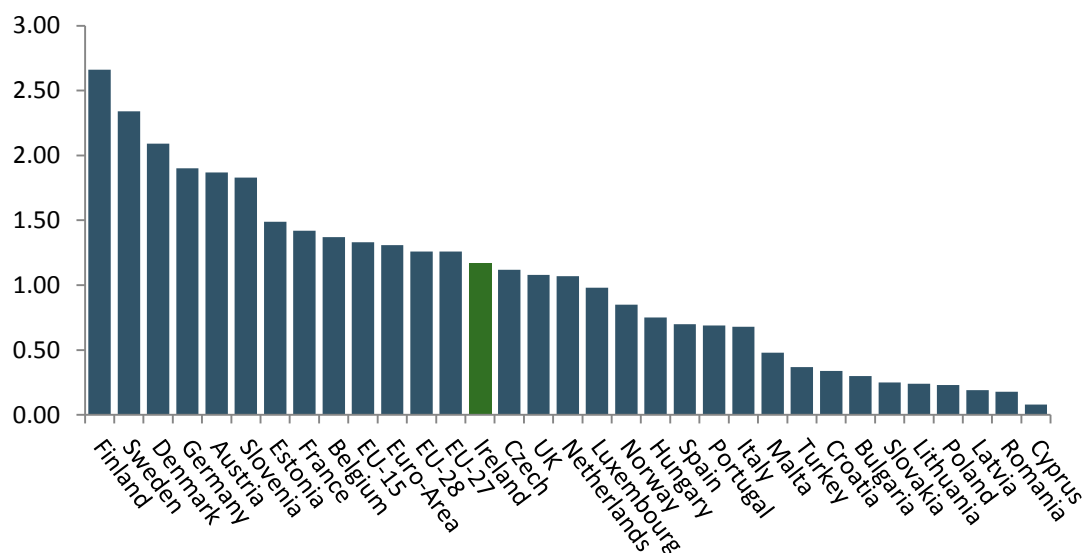


Figure 2: Business expenditure on R&D as a share of GDP, European Union, 2012
Source: Eurostat

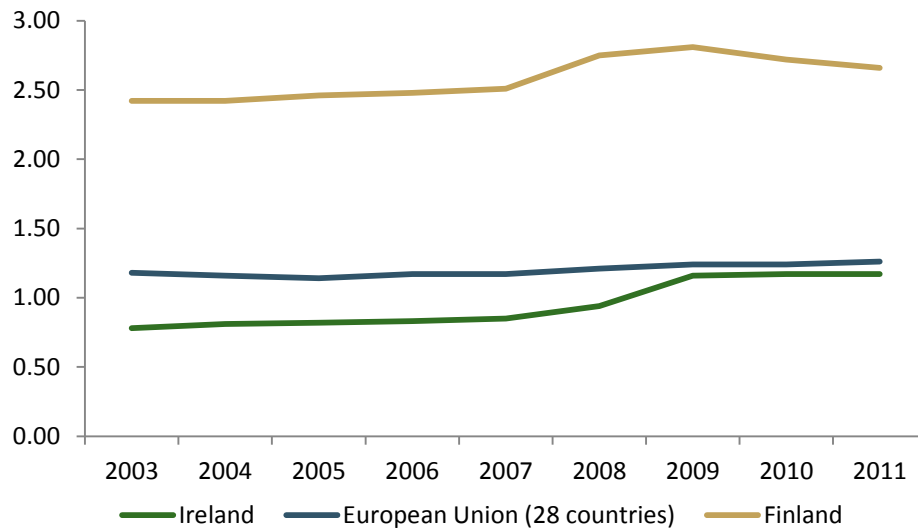


Figure 3: Business expenditure on R&D as a share of GDP, 2003-2012
Source: Eurostat

- 3.49 Overall, the number of R&D performing firms increased by 25% from 2009 to 2011 to over 1,600 and almost three quarter were Irish owned. Foreign owned enterprises accounted for 71% of the total business R&D spend in 2011 with indigenous owned enterprises accounting for 29%. This share has remained relatively constant since 2007 when the foreign owned company share was 72%. As a share of the total numbers of firms active in R&D, the Irish owned cohort accounted for 75% in 2012, an increase from 68% in 2007.

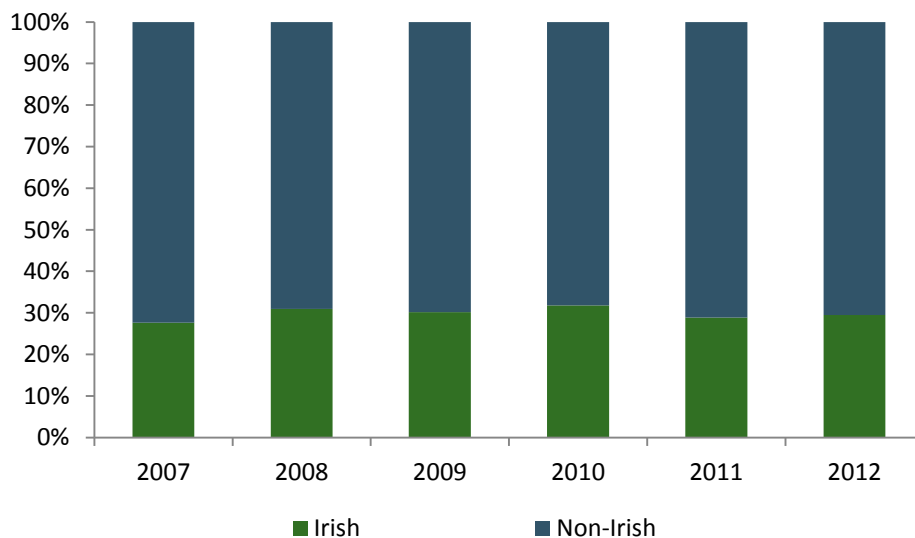


Figure 4: Share of expenditure on R&D by Irish and non-Irish companies 2007-2012
Source: CSO

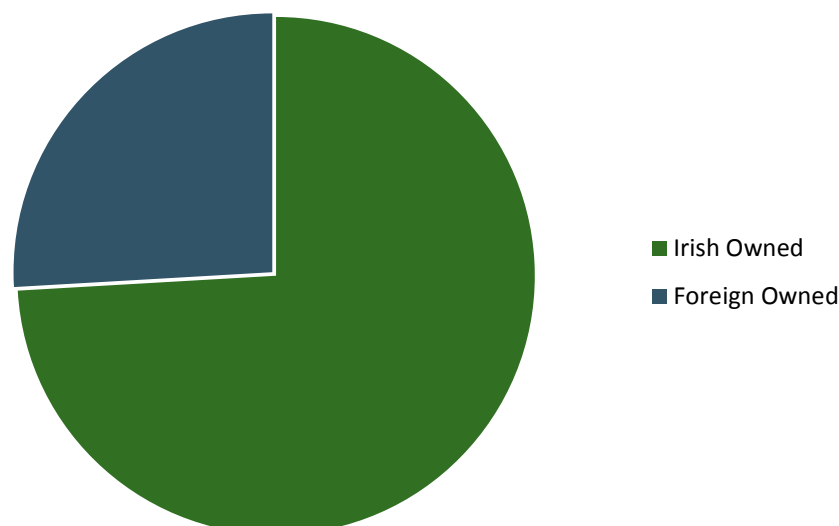


Figure 5: Distribution of numbers of companies active in R&D, Irish and non-Irish 2012
Source: CSO

- 3.50 Approximately 88% of expenditure on R&D by businesses in 2012 was incurred on current expenditure (wages of R&D staff etc.) and 12% incurred on capital expenditure (e.g. buildings, equipment, licence payments, etc.). This has grown consistently since 2007 when the share of current expenditure was 83%.
- 3.51 60% of BERD was generated in the services sector in 2011 with 40% taking place in the manufacturing sector. Within the services sector 10% was spent in 'Wholesale and Retail Trade and Transport and Storage' (NACE sectors G-H), 31% in Information and Communications Services (NACE sector J), and 16% in 'Professional, Scientific and Technical Activities' (NACE sectors L-M).

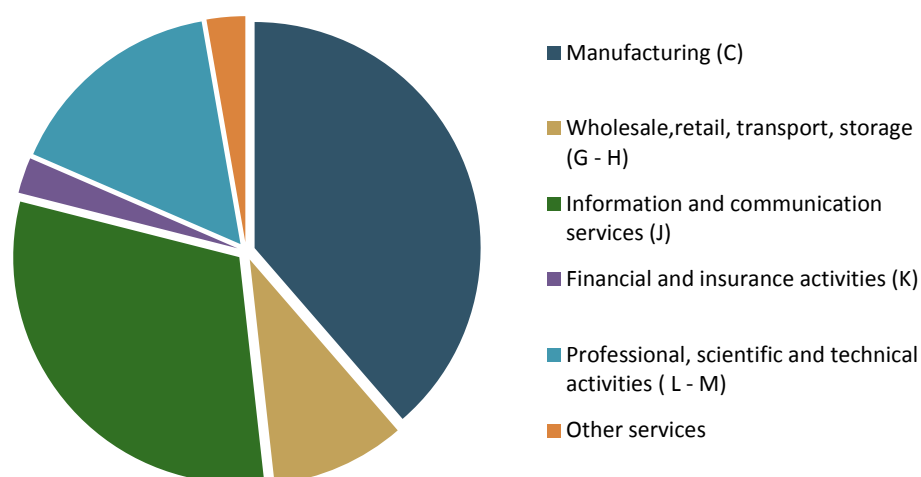


Figure 6: Business expenditure on R&D, sectoral distribution, 2012
Source: CSO

3.52 Expenditure by small companies¹⁹ accounted for 26% of total business expenditure in 2011 having risen from 17% in 2007. However as a share of the number of companies that were active in R&D, small companies accounted for 69% in 2011, a share that grew from 58% in 2007.

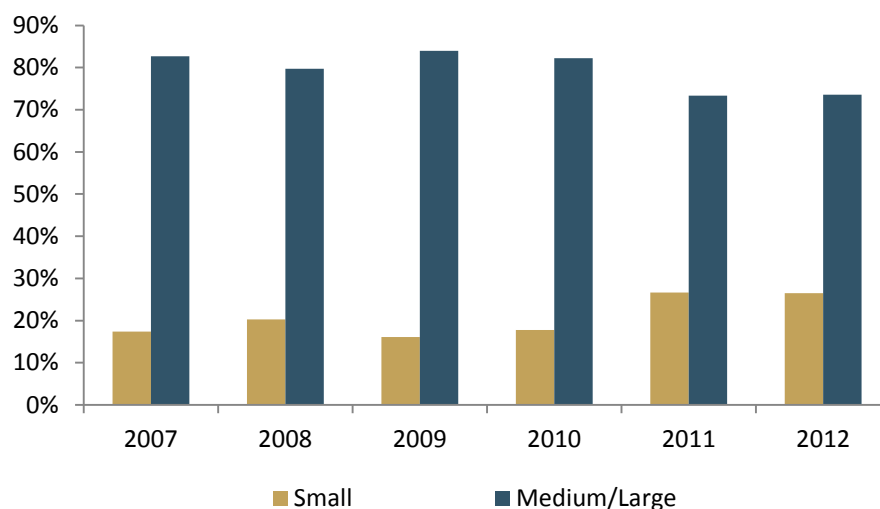


Figure 7: Share of total R&D Expenditure by Company size, 2007-2012
Source: CSO

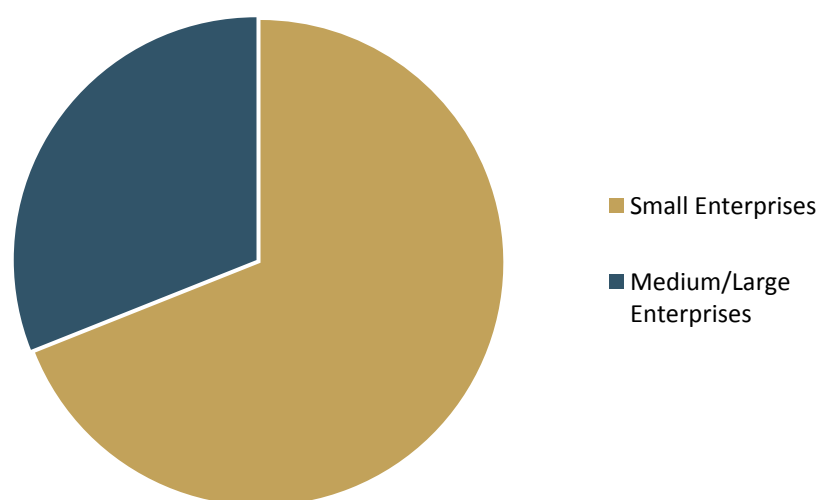


Figure 8: Share of numbers total enterprises, size distribution, 2012
Source: CSO

3.53 Of all R&D performing firms, 35% engaged in joint research projects with other parties in 2011. These included joint research with other firms outside the State 18%, joint research with higher education or other institutes within Ireland 19.5% and higher education or other institutes outside Ireland 8%.

¹⁹ The breakdown on company size is based on the size definition used by the European Union, which denotes micro firms as those employing less than 10 people, small firms as those employing greater than 9 and less than 50, medium firms as those employing greater than 49 and less than 250 and large firm as those employing greater than 249.

- 3.54 The 2011 level is a decline from the 2007 level of 42% and is driven by a reduction in the small enterprise and medium/large sectors, as well as Irish and non-Irish owned enterprises. Given the overall increase in BERD, this is reflective of a greater share of R&D expenditure taking place in house.
- 3.55 Overall the greatest numbers of collaborations are taking place with higher education institutes in Ireland and with firms outside Ireland. Higher education institutes outside Ireland have the lowest share of joint research projects with enterprises located in the State.

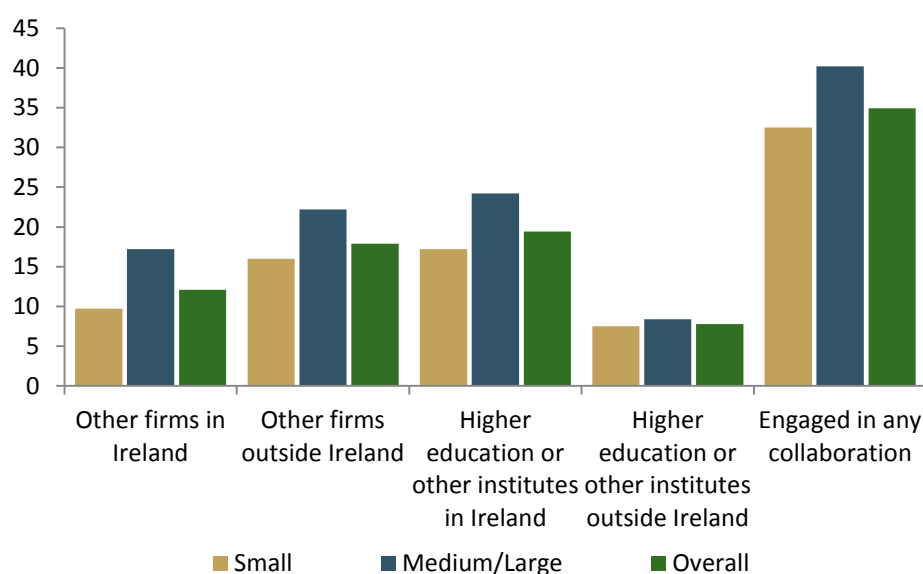


Figure 9: Joint research projects by company size, 2011
Source: CSO

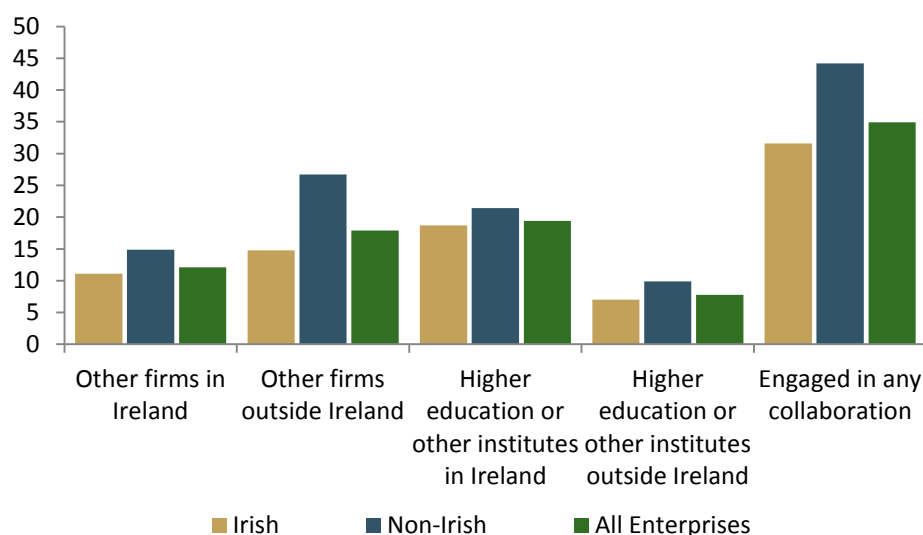


Figure 10: Joint research projects by company ownership, 2011
Source: CSO

- 3.56 The data and analysis presented above business expenditure on R&D will be informative in the context of the data presented in Chapter 5 based on claims data in respect of the R&D Tax Credit provided by the Revenue Commissioners.

CHAPTER 4

LITERATURE REVIEW

Economic Rationale for Incentivising R&D

Importance of R&D to Economic Growth

- 4.1 In the Irish context, Research and Development (R&D) activities tend to be publicly welcomed due to the perceived tax revenues, highly paid jobs, and trickle down effects for the local areas associated with large R&D investments. However, economists tend to view the benefits of R&D in terms of their contribution to productivity and thus to economic growth. This chapter describes the mechanisms by which R&D drives economic growth.
- 4.2 The equation below shows a production function which describes total output in an economy (Y), and growth in output, as being determined by three components, namely human capital (L), physical capital (K) and total factor productivity (A):

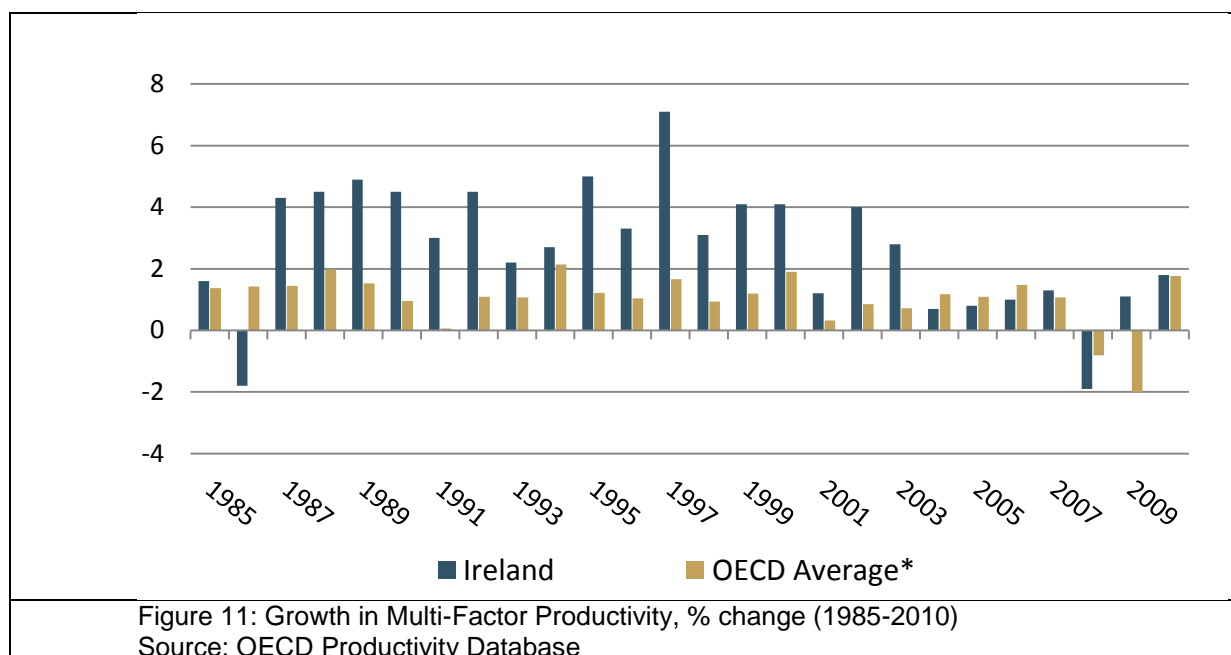
$$Y = F(L, K, A)$$

- 4.3 The early literature on economic growth focused only on human and physical capital with productivity considered to be exogenous (i.e. determined outside the model). The key finding from these 'exogenous' growth models was that growth occurs only through the accumulation of capital, which itself is determined by the level of savings and depreciation in an economy. Additions of capital to a fixed supply of labour result in decreasing returns to capital over time and a long run limit on the growth in living standards. The drawback of the exogenous growth model is that it ignored the critical driver of permanent increases in growth, namely productivity.
- 4.4 More recent literature on growth models, known as endogenous growth models, explicitly modelled improvements in productivity, thus allowing for sustained growth and an explanation of its sources. Endogenous models focus on the drivers of total factor productivity and include explicit models of improvements in human capital, learning by doing, innovation, research and development and technology transfer.
- 4.5 Romer (1990) introduced models which had commercially oriented innovation efforts by firms that respond to economic incentives driving technological progress. Aghion and Howitt (1992) continued in this vein by modelling growth based on the 'Schumpeterian' ideas of creative destruction. In this model, new products and processes are developed, due to expenditure on research and development, which are superior to existing ones, eventually replacing them. This continuous process of newer and more advanced processes replacing older approaches therefore improves the overall stock of technological know-how in an economy and boosts economy wide productivity. Aghion and Howitt's paper also emphasised that a perfectly competitive market may not generate an optimal amount of R&D expenditure due to the externalities associated with it. This idea is developed further below.
- 4.6 While capital and labour in an economy are relatively easily measured, it remains a challenge to adequately measure technological progress and its effects on output. It

is normally measured as a residual, often called the Solow residual, which accounts for effects on total output (Y) not caused by changes capital (K) or labour (L).

4.7 This residual is often referred to as Multi-Factor Productivity (MFP).²⁰

4.8 The figure below shows yearly growth of multi-factor productivity as estimated for Ireland over the last few decades. Ireland's growth in productivity was above the OECD average during the export driven boom period of the 1990s and early 2000s.



4.9 The role of R&D in fuelling economic growth has been estimated in terms of its contribution to MFP. Coe and Helpman (1995) investigate the effects of both own country and foreign country R&D capital stocks in increasing MFP, finding that that both domestic and foreign R&D make large contributions to MFP and importantly for Ireland; that foreign owned R&D capital stocks have a particularly large effect on smaller, open economies. Empirical research subsequently presented evidence that cumulative R&D expenditure was an important determinant of productivity (Coe and Moghadam, 1993).

4.10 The link between R&D in the Irish economy and economic growth has also been explored. Analysis has been conducted using the QUEST III endogenous growth model developed by the European Commission specifically for the task of examining structural reform. The research, published by the Department of Finance in the Stability Programme Update 2011, considered the effect of an R&D Tax Credit equal to 0.1% of GDP. In this model, the increase in business expenditure on R&D results in a permanent increase in GDP of 0.22% in the long-run.

R&D Investment, Spillovers and Firm Productivity

4.11 Increases in firm productivity due to R&D are generally seen to occur through two main avenues; innovations within a firm, as well as an increased capacity to

²⁰ MFP is a variable which accounts for effects in total output not caused by traditionally measured inputs such as labour and capital. If all inputs are accounted for, then MFP can be taken as a measure of an economy's long-term technological change.

understand and absorb new knowledge and innovations generated outside the firm (i.e. spillovers from innovations by other firms).

- 4.12 Evidence for both of these paths is provided by Griffith, Redding and Van Reenen (2000). Using a panel of 12 countries, they examine whether a country's investment in R&D has an effect on MFP growth and on whether R&D's effect on MFP growth is dependent on that country's distance from the technological frontier.²¹ The authors find that the further a country lies behind the technological frontier, the greater the potential for R&D to increase MFP growth through technology transfer from more advanced countries. They also find that human capital plays a large role in innovation but international trade much less so.
- 4.13 While this research provides evidence for both the effects of R&D on productivity through innovations and technological transfer, Jaffe (1986) investigates at the firm level. Jaffe's approach tests the effect of neighbouring firms R&D intensity on a firm's own R&D success as measured by patents, finding a positive effect with a larger effect for those firms with higher R&D intensities. In addition, the effect of neighbouring firm's R&D intensity on own firm's profitability and market share is positive where the firm's own R&D intensity is high and negative for those firms with relatively low R&D intensities.
- 4.14 It is important to note that R&D conducted by firms is not the only source of productivity growth in an economy. Governments directly spend significant amounts of money on publicly funded R&D that privately operating companies are unlikely to have the risk appetite or cash flows to engage in. As this paper is concerned with business expenditure on R&D, and government incentives for same, this issue is not investigated here.

Market Failure

- 4.15 While the preceding section demonstrates the importance of R&D for economic growth, this does not automatically imply that the State should intervene to encourage R&D investment. Economists usually require the existence of a market failure, for instance underinvestment by the private sector relative to a societal optimum level, as a necessary condition for intervention. There is a significant body of literature describing the market failures which exist around firm investment in R&D and this is discussed below.
- 4.16 The literature identifies two main forms of market failure that arise with R&D, positive externalities and asymmetric information.
- 4.17 From a societal point of view, firms in the marketplace are generally considered to under-invest in R&D relative to an 'optimum' or desired level that society would choose. This is due to the rate of return to society being higher than the private rate of return available to a firm or investor. In other words there is a positive externality from firm level investments which benefits society but not the firm that undertakes the investment. The firm itself only takes account of the private return to the firm. Thus if R&D decisions were left solely to private firms, there would be under investment in R&D relative to the socially optimal level. Information asymmetries are also commonly cited as a justification for intervention.

²¹ This latter test is a proxy for the potential of a country to engage in technological transfer with more technologically advanced countries.

Externalities

- 4.18 The benefit to a private firm is lower than that available to society due to the inability of firms to fully capture all the benefits arising from R&D conducted internally. This is due to the nature of R&D as a partially non-excludable good i.e. once an idea or innovation is introduced to the marketplace its use by other firms can no longer be restricted as effectively by the firm. The ability of firms to absorb and innovate using knowledge developed in other firms is a positive externality often described as a knowledge spillover.
- 4.19 It is due to the existence of the externality that the Mirrlees Review²² explicitly identified the R&D tax incentives as one of the few areas that Government's should depart from the concept of neutrality in terms of the concept of optimum taxation.
- 4.20 One of the ways in which companies are incentivised to invest in R&D is by the granting of patents. Patents are designed to give the firm temporary monopoly power over their economic benefits from the research which increases the appropriability of the returns of R&D to the firm. This minimises the gap between social and private returns and serves to increase private R&D to a level closer to the social optimum. However, patents are not without their own criticisms. For example, Dasgupta and Stiglitz (1980) showed that in the presence of patents, firms would undertake socially excessive R&D expenditures in their attempts to deter entry to market with patented inventions.
- 4.21 Spence (1984) argues that perfect appropriability of R&D returns would result in redundant and hence excessive levels of R&D at the industry level. Thus there is a theoretical trade-off between the positive incentives to the individual firm of appropriability on the one hand and cost efficiency with which the industry as a whole innovates, on the other. Spillovers therefore have been described as having a positive partial effect on industry's costs and a negative effect on incentives. On the whole Spence argued that potential industry performance is significantly better with high spillovers (or low appropriability) because the output of R&D is essentially a public good and if it is implicitly priced as a private good, the performance of the system will be adversely affected.
- 4.22 Joint ventures are a method available to firms to reduce the benefits escaping to third parties. In this scenario, a number of firms co-finance an R&D project with agreed upon rules for how the information from the project will be used by each party. Going in together allows the same information to be gained by an individual firm as paying all the costs themselves. However, this type of firm behaviour is limited in value in markets where there are many suppliers, the benefits of the research project are hard to define and/or divide up.

Asymmetric Information

- 4.23 Another market failure is the presence of asymmetric information. Market transactions that would normally take place often break down when the seller knows more about a product than the buyer. If the quality of a product is undistinguishable beforehand by the buyer (due to the asymmetry of information), incentives exist for the seller to pass off low-quality goods as higher-quality ones. The buyer, however, takes this incentive into consideration, and takes the quality of the goods to be uncertain.

²² See Section 2, the Economic Approach to Tax Design in '*Tax by Design*', the Mirrlees Review, Institute of Fiscal Studies, London, 2011.

- 4.24 The presence of asymmetric information between R&D performers and financiers limits financing of R&D projects. A research based project warrants secrecy to prevent rivals from undertaking similar work but project financing requires release of vital information to determine the quality of the research. In the absence of perfect information, many projects lapse due to lack of financing (Hall, 2002). This is clearly a more acute problem in smaller firms with poorer access to debt or equity than research divisions of large multi-nationals. This phenomenon may not be observable as discouraged firms may not choose to apply for finance at all.

Estimates of Private and Social Returns to R&D

- 4.25 While previous research has made attempts to estimate the social return of R&D, it is generally acknowledged that there are serious methodological and data issues involved. Hall et al. (2010) reviewed the literature measuring both private and social returns to R&D. They find that the estimates of industry-level spillover returns from R&D can range from an upper bound of 80% to a statistically negligible estimate. However in most cases, the estimates are significant and indicate the existence of major spillovers of research from one industry to another. Hall et al. also gives the range of the private rate of return observed in the literature as being between 10% and 20%. Jones and Williams (1998) demonstrate that some estimates of the social return to R&D ranging from 71% to 100% derived from regressions of MFP on R&D intensity form lower bounds when taking into account dynamic general equilibrium effects such as intertemporal knowledge spillovers.
- 4.26 In addition, empirical evidence on international level spillovers produced by Coe and Helpman (1995) informs us that roughly a quarter of the benefits of conducting R&D accrue to a country's trading partners. This implies that Ireland benefits significantly from the R&D conducted in our R&D intensive trading partners i.e. US, UK and Germany.

Government's Means of Affecting Business Expenditure on R&D

- 4.27 There are a myriad of ways Governments influence the level of private R&D expenditure in an economy. These range from the more direct and commonly known methods such as grants and tax credits, to the legal, regulatory and competitive environment fostered in a country through patent law; competition, tax, and immigration policy; and the efficiency of public administration. In addition, the ability of a country to supply highly educated staff through its higher education system is critical. The three most prominent methods, patent laws, grants and tax credits, are outlined below taking into account their efficacy as assessed by the empirical literature.
- 4.28 Patent law increases the appropriability of private returns to R&D by offering legal protection to intellectual property. However, this approach has drawbacks as it inherently trades off public benefits for private. The limitations on the free use of new ideas inhibit both further research and the development of valuable commercial innovations which are a source of spillover benefits. Thus, although patent protections and similar rules maintain a prominent role in innovation policy (for example in the pharmaceutical industry), governments have also turned to direct support of R&D activities.

R&D Tax Credits and Grants

- 4.29 One pillar of supports for R&D expenditure are grants tied to specific R&D projects and/or capital investments as a means of increasing R&D expenditures. A grant based system allows a more targeted approach to the investments made in an economy while also giving certainty to the exchequer regarding ultimate cost. However, this targeted approach is in itself is an issue as it places a significant burden on the granting authority when deciding among many applicants and the lobby that may arise for a specific research area once grants are committed. Often these R&D projects require a significant level of expertise in specific areas of science which may not be readily available to a granting authority.
- 4.30 As the purpose of this review is to evaluate the R&D Tax Credit the rest of this chapter concerns itself with this topic.
- 4.31 The theory of optimal taxation requires that a form of tax be neutral on an individual's or a company's decisions, for example between one form of investment and another. Neutrality would therefore imply that a company should not be incentivised to invest in R&D over other investments. However given the externalities that exist in respect of private sector investment in R&D, R&D incentives are regarded by economists as one of a small number of examples of where policy makers should explicitly depart from neutrality.²³
- 4.32 Tax incentives are a market-orientated means of delivering an increase in private R&D expenditures which also allows the support offered by the credit flexibility to respond to market demand. Tax credits allow expenditure to be directed by market aware firms rather than a centralised authority. While the flexibility of a credit to respond to market demand is useful it also creates an uncertain and unlimited demand on the exchequer. Their operation varies between countries but in general companies can deduct a percentage of eligible R&D expenditure from Corporation Tax liability.
- 4.33 Eligible R&D expenditure in most countries is guided by the OECD Frascati Manual which places strict limits on what are considered R&D expenses and activities. In certain jurisdictions such as Ireland there are provisions allowing the credit to be retrospectively applied, carried forward into future years and/or refunded to the company if profit is insufficient in a given year. The latter option is considered to be especially important as a cash flow source for start-up companies which often do not have profits on which to offset a credit or ready access to liquidity or early stage financing.

Ability of Government to Correct the Market Failure

- 4.34 The existence of a gap between the private and social returns to R&D as outlined previously is not sufficient in itself to justify a government support such as a tax credit. It is critical that R&D Tax Credits induce firms to increase expenditure on R&D rather than merely use them to replace expenditure they would have otherwise committed to R&D. Where an R&D credit replaces existing expenditure it imposes a deadweight loss on society. In addition, there are unintended consequences associated with government incentives for R&D which are supported by empirical research. These are set out below.

²³ Other examples include the taxation of environmental or social bads, which seek to reduce *negative* externalities.

Additionality

- 4.35 A significant concern with regard to government supports for R&D is their efficacy in eliciting additional R&D expenditure from firms. The danger is that firms may just be substituting the government funds for funds they would have otherwise invested themselves.
- 4.36 There is a large body of literature which attempts to evaluate the additionality of R&D Tax Credits by calculating the benefit-to-cost ratio.²⁴ This ratio gives the amount of firm R&D expenditure induced for a given amount of tax foregone. In general, benefit-to-cost ratios greater than one are considered to be effective interventions.
- 4.37 The body of literature which attempts to calculate a benefit-to-cost ratio is varied by methodology, jurisdiction, data type, time period etc. which makes any two comparisons between results difficult. However, a series of such evaluations reviewed by Her Majesty's Revenue Commissioners (HMRC) in the UK found that for every one euro foregone in each jurisdiction, between €0.29 and €3.6 was induced from private firms.²⁵ HMRC's own analysis of the UK's R&D Tax Credit scheme found the benefit to cost ratio to be up to £3 in private R&D expenditure for every £1 foregone in tax revenue.
- 4.38 However, this measure alone is not a complete endorsement of the R&D Tax Credit. While ability of R&D Tax Credits to effect an increase in private R&D expenditures is crucial, other consequences both need to be considered in making a judgement on the ability of the R&D credit to have a positive effect on the economy.

The Unintended Consequences of Stimulating Private R&D

- 4.39 A classic concern raised by Goolsbee (1998) is that that tax credits along with other similar government incentives only serve to increase the wages of scientists and researchers as opposed to increasing knowledge creation in firms. While this phenomenon would fail to result in the normal benefits associated with an increase in research activity, in the long-run the increased wages may induce people into the technical and research based careers serving to reduce wages and increase output of scientific research and commercial innovation.
- 4.40 Evidence presented in Bloom, Griffith and Van Reenen (1999) suggests that the location of R&D may be affected by tax-induced changes in the cost of R&D. So while tax credits may demonstrate themselves to increase R&D activity within a given jurisdiction, this may not result in as large a net increase globally. This concern was raised recently by the OECD who add to the argument by exploring the consequences of firm's tax strategies on the development and use of knowledge-based capital (KBC).²⁶
- 4.41 Firms may be incentivised to produce KBC, embed it in production and hold the patent rights, all in different countries. In this scenario it is unclear how the spillover benefits from R&D are distributed. In addition, the OECD argue that domestic firms

²⁴ The benefit-to-cost ratio mechanically derived from the elasticity of R&D expenditure to changes in tax relief as outlined in the data analysis chapter.

²⁵ <http://www.hmrc.gov.uk/research/report107.pdf>

²⁶ <http://www.oecd.org/sti/inno/newsourcesofgrowthknowledge-basedcapital.htm>

will be at a disadvantage due to their limitations in accessing the benefits of tax-planning via multiple jurisdictions which would limit their ability to compete and grow in a globalised world.

Results of Reviews of R&D Incentives in Other Countries

- 4.42 The following paragraphs outline the results of reviews of R&D tax incentives in other jurisdictions. The countries included are the United Kingdom, France, Canada and the Netherlands. These have been authored varyingly by institutions under whose aegis the R&D Tax Credit operates or by academics familiar with the literature surrounding R&D.
- 4.43 The difficulty surrounding measurement of the benefits and causation of R&D schemes results in several lines of research among these authors. The most common are concerned with the responsiveness of business expenditure on R&D to changes in the credit regime. As such most of the reviews below deal with some aspect of this measure.
- 4.44 Most econometric studies of R&D tax incentive programmes determine their effectiveness by evaluating the ratio of R&D expenditure induced by the scheme to its tax cost. This ratio is called either the benefit-cost ratio, incrementality ratio, tax sensitivity ratio or the 'bang for the buck'. If the ratio is greater than one, more industrial R&D expenditure is stimulated by the tax incentive than it costs to the taxpayer and the scheme can be considered cost effective. In the UK review, the HMRC point out that this ratio does not take into account all of the costs (such as administration) and benefits (for example, the social returns on the R&D investment) of the R&D subsidies, so simply determining if the scheme is cost effective based on this ratio may be misleading.

United Kingdom

- 4.45 A review of the United Kingdom's R&D Tax Credit was carried out in 2010 by HMRC. The report is built on an earlier feasibility study by Oxera (2006) recommending the estimation of an elasticity of R&D expenditure to the credit could provide the most accurate impacts of the R&D credit scheme. Oxera also suggested that a potential control group could be formed through the identification of firms that have similar characteristics but do not claim R&D Tax Credits or the use of data from the same firms before the introduction of the policy. HMRC found difficulties in developing a control group according to those methods outlined in the Oxera report.²⁷
- 4.46 The HMRC model indirectly estimated the impact of the credit by estimating how changes in the user cost of R&D – a variable that is directly impacted by the credit – impact on levels of expenditure on R&D. Increasing the R&D credit rate, increases the tax cost and decreases the user cost of R&D, correspondingly increasing the level of R&D investment. This is quantified by estimating an elasticity or semi-elasticity (or both).
- 4.47 The semi-elasticities derived for the UK's large company scheme implied a benefit-cost ratio of between 0.93 and 1.85 in the long-run. In other words, over time £1 of cost to the taxpayer returns between £0.93 and £1.85 of R&D investment. The estimates for the SME scheme were smaller if they are based on semi-elasticities

²⁷ The use of control groups in evaluating the impact of Ireland's R&D Tax Credit was also recommended by the OECD in its recent economic survey on Ireland.

(0.41 or 0.71), but much larger if they are derived from the elasticity estimates (2.33 and 3.37).²⁸

- 4.48 Thus the HMRC analysis suggested that every £1 of tax foregone stimulates between £0.41 and £3.37 of additional R&D investment.
- 4.49 Their review also contained a qualitative element featuring interviews with managing directors, finance directors and the directors responsible for R&D in sixty-nine companies. The main purpose of these interviews was to assess the degree to which these companies would be engaged in R&D if not for the credit. The results of the interviews suggested that the credit had little effect on decisions to conduct individual pieces of R&D work, a finding that would seem inconsistent with the quantitative results.
- 4.50 The authors however believed that these views were a function of the timing of claims (after the expenditure has been incurred), and by the communication gap between the R&D and the finance functions of companies. They also note a generally poor understanding of the operation of the credit among interviewees.

France

- 4.51 France undertook a review of its R&D Tax Credit as part of the French Evaluation Committee for Tax Expenditures and Social Contribution Exemptions (2011). Their report produced by the Ministry of Finance was tasked with identifying tax expenditures with opportunities for reform. The authors evaluated the R&D credit in general as well as the reforms of the scheme previously implemented in 2008.
- 4.52 At the time of their introduction the reforms were projected to have the capacity to raise GDP by 0.3% after 15 years. Acknowledging the dynamic process of R&D investment and the early stage the reforms were in, in 2011, the Committee considered that any attempt to quantify its macroeconomic impact would be premature.

The report also found that:

- In many industrial sectors, R&D expenditures as a percentage of the turnover improved between 2007 and 2008;
 - French affiliates of foreign companies increased their R&D expenditures faster than other French companies. This suggests that tax credit improved France's international attractiveness; and,
 - Corporate R&D expenditures continued to grow in 2009 despite a sharp decline of GDP due to international crisis.
- 4.53 As France has had a tax credit for R&D since 1983 it has been studied more often than that of either Ireland or the UK which were introduced more recently. As such there are two papers in the economic literature which estimate the responsiveness of R&D expenditure to changes in the credit. Mulkay and Mariesse (2004) find that the estimated impact of a €1 tax credit on R&D expenditures to be in the range of €2 to €3.6 in the long term

²⁸ Semi-elasticities measure the absolute change in R&D expenditure to a percentage change in the user cost of R&D, whereas elasticities measure the percentage change in R&D expenditure to a percentage change in the user cost of R&D.

Canada

- 4.54 Possibly the most comprehensively studied research and development tax credit is the Canadian tax credit. Parsons and Phillips (2008) review the literature on Canada for three key areas: spillover benefits of R&D; opportunity cost of public funds; and administration and compliance costs. Using parameter values in these areas and the elasticity of R&D to the credit the authors build a general equilibrium model of changes in welfare over three stages.
- 4.55 The first stage views changes in welfare in a world where there are no externalities associated with R&D and no tax distortions (or compliance costs) associated with the scheme. This scenario concludes that the R&D credit is net welfare reducing. This result confirms that, in the absence of externalities, government subsidies lower welfare since the gain in producer surplus of R&D subsidised firms is lower than the loss to other firms, which must pay for the subsidy.
- 4.56 The next stages add in the welfare benefits of spillover effects from conducting R&D as well as the distortionary impacts of taxation on the economy. Spillovers are included by adding the benefit private firms receive from R&D conducted in other firms. The negative effects of taxation enter the model in two ways. Taxes taken from the economy distort allocation of resources and therefore impose a welfare loss on society. In addition, the increased R&D generates its own tax revenue, thus reducing the need to raise taxes elsewhere, reducing the welfare loss of the endeavour. The authors also include administration and compliance costs, part of which also have to be financed by government, resulting in another welfare loss from distortionary taxes.
- 4.57 The model requires estimates of key parameter values such as the long-run R&D incrementality ratio, the spillover benefit from conducting R&D and the cost from distorting allocation of resources on society.
- 4.58 The general equilibrium model is used to estimate the welfare gain to society of subsidising private R&D. The authors calculate that the net welfare gain per dollar of tax subsidy is 0.109. In other words the gross gain per dollar of subsidy is approximately \$1.10

Netherlands

- 4.59 Lokshin and Mohnen (2010) review the credit as it exists in the Netherlands, covering a period from 1996-2004 estimating the elasticity of firm R&D capital accumulation to its user cost. The authors use this as an input to a cost benefit analysis which is based around the idea that a firm's response is dynamic over time encountering delays such as project proposal and financing. As such the impacts of the scheme are measured throughout time. Included in these impacts are the compliance costs for companies as well as the government's opportunity costs for the tax expenditure itself which are often excluded from credit evaluations.
- 4.60 Their findings conclude that there is additionality in the scheme but that crowding out can only be rejected for smaller firms. This is reflective of a situation where smaller firms may not have the same access to finance as large firms with internal financing functions and greater capacity to supply collateral. The authors also find that in the short-term the scheme is effective however the long-term the impacts of the scheme fall due to the level based nature of the incentive.

Others

- 4.61 The table below, taken from HMRC (2010), shows the results of a number of evaluations across a number of other countries. The final column outlines the benefit- cost ratios estimated in the relevant reviews. The benefit to cost ratios range from 0.29 times in the case of McCutchen (1993) to 3.6 times in Mairesse & Mulkay (2004).

Study	Countries	Data	Dates	Elasticity short-run (SR) or Long-run (LR) where available	Benefit-cost
HMRC (2010)	UK	HMRC data & FAME database	2003-07	Semi-elasticity estimate -2.41 to -0.91 (SR) -5.16 to -1.11 (LR) -2.59 to -1.60 (SR) -2.41 to -1.66 (LR)	0.41 to 3.37
Lokshin & Mohnen (2010)	Netherlands	Firm-level unbalanced data from surveys and government datasets.	1996-04	-0.5 to -0.2 (SR) -0.8 to -0.4 (LR)	0.42 to 3.24
Baghana & Mohnen (2009)	Quebec	Firm level data, survey data and province administrative data of the actual amount of incentive received.	1997-03	-0.14 (SR) -0.19 (LR)	1 to ~3 Depending on tax incentive and size of firm
Hægeland & Møen (2007)	Norway	Various methods, using data from surveys and government databases	1993-05		1.5 to 3.0
Lokshin & Mohnen (2007)	Netherlands	Firm-level unbalanced data from surveys and government datasets	1996-04	-0.5 to -0.3 (SR) -0.7 to -0.3 (LR)	0.4 to ~3.5
Wilson (2007)	US	NSF R&D by state	1981-04	-1.2 (SR) -2.2 (LR)	
Harris et al. (2005)	Northern Ireland	Follows Bloom et al. (2002). Firm-level data for 11 manufacturing industries. From BERD/ARD surveys	1998-03	-1.36 (LR)	
McKenzie & Sershun (2005)	G7, Australian and Spain			-0.3 to -0.2 (SR) -0.9 to -0.7 (LR)	
Klassen et al. (2004)	Canada and US	Matched sample of 58 Canadian and 110 US firms from	1991-97		1.30 (Canada) 2.96 (US)

		Compustat			
Mairesse & Mulkay (2004)	France	765 manufacturing firms.	1983-97	-2.78 to -2.68	2.0 to 3.6
Bloom et al. (2002)	G7 + Australia & Spain	OECD BERD survey	1979-97	-0.14 (SR) -1.09 (LR)	
Parisi & Sembellini (2001)	Italy	Balanced panel of 726 firms	1992-97	-1.77 to -1.50	
van den Hove et al. (1998)	Netherlands		1994-96		0.7 to 1.7
Dagenais et al. (1997)	Canada	Unbalanced panel of 437 firms, Compustat	1975-92	-0.07 (SR) -1.08 (LR)	0.98
Mamuneas & Nadiri (1996)	US	Industries from NSF and US Bureau of Labor Statistics	1956-88	-1.0 to -0.84	0.95
Shah (1994)	Canada	18 Industries	1963-83	-0.16 (SR)	1.80
Berger (1993)	US	balanced panel data from Compustat	1982-85	-1.5 to -1.0	1.74
Hall (1993)	US	800+ firms unbalanced Compustat	1981-91	-1.5 to -0.8 (SR) -2.7 to -2.0 (LR)	2
Hines (1993)	US	116 multinationals from Compustat	1984-89	-1.6 to -1.2	1.3 to 2.0
McCutchen (1993)	US	20 large pharmaceutical companies, from IMS.	1982-85	-10.0 to -0.28	0.29 to 0.35

Table 2
Source: HMRC

CHAPTER 5

DATA ANALYSIS

Introduction

- 5.1 This section presents a descriptive analysis of data from the Revenue Commissioners administrative records. This data is taken from the CT1 form which companies used to report their Corporation Tax and claim their Research and Development (R&D) Tax Credit.
- 5.2 The data was provided to the Department on a confidential basis under a temporary confidential authorisation and has only been seen and analysed by the officials that were granted authorisation. All outputs presented herein are presented on an aggregated basis and no company level data is revealed.
- 5.3 The data covers the period 2008 to 2011. Data for 2012 does not become available until 2014 and as such was not included in the analysis. The data includes complete records from the R&D Tax Credit panel on the CT1 forms.
- 5.4 The analysis produced covers levels of expenditure on R&D including base year expenditure, the amount outsourced and the use of the payable credit.
- 5.5 The analysis also includes a detailed examination of the types of companies that use the R&D Tax Credit in terms of their size (by employee numbers), their economic (i.e. NACE) sector and whether the companies were profit or loss making in the years in which they claimed.²⁹

Levels of R&D Tax Credit Over Time

- 5.6 Companies active in R&D, as defined by the OECD's Frascati manual, may make a claim for an R&D Tax Credit for expenditure that exceeds their 2003 R&D expenditure. Companies that also receive an R&D grant from one of the enterprise agencies may make a claim for expenditure net of the level of R&D grant aid.
- 5.7 Companies may also make a claim for the entirety of their expenditure on buildings i.e. the base year approach does not operate for expenditure on buildings.
- 5.8 The figure below represents the amount of expenditure on R&D which qualifies for the purpose of the credit and the base year expenditure for years 2008-2011. The estimated base year expenditure is likely to be an underestimate as the relevant field on the CT1 form is non-mandatory and as such companies may choose not to fill it out. In addition, base year was not recorded on the 2008 CT1 form as such it is not included in the figure.

²⁹ NACE is the statistical classification of economic activities used by members of the European Community e.g. Manufacturing, Agriculture, Computer Services etc.

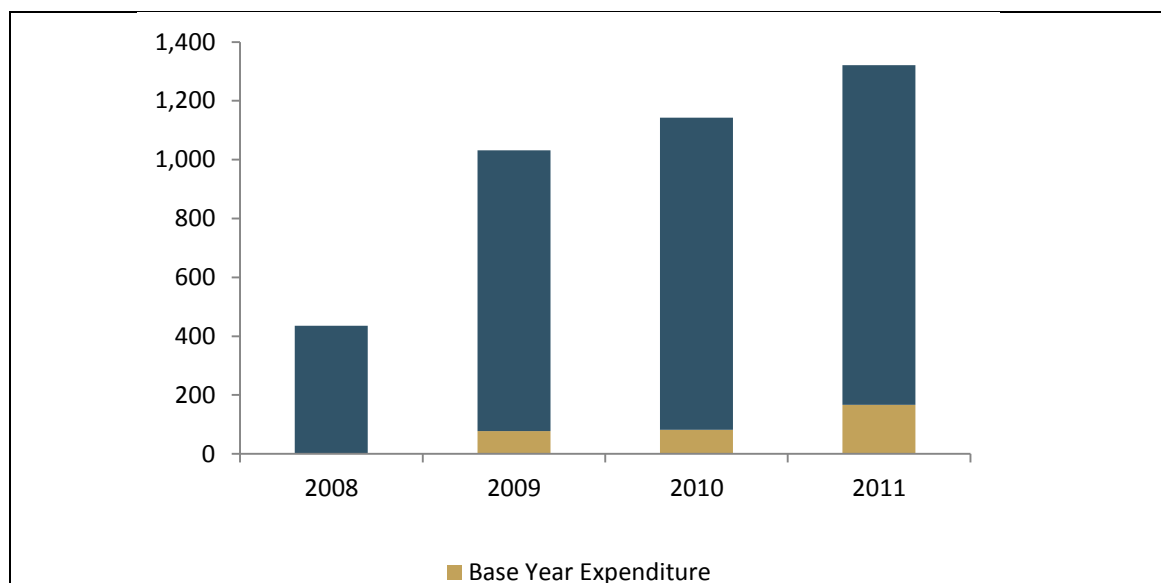


Figure 12: Total allowed and base year expenditure, €m, 2008-2011

Source: Department of Finance analysis of Revenue Commissioner data

- 5.9 Eligible expenditure for the R&D Tax Credit appeared to increase significantly from the period 2008 to 2009. As discussed some of this is because the base year field was only added to the CT1 form in 2009, but even accounting for this the eligible expenditure still experiences a significant climb from €436 million to €955 million. Part of this increase may be due to the introduction of a system of payable credits for companies without sufficient taxable income (or no taxable income) from which to fully utilise the credit. This issue is explored later. Another reason may be due to an increased awareness due to marketing and promotional efforts by government departments and agencies as well as tax advisors.
- 5.10 From 2010 to 2011 the allowed expenditure rose from €1,061 million to €1,167 million which is a change of €106 million. As the base year expenditure rises from €77 million to €167 million it seems likely that there was a substantial amount of increased reporting of base year expenditure as well as an increase in claims for firms whose R&D spending just breached their base year expenditure.
- 5.11 The analysis of the BERD data in Chapter 3 gave a sectoral breakdown from the BERD survey of R&D activities by the private sector in the State. The Figure below provides a NACE sector categorisation of claims for the R&D Tax Credit in 2011.
- 5.12 It is unsurprising that the top two sectors in 2011 were Manufacturing and Information and Communication (NACE sectors A and J) which between them accounted for 62% of total claims. The next largest sector at 14% of total claims was Professional, Scientific and Technical (NACE sector M) which includes a number of scientific, engineering and technical activities. What is surprising, however, is that the fourth largest sector, at 11% of total claims was the Wholesale and Retail Trade. Based on an analysis of the firm level data it appears that many of these companies are not classic retailers or wholesalers but would be part of larger groups that include some manufacturing or other activities. It is possible that the R&D claim came in with a part of the company that identified itself as being in wholesale and retail sector but that R&D activity is for use in another sector.

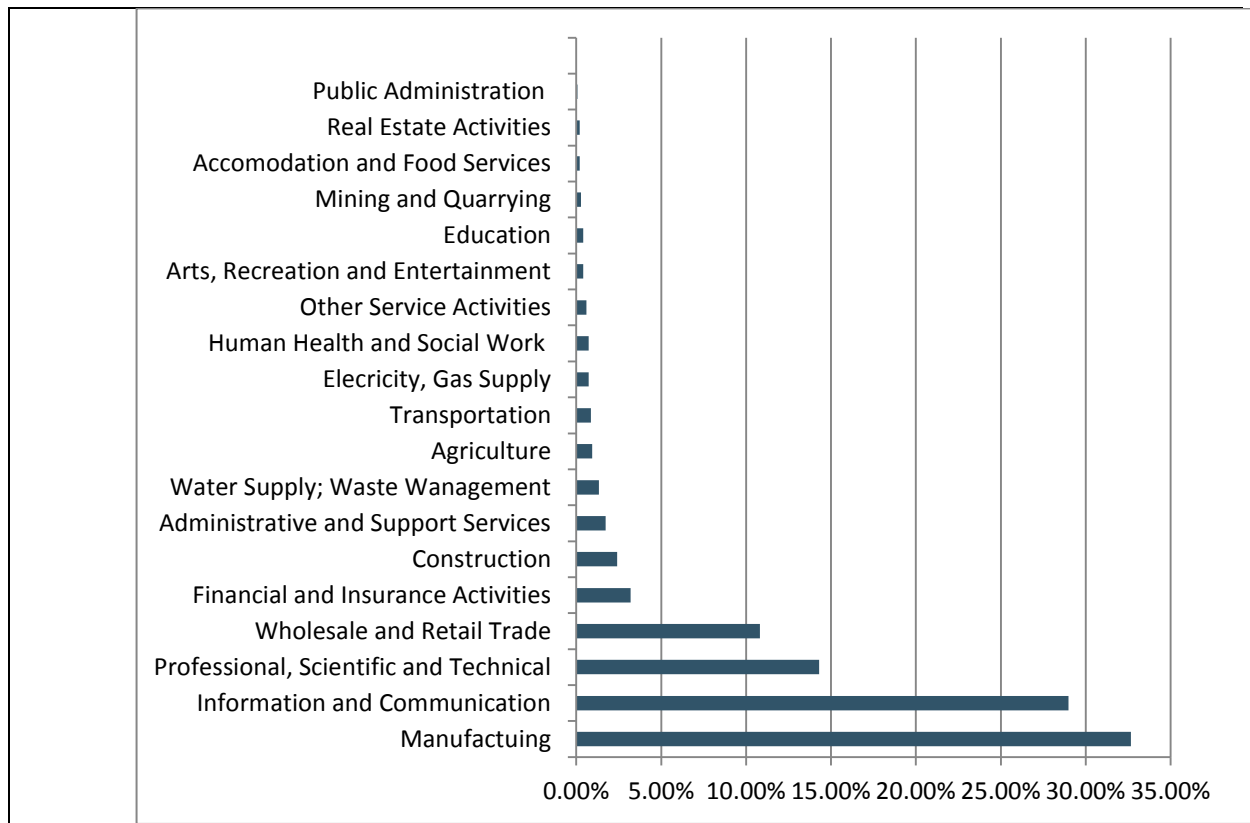


Figure 13: Sectoral distribution R&D Tax Credit claims, €m, 2011
Source: Department of Finance analysis of Revenue Commissioner data

Exchequer Cost

- 5.13 The Exchequer cost in a given year can be defined by three main items: the amount of corporation tax liability written down in a given year; the amount of payable credit paid out; and, the amount of tax credit carried back for write-off against Corporation Tax of the previous period. The cost of the payable credit in any given year is a function of the payable credit generated in the previous two years and the payable credit generated the year in question. This is due to the payable credit being distributed over three years. The exchequer costs for the years 2009 to 2011 are presented as these years will include the impact of the payable credit introduced in 2009.

Exchequer cost of the R&D Tax Credit		
2009 (€m)	2010 (€m)	2011 (€m)
216	223	267

Table 3: Estimated annual exchequer cost of the R&D Tax Credit
Source: Revenue Commissioners

Descriptive Statistics

- 5.14 The table below provides summary descriptive statistics on R&D Tax Credit claims in 2011. The total claim by a company in a given year is the summation of:
- All eligible credit generated in a given year through expenditure on R&D activities (section 766) and expenditure on buildings and refurbishment (section 766A). These are items 10.1(a) and 10.5 from the CT1 form for 2011;

- The amount of credit carried forward from previous periods to be used against the current tax year. This is items 10.2 and 10.6 from the 2011 CT1 form; and,
- The amount of payable credit from previous years available to write down Corporation Tax or to be paid out in the form of a payable credit. This is items 10.3, 10.4, 10.7 and 10.8 from the 2011 CT1 form;
- Excess credit surrendered or received from other companies in the group. This is items 10.9 and 10.10 from the 2011 CT1 form

2011 Tax Credit Claims	
Total Amount Claimed 2011	€552,800,000
Average claim in 2011	€368,266
Max claim in 2011	*€25-€30,000,000
Min claim in 2011	€35
Median claim in 2011	€54,701
Deciles	
10%	€4,713
20%	€13,542
30%	€23,754
40%	€36,891
50%	€54,701
60%	€87,229
70%	€158,106
80%	€276,098
90%	€727,704
100%	*€25-€30,000,000

Table 4: Descriptive statistics from R&D Tax Credit claims, 2011

Source: Department of Finance analysis of Revenue Commissioner data

* For confidentiality purposes the maximum claim is not given

- 5.15 The total claim in the 2011 was €552.8 million. This does not constitute a direct cost to the Exchequer as only €261 million of this was actually used to write down corporation tax liability or was paid out in the form of a payable credit generated in 2009, 2010, or 2011.³⁰ This implies that the amount of credit carried forward for use in future periods was €291 million in 2011. As some company's tax liabilities are zero for example early stage start-ups it's possible that some of this €291 million will never be borne as a cost to the Exchequer where these firms wind-up before generating a tax liability³¹.
- 5.16 From the average claim of €368,266 it can be inferred that the distribution is positively skewed given the median value is a much smaller at €54,701. In other words the average claim size is pulled upwards away from the mean due to very large levels of R&D expenditure by a small number of companies. For instance the single largest claim in 2011 was in the region of €25-30m which was significantly above the 90th percentile threshold of €727,704.³²

³⁰ See Table 1.

³¹ See Revenue Commissioners Guidance on the Operation of the R&D credit

³² A detailed analysis of the claim by this company revealed that a significant proportion of the claim was in respect of payable credits due from expenditure in previous years and outstanding claims carried forward that exceeded the corporation tax and payroll tax limits for the payable credit.

Amount of Payable Credit

- 5.17 Subject to limits, firms with insufficient taxable income to avail of the full value of the credit in a given year can apply make a claim for one third of the unused credit to be paid in cash.³³ The outstanding amount is either used to reduce future tax liability or is paid out as a payable credit over the next two years.
- 5.18 The system of payable credits has been in place since 2009. There is therefore three years of data available for analysis. The figure below represents the amount of payable credit paid out in years 2009-2011. The amount paid out for 2009 represents payable credit attributable to R&D expenditure in that year. In 2010 and 2011 it represents payable credits attributable to expenditure in that year as well as payable credits representing expenditure in previous years.

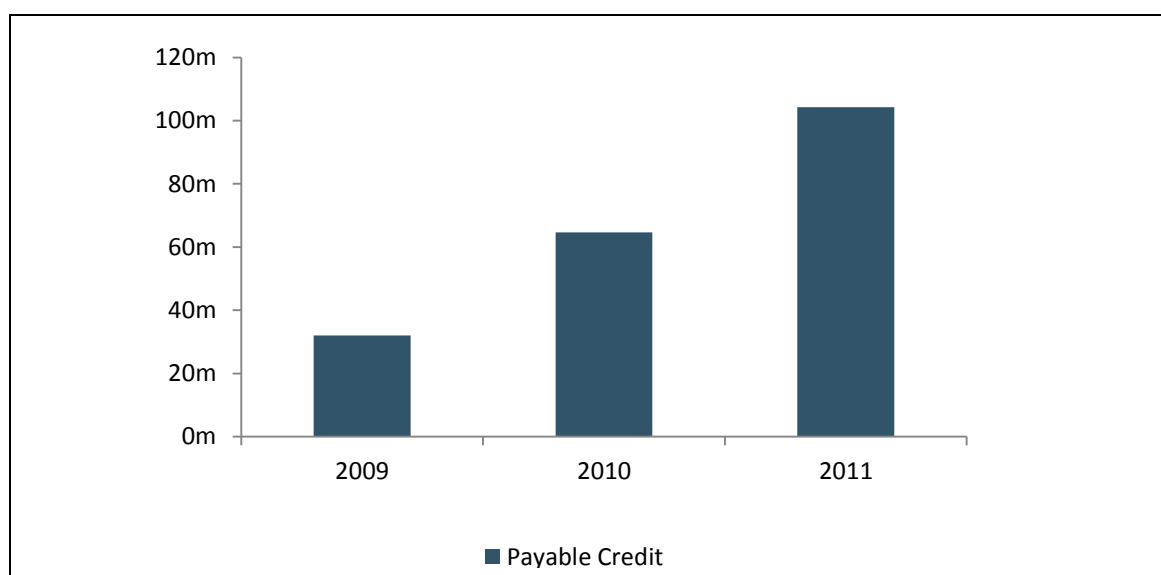


Figure 14: Payable Credit, €m, 2009-2011

Source: Department of Finance analysis of Revenue Commissioners data

- 5.19 Given the payable credit is received by firms in thirds it is not unexpected that the cost would double in the first period from €31 million in 2009 to €64 million in 2010 and rise in 2011 by half to €106 million. It can also be expected that the climb in the cost of the payable credit will stabilise in the next series of data in 2012 with changes in cost only being observed due to changes in firm expenditure and tax liability rather than additional instalments coming online as happened in the first three years of its operation.

Profile of R&D Claimants Over Time

- 5.20 This section gives a breakdown of claimants of the R&D credit, the payable credit and those subcontracting R&D activity. The breakdown is provided based on company size (employee numbers) and their status as profit making or not profit making for the year in question.

³³ The payable credit in any given year is the amount of credit generated in this period not exceeding the greater of ten year's corporation tax liability or one year's payroll taxes.

- 5.21 The breakdown on company size is based on the size definition used by the European Union,³⁴ which denotes micro firms as those employing less than 10 people, small firms as those employing greater than 9 and less than 50, medium firms as those employing greater than 49 and less than 250 and large firm as those employing greater than 249.

Profile of Companies Based on R&D Claim

- 5.22 The figure below shows the distribution of the number of claimants for the R&D credit by company size. The claim of companies benefiting from the R&D credit is composed of the definition included in paragraph 5.14 above. It is not possible with currently available data to get a profile of companies based on the exchequer cost which was discussed in paragraph 5.13. However, the company claim forms a useful proxy for the value of the benefit to companies. The total claim for companies in 2011 is reported in Table at €552 million.
- 5.23 The largest group of users of the credit were small companies followed by micro enterprises. Together these two groups accounted for 70% of total claims in 2011.

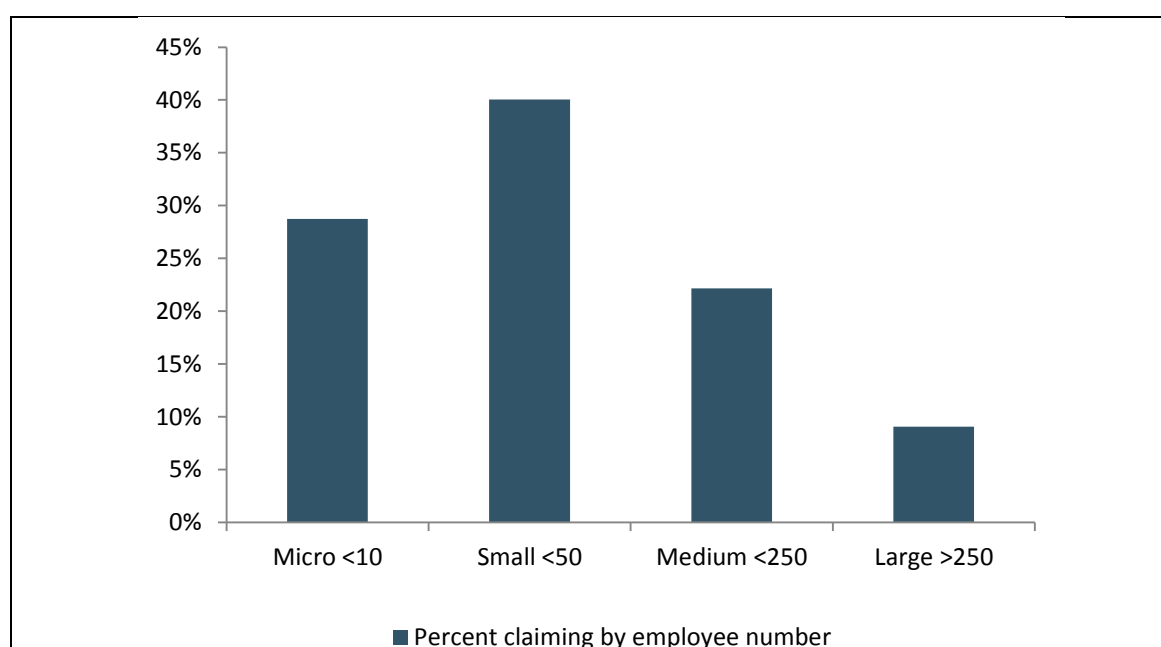


Figure 15: Numbers Claiming credit Distribution by employee numbers
Source: Department of Finance analysis of Revenue Commissioners data

- 5.24 When one looks at the distribution of claimants by claim size, it is clear that a linear relationship exists between company size (as defined by employee numbers) and the size of that company's credit. Approximately 45% of the total value of claims came from large companies which accounted for less than 10% of the total number of claims.

³⁴ The definition can be found here:
<http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/>

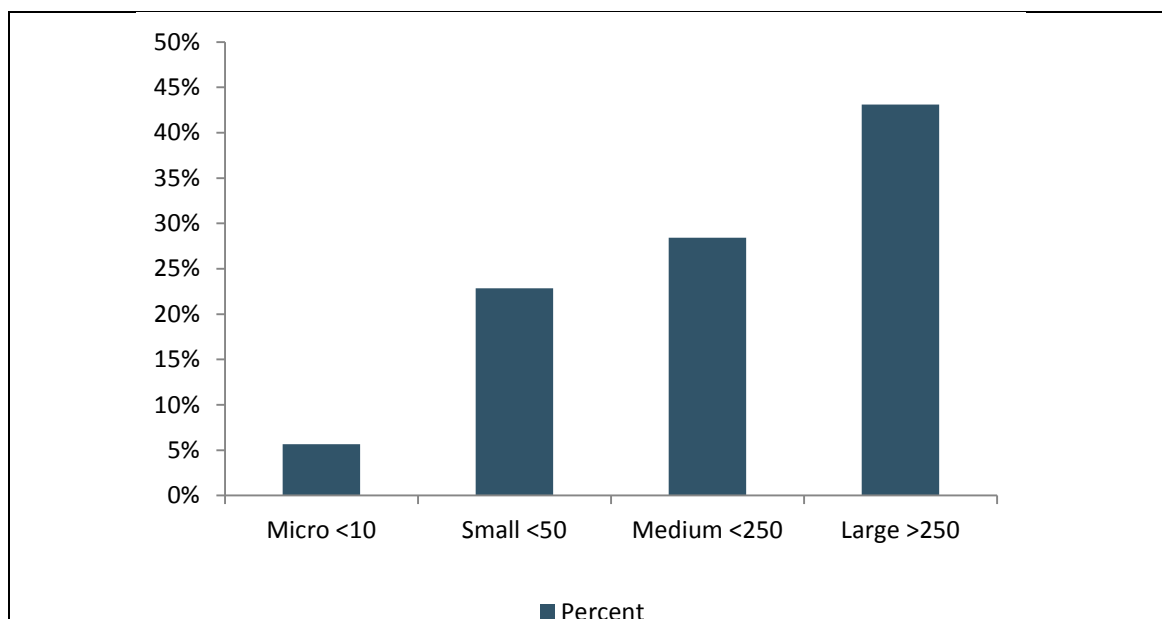


Figure 16: Percentage value of claim by employee numbers
Source: Department of Finance analysis of Revenue Commissioner data

5.25 An interesting stream of analysis is one which looks at the profit status of companies that used the credit.³⁵ The figure below provides a distribution of profit making and loss making companies in 2011. As can be seen close to 80% of claims from loss making companies came from small and micro enterprises. The same group of companies accounted for the majority (61%) of claims by profitable companies.

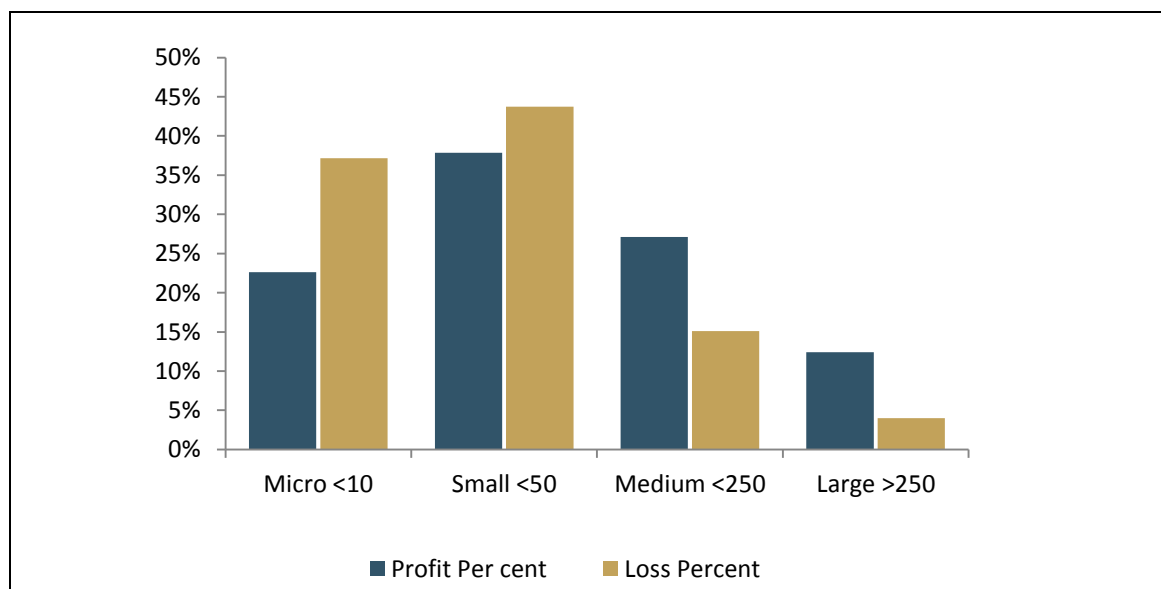


Figure 17: Numbers Claiming credit and profit/loss-making by employee numbers
Source: Department of Finance analysis of Revenue Commissioner data

5.26 When one undertakes a similar analysis based on the value of the claim, the weighting of micro enterprises falls relative to their share of total claimants. The greatest value of claims by profitable companies came from large companies (56%).

³⁵ Profit making in this analysis refers to companies' accounting profit and not their taxable profit. An accounting profit does not necessarily imply a tax liability for a given company.

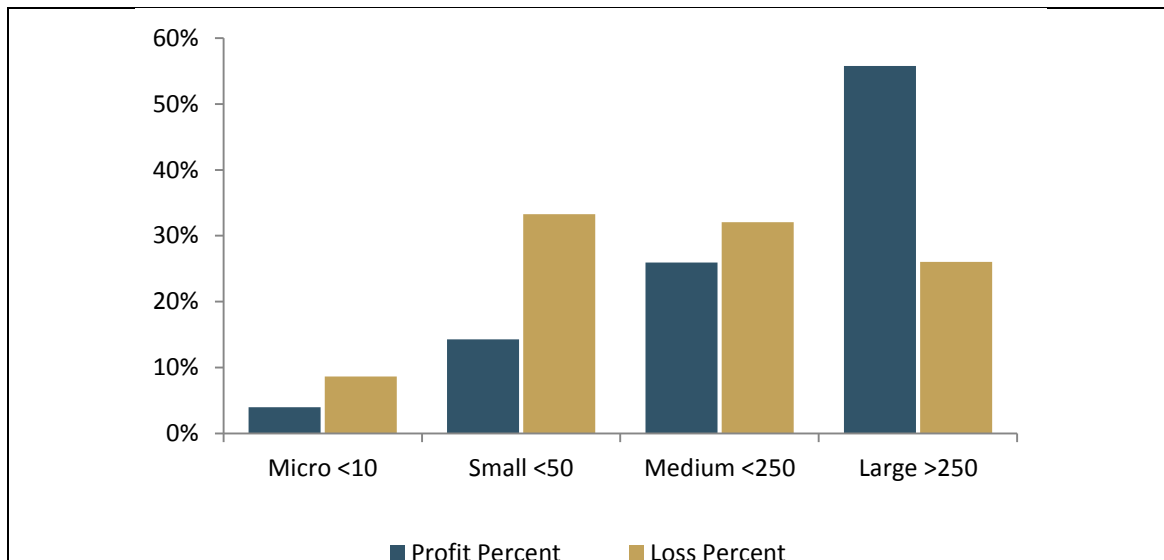


Figure 18: Value of credit claim by profit/loss-making status and company size
Source: Department of Finance analysis of Revenue Commissioners data

Profiling of Companies Claiming the Payable Credit by Numbers

- 5.27 Approximately 80% of claimants for a payable credit came from small or micro enterprises. This is consistent with the distribution of loss making companies presented above. It is also representative of the lower probabilities of profit generation by early stage companies. The value of the payable credit in 2011 was €106 million.

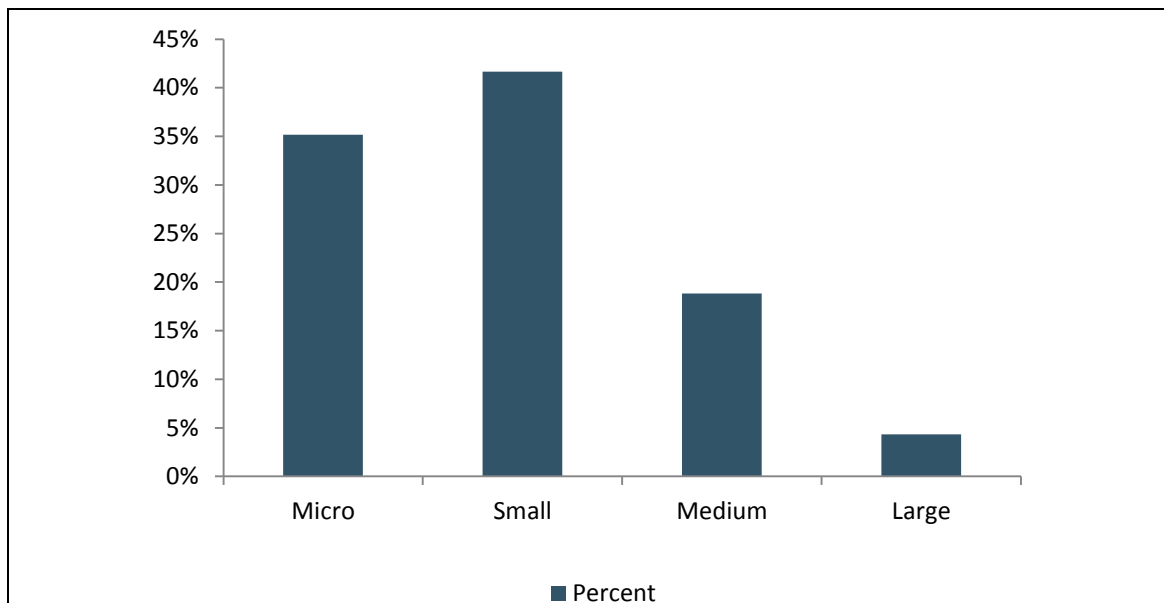


Figure 19: Numbers claiming payable credit distribution by employees
Source: Department of Finance analysis of Revenue Commissioners data

- 5.28 As with the overall use of the R&D Tax Credit, when the data on the payable credit is presented by the size of the payable credit claim, the share of large companies increases significantly with large companies claiming for 35% of all payable credits in 2011.
- 5.29 Small and micro companies which accounted for 80% of payable credit claimants account for 36% of the value of payable credit claim, with micro enterprises

accounting for 7% of the value of claims despite accounting for 35% of overall claimants for the payable credit.

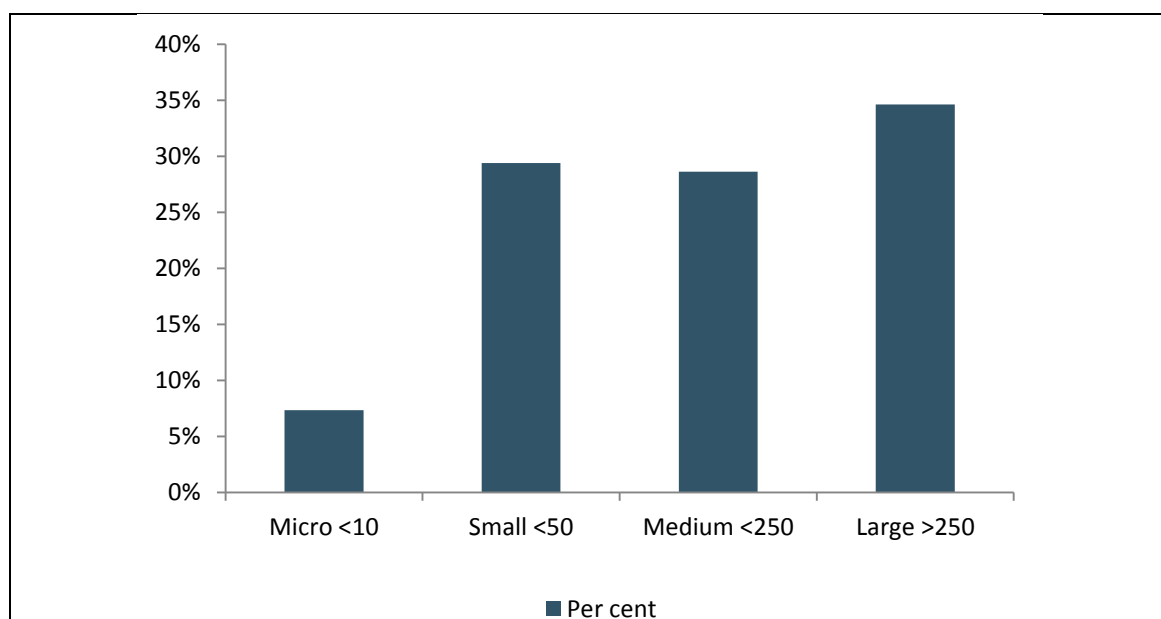


Figure 20: Value of payable credit distributed by company size

Source: Department of Finance analysis of Revenue Commissioners data

- 5.30 Given that the payable credit is ostensibly designed to provide an incentive for R&D expenditure to companies that have low or no taxable income, it is worth analysing the profit status of companies that actually claimed a payable credit in 2011.
- 5.31 The proportion of companies claiming the payable credit in a profit and loss making position are quite close for companies defined as small at just over 40% each. As can be seen in Figure 21 though, loss making companies who receive the credit tend to be smaller than their profit making counterparts in general.

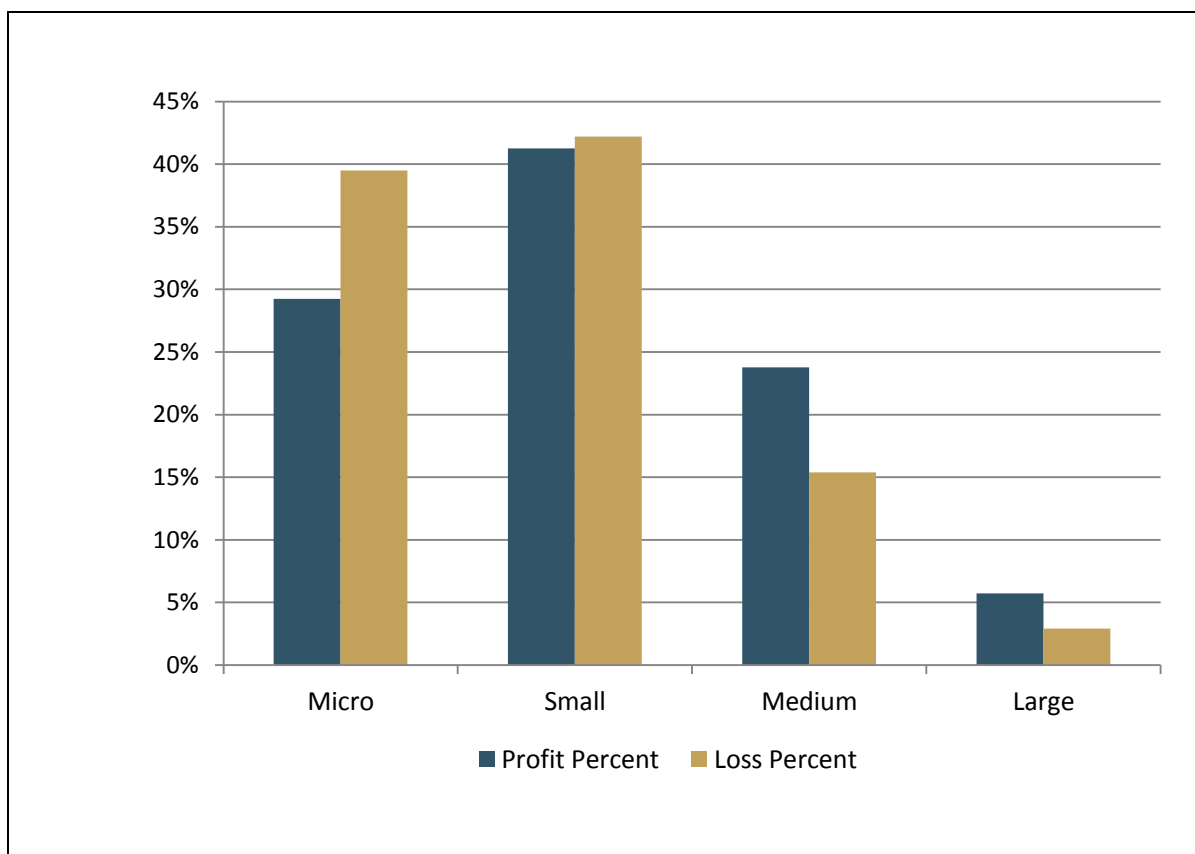


Figure 21: Numbers claiming payable credit distributed by profit status and company size
Source: Department of Finance analysis of Revenue Commissioners data

- 5.32 In a similar story to the breakdown of companies by profit status for the value of the R&D claim, the majority of payable credit for profit making companies is located in large companies at 50%. The category of firms receiving highest proportion of payable credit, for those in a loss making position, are small companies at 36% of the payable credit value.

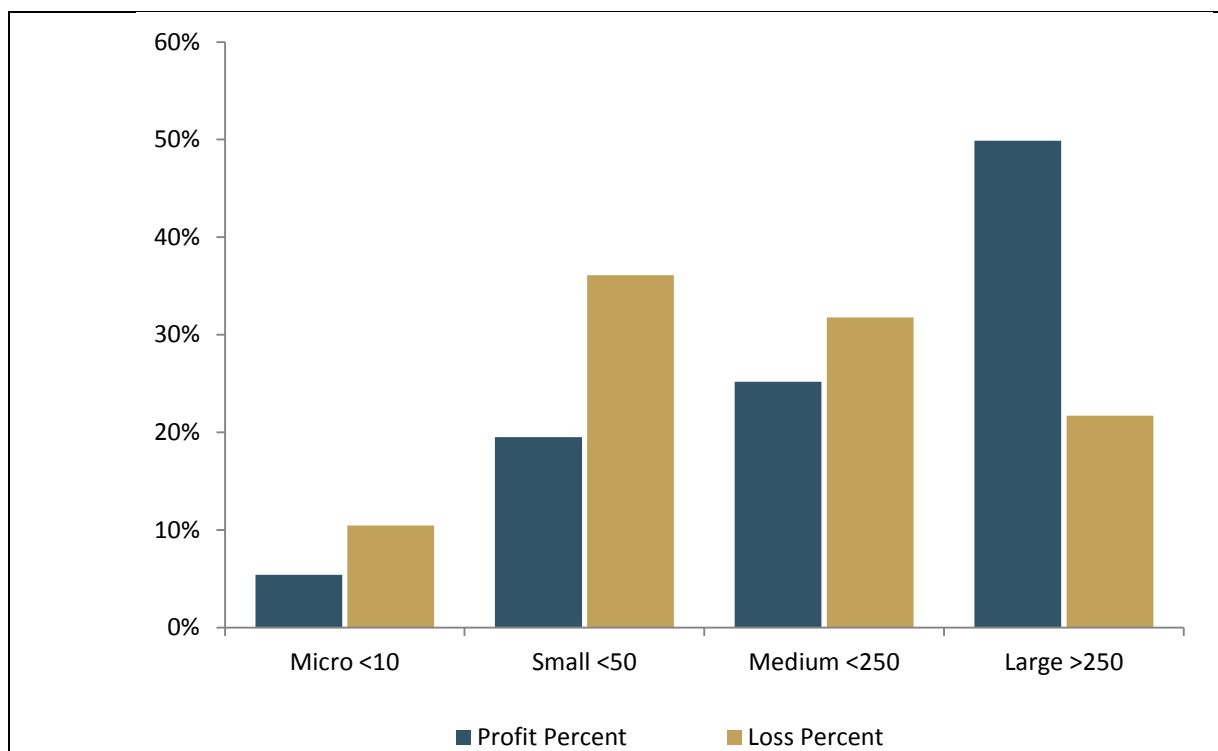


Figure 22: Value of payable credit distributed by profit status and company size
Source: Department of Finance analysis of Revenue Commissioners data

Profiling of Subcontracting

- 5.33 Companies claiming for an R&D credit are allowed to claim for expenditure subcontracted to universities and other persons e.g. firms. The amount of subcontracting expenditure to universities allowed is limited to 5% of expenditure on R&D activities i.e. non buildings expenditure, and 10% for subcontracting to other persons. As such it's possible for a company to claim up to 15% of its claim on R&D activities for sub-contracted work.
- 5.34 In 2011, claims for qualifying expenditure on sub-contracted R&D work amounted to approximately €34 million, which represented almost a fourfold increase on the 2009 level of approximately €9 million. The largest cohort of enterprises that sub-contracted R&D work in 2011 were small companies 42% and medium 28%. The small company share was in line with its overall share of R&D claims made; the medium and large company share exceeded their share of overall claimants while the small company share was below its share of claimants.
- 5.35 Another point to note is that some firms level of subcontracting as a percentage of their R&D expenditure is much greater than 15%. This is an error as the field on the CT1 form requests firms enter the amount of subcontracting expenditure that the credit is allowed for. It seems likely that firms are reporting the total amount they are spending on R&D regardless of whether they are claiming the credit on it or not.

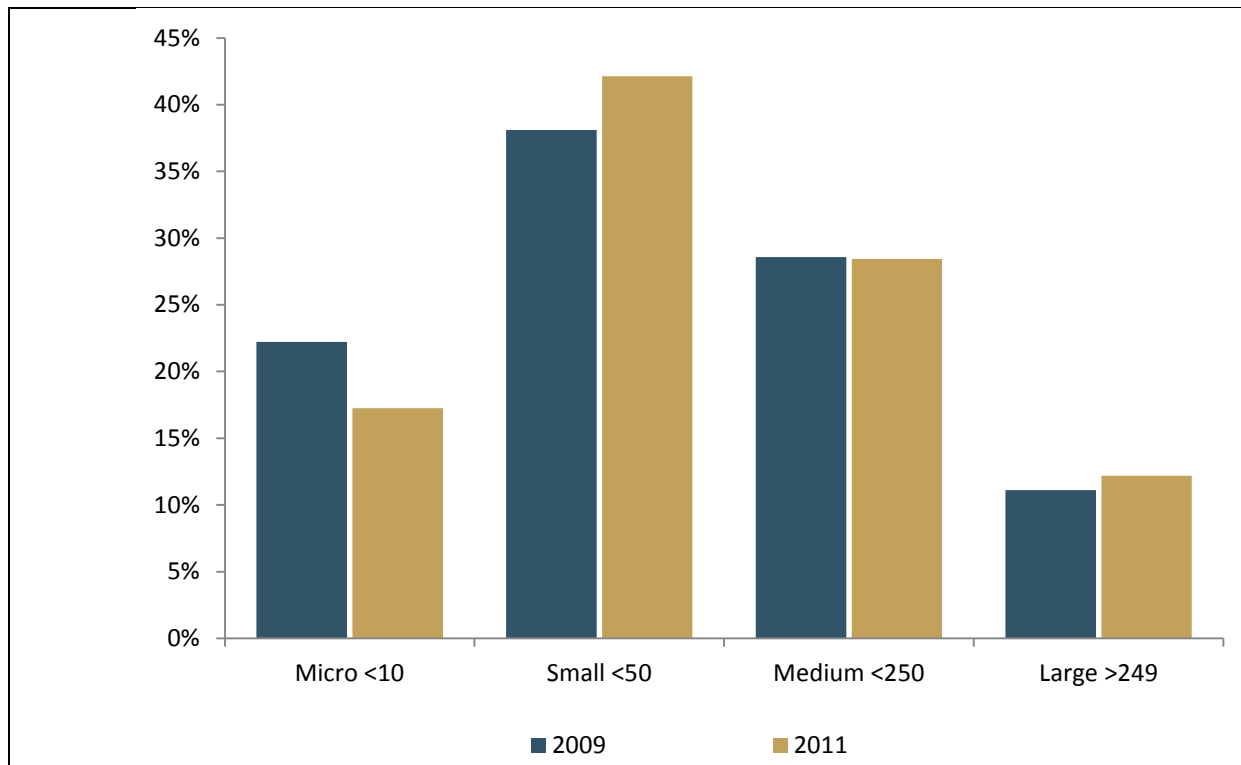


Figure 23: Distribution of outsourcing subcontracting by employee number
Source: Department of Finance analysis of Revenue Commissioners data

- 5.36 In terms of policy it is worth looking at the number of companies that have submitted claims for outsourcing that are at or close to the maximum allowed. This would give an indication of whether the limit acts as a constraint and whether the use of outsourcing as a share of overall R&D expenditure would increase if the limits were relaxed.
- 5.37 An analysis of the data, illustrated in the Figure below reveals that just under 30% of all claims for sub-contracted R&D are at the limit of 10%. A further 14% have subcontracted between 10% and 15% which suggests the use of third party companies and third level institutions.
- 5.38 Some firms reported shares in excess of 15% of total R&D expenditure. Whilst the field on the CT1 represents how much of the credit claim is in respect of sub-contracted expenditure and therefore should not exceed 15%, it is likely that some companies misinterpreted the field and instead reported total sub-contracted expenditure, rather than the amount that is eligible for the credit. Unfortunately this does not represent the true quantum of sub-contracted work that exceeded the threshold as it is possible that companies that claimed up to the maximum also had sub-contracted expenditure that exceeded the limit.

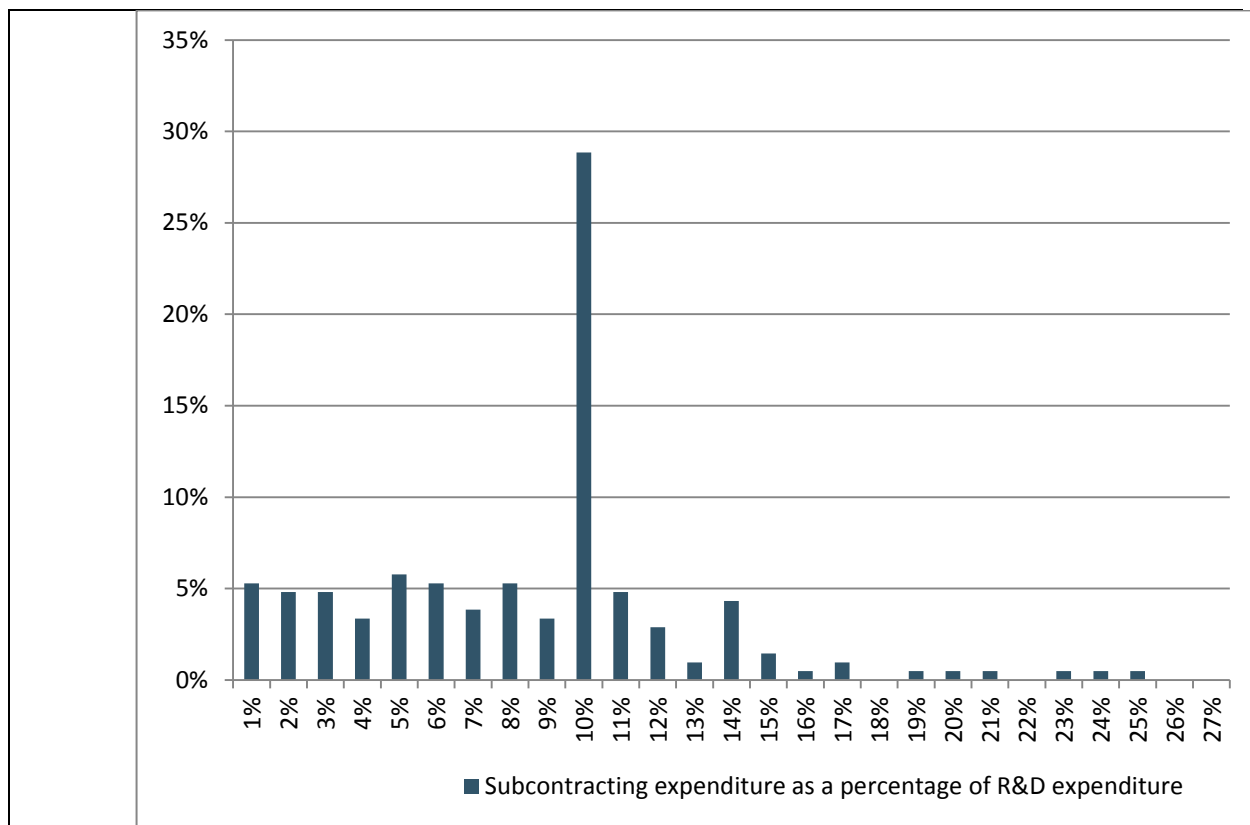


Figure 24: Subcontracting expenditure as a percentage of R&D expenditure
Source: Department of Finance analysis of Revenue Commissioners data

6. Summary

- 6.1 As part of the review of the R&D Tax Credit in 2013, the Department of Finance received over 20 submissions and met with almost 100 companies.
- 6.2 The following summary relates to the written submissions which were received, which are also being published on the website. These were complemented by the face to face meetings which included participation at round table discussions, conferences and site visits.
- 6.3 It should be noted that this summary relates to the submissions received in relation to the R&D Tax Credit however other tax items were mentioned on occasion such as those related specifically to Income Tax. These have been forwarded to the appropriate section of the Fiscal Policy Division in the Department of Finance for their consideration as part of the regular process for Budget 2014.

On the Value of the Credit

- 6.4 The vast majority of the submissions were extremely positive in their support for the retention of the tax credit, with only one calling for it to be removed in full and only one other expressing concern about its impact. The message received was that the R&D Tax Credit is an important aspect of our corporation tax offering both domestically and internationally, and that it should remain in place. The R&D Tax Credit's value in helping to attract mobile investment into Ireland was mentioned frequently.
- 6.5 A large number of respondents underlined that the credit is an extremely useful tool to help Irish subsidiaries of multi-national firms compete for and bring new projects to Ireland. Some larger, multi-national companies reported that this is especially the case when the Irish company is competing internally with subsidiaries in other jurisdictions for inter-group projects, as the existence of the credit has helped to enhance the strategic importance of the Irish sites. The existence of R&D operations is also able to underpin existing manufacturing operations. The tax credit is therefore viewed as a vital support for jobs as it helps embed substantial activity in Ireland.
- 6.6 The submissions also highlighted that the credit helps Ireland stay competitive internationally from a cost perspective. At a very elementary level, it obviously reduces the cost of carrying out the R&D in Ireland by 25%, which is valuable as this may help to balance out areas where Ireland may not be so competitive from a cost perspective (for example in relation to labour costs or energy costs). The credit is relevant at the firm level when making financial decisions regarding the location of R&D projects, as it helps to reduce the 'cost-per-head' value of carrying out R&D in Ireland. The 'above-the-line' element of the credit was highlighted as particularly valuable in this context. These aspects will be explained further in a case study later in this section.
- 6.7 Smaller, indigenous firms reported that the value of the credit is in its ability to mitigate some of the financial risks involved in carrying out R&D. In particular, the payable element of the credit was highlighted as a useful cash boost for such companies. This was also borne out in the results of the Crowe Horwath survey.
- 6.8 Some respondents had commissioned their own survey of companies who avail of the credit. These survey results underlined that firms believe the tax credit is an important factor in the decision of companies to bring R&D projects to Ireland, that it

has led to an increase in the amount of R&D being carried out in Ireland and that the credit is important for the retention of jobs here. 98% of companies who responded to the survey commissioned by IBEC rate the regime as good or very good in terms of 'overall usefulness'.

- 6.9 Several of the submissions referenced the economic benefits of having a tax credit for R&D, and how in developed countries, R&D outputs are a significant driver of technological progress and economic growth. The merits of this view are considered further in the economic analysis of this review in Chapter 3 and Chapter 4.
- 6.10 The submissions also mentioned the value of additional government supports for R&D beyond the tax code, such as the use of direct funding like aid and grants. The review has focused only on the tax credit; however some of Chapter 3 has referenced other government supports. Such submissions have been forwarded to our colleagues in the Department of Jobs, Enterprise and Innovation for their consideration. It was noted that, according to the submission from the Enterprise Development Agencies, in an OECD study of government funding for R&D³⁶ Ireland is ranked 5th of 37 for tax incentives but only 22nd for direct funding. They identified that the policy mix in Ireland favours the use of the tax code which reflects the more neutral, market driven approach in Ireland.
- 6.11 Also noteworthy are Ireland's international commitments in relation to the amount of R&D carried out in the State. The Enterprise Development Agencies reported that the EU 20/20 target of 3% of GDP to be spent on R&D; according to Eurostat, as of 2012 Ireland is currently at 1.7%, with the EU average being 2%³⁷.

Specific elements of the Credit

- 6.12 The submissions emphasised the positive elements of the credit including:
- Rate
 - Above the line treatment
 - Payable element of the credit
 - Scope of eligible activities
- 6.13 The submissions also raised the following aspects of the credit for further discussion:

Base year

- 6.14 A number of the submissions identified the removal of the base year as an issue to be considered. There was, however, a general recognition that there would be an additional cost to the Exchequer from such a move. It is notable that, according to the submissions, the motivation for such a removal from the company's perspective is not necessarily cost related. Rather, the case is being made as the requirement to keep records dating back some 10 years is a significant practical and administrative issue. This is particularly true for well established companies who are moving into the R&D space for the first time.

³⁶ OECD (2012), Science, Technology and Industry Scoreboard 2012

³⁷ Irish Exporters Association

Outsourcing

- 6.15 Many of the submissions raised the point that the current cap on outsourcing may be affecting their ability to carry out additional R&D as companies involved in R&D are increasingly looking to use outsourcing. The nature of R&D means that it requires additional flexibility around how staff are employed as it is project based and therefore constantly in flux. It was raised that R&D increasingly requires specialist staff, so companies are less likely to have the in-house staff to meet the needs of a particular project: outsourcing is therefore a necessity in many cases. Further, some firms are under pressure to maintain a stable headcount of employees, which makes it difficult for them to be able to justify short-term hires.
- 6.16 There was a strong focus on the use of agency employed sub-contractors, and the case has been made that expenditure incurred on sub-contractors who are under the direction and control of the company performing R&D in Ireland should not be subject to the cap on outsourcing.

Key Employee Provision

- 6.17 There was a mixed message on the uptake and use of this provision: some submissions reported that no companies were using it, but one of the survey results reported that 5% of the companies surveyed had used this provision (which would amount to 12 companies in the first year of it being available).
- 6.18 Several submissions made the case that this provision should be extended to all employees, including directors and those not necessarily directly involved in R&D, and that it should be extended to loss making companies. There were also calls for the liability of an incorrect claim be confined solely to the company and not the employee in question.
- 6.19 One submission called for this provision to be removed entirely.

Payable Credit

- 6.20 Three submissions called for the payable credit to be paid in one instalment (instead of spread over 3 years).

Sectors

- 6.21 We received some feedback that the credit should be better targeted to small and medium sized firms.

Definition of Qualifying Activities

- 6.22 In general, there was a positive view of the general breadth of criteria that determines what constitutes R&D for the purposes of the tax credit in Ireland.
- 6.23 It was suggested that there should be further assessment of the merits of allowing social sciences to qualify for the tax credit, and that it should be extended to Clinical Research Organisations.

Definition of Eligible Expenditure

- 6.24 There was also a broadly positive view of the types of expenditure that qualifies for the tax credit in Ireland.

- 6.25 However, a number of submissions expressed concern about uncertainty around additional indirect costs which may be allowable for the credit. It was suggested that additional Revenue guidelines may be preferable to legislation as they allow for more frequent updating in response to innovative R&D developments.
- 6.26 In addition, there was also a call for guidance relating to specific sectors to be issued – e.g. for the gaming industry.

Administration

- 6.27 Some submissions included commentary on the administration of the tax credit. The 2013 Department of Finance review of the R&D Tax Credit has been policy focussed in its entirety and throughout the consultation process the Department of Finance has been clear to point out that the Revenue Commissioners are statutorily independent. However the feedback received, where relevant, has been passed onto the Revenue Commissioners for their consideration.

Other

- 6.28 Several submissions made the case for additional tax supports for R&D, beyond the current tax credit. Many called for the introduction of some version of an innovation/patent box to give a preferential rate of tax for the profits attributable to the end results of R&D carried out in the State (e.g. patents). The case was made that these supports are being introduced in other jurisdictions (such as the UK, Netherlands and Luxembourg) and that Ireland should remain competitive. These elements were not considered as part of the review, but are being considered separately as part of the regular process for Budget 2014.

Case Study

- 6.29 Much of the feedback received reported that the costs involved in R&D are the most important factor, and that the R&D Tax Credit is significant in that regard as it reduces the cost per head/employee of a project.
- 6.30 The following case study has been developed to illustrate the significance of this feature, and is an amalgam of the many case studies and real life examples that were collected as part of the consultation process.
- 6.31 Company A is a multinational firm operating in Ireland for a number of years with over 1,000 employees.
- 6.32 Company A's General Business Processes are illustrated in the following diagram:

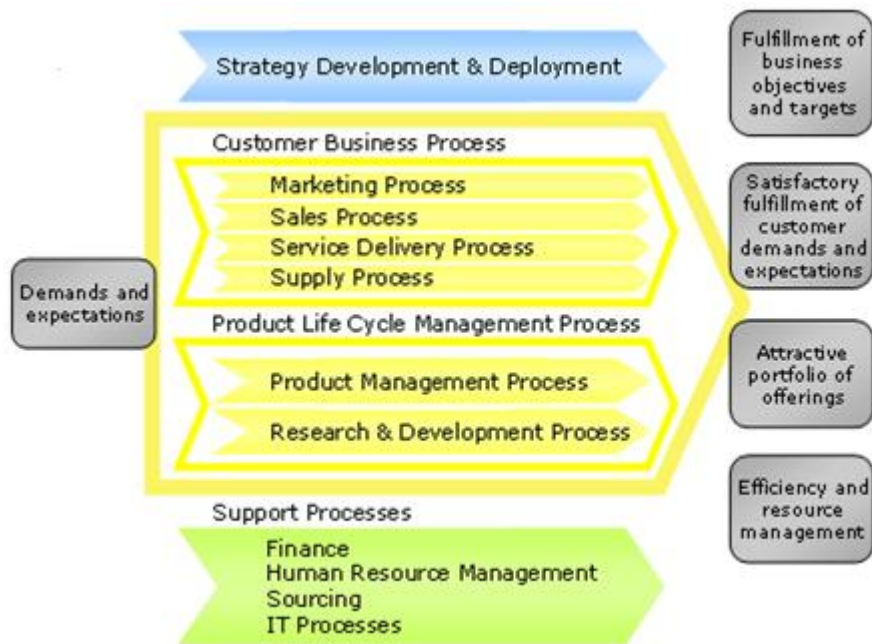


Figure 26: Company A General Business Process

- 6.33 Technology advancement is critical to the success of the business and R&D is therefore of key strategic importance to the group. The group has R&D facilities in several countries other than Ireland, including North America, Asian and mainland Europe and so competes with these and other locations for R&D projects.
- 6.34 In making the decision over the location of R&D projects, the group HQ will consider the following:
- Costs
 - Local Competence Skills
 - Critical Mass
 - Time zone (to support 24 hour activities)
 - Local Sales
- 6.35 When comparing the cost of undertaking R&D across different jurisdictions, the 'above the line' accounting treatment allows the Irish subsidiary to present the cost of conducting R&D in Ireland as 75% of actual cost.
- 6.36 This leads to a situation where, in a comparison of the costs involved in R&D per employee across a number of the groups R&D facilities, the Irish location is in the middle as regards to cost competitiveness. When factors other than this particular cost are considered, Ireland may be viewed as a very competitive location for this firm.
- 6.37 The lowest costs relate to sites in China and India. As these other locations increase their competence levels and capability, it is important that the Irish site remains competitive in the medium term to be able to retain a presence in Ireland.
- 6.38 The ability of the R&D Tax Credit to reduce the comparable costs of the Irish R&D activities 'above the line' has played an important role in helping the Irish site achieve the cost competitiveness. The introduction of the payable element of the credit in Finance Act 2009 has contributed to the ability to account for the credit in this way. The above illustrates how useful that is for firms who seek to bring R&D projects to Ireland.

CHAPTER 7

SURVEY SUMMARY



Department of Finance
Final Report: R&D Tax Credit Survey

Executive Summary

Introduction and Background

Crowe Horwath was commissioned in May 2013 by the Department of Finance to conduct a survey of research and development (R&D) active firms in respect of the R&D Tax Credit. As part of an overall review of the R&D Tax Credit being undertaken by the Department itself, it was decided to undertake a survey of companies active in R&D in order to elicit a body of information that would be of relevance in determining the take-up and effectiveness of the R&D Tax Credit among Irish industry.

The terms of reference were to design and conduct a survey, aimed at R&D active companies that have a presence in the State, based on the guidance contained in the RFT document and to prepare a report that synthesises and presents the findings from the survey.

Crowe Horwath set out a methodology to meet the terms of reference, commencing with project initiation and a review of background information, followed by the design and roll-out of the survey itself. This was succeeded by the analysis phase, incorporating quantitative SPSS analysis and qualitative analysis using NVivo software. Finally, the draft and final reports were developed in conjunction with the Department, setting out all the findings from the survey process.

The survey itself, once the content was agreed with the Department, was developed using online survey software LimeSurvey and constructed as an online questionnaire, allocating individual “tokens” or access codes to the survey to participants. The survey was presented as a series of grouped questions, and included many dependent or conditional questions, only presenting to those who had answered previous questions in specific ways.

Profile of Survey Respondents

- Approximately 1525 valid contacts were invited to participate in the survey. A number of incomplete responses were discarded, resulting in a final dataset of 331 responses, representing approximately 21.7%. Based on our experience, this is a very strong response rate for a survey such as this.
- As set out in the report, 81% (269) of the respondents were active in R&D in Ireland – 103 described themselves multinational firms (39.8%) and 156 as indigenous Irish organisations (60.2%) – and this cohort effectively represents the dataset used for the analysis because those who were not active were eliminated from the survey process at the first stage. A total of 217 respondents indicated that they currently claim the R&D Tax Credit; this represents approximately 14.7% of the total number claiming the R&D Tax Credit according to Department records.

- The dominant economic sectors among the survey respondents are manufacturing (46.1%) and information and communication (23%), with professional, scientific and technical activities and financial and insurance activities also represented well. There are some discrepancies between this sector breakdown and that of the firms claiming the R&D Tax Credit according to Department figures but the overall pattern of the sector profile is similar – dominated by manufacturing and information and communication categories.
- The average turnover figure among survey respondents is €170.4m (this figure is skewed upwards due to a small number of very high turnover figures). The total turnover of all responding firms amounts to €41.7bn. 60% of respondents had turnover of more than €5m in the past financial year, with 15% having turnover of less than €1m.
- The average number of employees in responding firms is 220, ranging from 3 to 4,500. Respondents employ a total of 55,800 employees. More than half of the firms surveyed had fewer than 50 employees, with more than three-quarters employing fewer than 150 employees.
- Multinationals tend towards the higher turnover figures, with 41.6% reporting turnover of more than €50m in the last year, and only 14.6% indicating turnover of less than €5m. By contrast, more than half (55.6%) of the indigenous firms have turnover of less than €5m; more than three-quarters of the indigenous firms (76.5%) have turnover of less than €10m, with only one-quarter (25.8%) of the multinationals having turnover of less than €10m.
- The contrast in organisation size between multinational and indigenous organisations continues when examining employee numbers: nearly half (48%) of multinational respondents employ 150 or more, by contrast to just 10.5% of indigenous firms employing 150 or more. More than two-thirds (68.4%) of indigenous firms employ fewer than 50 people, versus only 21.4% of multinationals. The average employee numbers in multinational firms are 432, by contrast with an average of 88 for indigenous firms, and multinational respondents employ a total of 42,291, with indigenous firms employing 13,378.

Multinational respondent firms are on average larger than the indigenous respondents, both in terms of employee numbers and turnover.

Key Findings

- Firms claiming the R&D Tax Credit, currently or previously, indicate that they have more than 50,000 employees collectively, and on average employ 213 employees.
- More than half of the survey respondents (147 or 54.6%) had received R&D grants from Enterprise Ireland, with a further 46 (17.1%) having received such grants from the IDA. 82.5% of those currently claiming the R&D Tax Credit are also recipients of R&D grants, whilst 62.5% of those who previously claimed the R&D Tax Credit have been in receipt of R&D grants.

Firms whose base year (2003) and 2011 spend could be compared showed overall increases in spending on R&D activities.

We asked respondents about their R&D expenditure in 2003, the base year for the purposes of claiming the R&D Tax Credit and a baseline figure for comparing pre-credit activity. The 2003 spend is dominated by relatively low levels – below €200,000, with more than three-quarters of firms falling into this category. When we asked respondents about their spend in 2011, the last relevant tax year for which claims would have been prepared, we can see an increase in R&D expenditure: the 2011 figures show just over 35% of firms in the same low-spend category, with 37% now spending more than €500,000, by comparison with 13% in 2003.

- 57% of firms who responded (62) indicated there had been changes in R&D expenditure in the years following the first claim for the R&D Tax Credit. When asked to clarify what had changed, 86.9% of those responding to the question indicated that expenditure had increased. It appears that the R&D Tax Credit had an influence on the increased expenditure for the (small number of) firms in question, with 32.7% indicating that it had a greater influence than the R&D grant and a further 30.8% stating that the credit and the grant had the same level of influence.
- The majority (132 or 67%) indicated that have not used and do not intend to use the key employee provision, with only a very small number (7 or 3.6%) having used this to date. Despite a low number of those who have used or intend to use it, there is a large majority of respondents (88 respondents or 72.1%) with a positive view towards the provision. Some negative perceptions in relation to this provision include applicability, difficulty, risk, restrictiveness, and divisiveness.
- 60% of those who answered believe that the firm would have invested less in the R&D being conducted in the absence of the R&D Tax Credit. The perceptions differ between multinational and indigenous firms: e.g. the risk of losing R&D functions to other countries is high for multinationals, whereas more indigenous companies indicate that they might have undertaken less risky R&D.
- The most common R&D activities were experimental development (124 respondents or 46.1%), mixed activities (109 respondents or 40.5%), and applied research (95 respondents or 35.3%).
- Strengths of the general R&D environment in Ireland included State supports, corporation tax rate, links with third-level institution, Ireland's overall attractiveness, and the qualified and skilled workforce.
- Weaknesses included the difficulties in recruiting and retaining skilled staff, complexities in support structures, restrictions in relation to the tax credit, current economic climate, high costs, and infrastructure issues.
- Nearly half of respondents (49.8%) have R&D links with third parties, with 30.5% of respondents indicating that such links were with third-level institutions in Ireland.
- A total of 82 firms (30.4% of the total cohort) gave details of outsourcing above 0%. The average amount of R&D activity outsourced is 13.8%, with a range from 0% to 85% in terms of how much is outsourced.

More than half of respondents believe that the firm would have invested less in the R&D being conducted in the absence of the R&D Tax Credit.

Most of the firms who have won R&D projects to Ireland in competition within a wider global group believe that the R&D Tax Credit played a part in their win

We asked respondents if they had to compete at times for R&D investment/projects within the wider global organisation. 74 or 31.1% indicated that this was the case. We then asked these respondents if they had ever lost an embedded R&D project to an overseas location: just over half of whom had lost such an investment. They were also asked if the Irish base had won R&D projects within the wider group; out of the 56 responses, three-quarters (75% or 42) had done so, and of those 33, or 84.6%, responded that the R&D Tax Credit had played a part in their win.

- More than one-third (103 or 38.3%) of respondents indicated that there had been no impact on their R&D activity following the economic downturn, with nearly 15% (40) stating that there had been an increase in R&D activity since the downturn. 21.9% (59) reported a reduction in activity, and 27.5% (74) reported a change in nature or focus of R&D activity
- Just under half of the individual respondents (47.2%) held responsibility for R&D financing currently, with 41.6% currently responsible for R&D decision-making.
- When asked for overall comments on the R&D Tax Credit, the following were the key themes:
 - Positivity: the most prominent theme arising from the responses was positivity towards the R&D Tax Credit and strong support for the scheme;
 - There are concerns regarding the outsourcing, key employee, and base year provisions;
 - Improvements suggested focus on simplifying the processes and bringing the criteria into line with the grant regime.

The most prominent theme arising from the free-format opinion responses was positivity towards the R&D Tax Credit and strong support for the scheme

CHAPTER 8

INTERNATIONAL COMPARISONS

- 8.1 The following is a summary of the findings of a significant body of research that was undertaken in the Department of Finance over the summer of 2013.
- 8.2 This report compares the Irish R&D Tax Credit with the tax policy supports for R&D that exist in a number of developed economies across the world. It then draws conclusion on the basis of this research, in order to form the policy conclusions of the review which are contained in chapter 1.
- 8.3 The purpose behind the international comparison is to ensure that the Irish regime is:
1. Competitive
 2. Best practice
- 8.4 The overall results of the research show that there is no such thing as a perfect one-size-fits-all tax incentive to suit all countries and firms, and that each country has tried to tailor their tax incentive in order to follow their overall government policy in relation to R&D and industrial development. The extent to which they are able to do so is impacted by a number of factors including the size of the country, type of R&D they want to incentivise, money available, political system, and their international obligations.
- 8.5 On individual factors of the tax supports, the research finds that the Irish tax credit compares very favourably with similar regimes internationally. This is both in terms of the competitiveness of the Irish offering, as well as following best practice internationally.

Introduction

- 8.6 Internationally, it is widely accepted that private firms undertaking Research & Development ('R&D') is good for the economy, that government involvement is necessary to encourage this behaviour, and that such intervention is justified as a means to stimulate economic growth.
- 8.7 Despite the budget challenges faced by countries globally, most countries have maintained or increased their focus on supports for innovation, including R&D. Given the current global economic challenges, this area is therefore becoming increasingly competitive.
- 8.8 Appreciating the role that Corporation Tax policy in Ireland plays in attracting FDI, it is therefore important to take stock of what other countries are doing in this area. There is a need to ensure that the supports in Ireland are competitive internationally, and identify if any modifications should be made to this end.
- 8.9 There is also a need to identify what is considered 'best practice' for tax policy: thus ensuring the effectiveness of the Irish policy objectives, as well as value for money from an Exchequer perspective.
- 8.10 Broadly speaking therefore this international comparison has looked at:
- Competitiveness of measures
 - 'Best Practice'
- 8.11 This section of the review has focussed on the area of government intervention in the field of innovation, and has identified the different means by which governments in other countries support R&D. A number of different tax incentives have been identified. It is important to note that, different countries select a combination of policy tools to make-up their overall policy support for R&D. The choice between these different options, and the combinations adopted reflect how other regimes customise and target their incentives for R&D.
- 8.12 It is also worth reflecting on the reasons why governments tailor their R&D incentives. This will likely be impacted by a number of factors, including the size of the particular country, the type of sectors they seeks to support and the size of firms they seek to incentivise. The aim of their overall economic policy will also likely be influential – e.g. does it seek to attract foreign direct investment, to support indigenous firms or remain neutral. To give an example, according to the OECD³⁸ close to half the world's R&D expenditure is accounted for by only around 700 multi-national firms. This may well account for the fact that some countries give greater incentives to larger firms, as they try to attract them to their country. However, another country may make the choice to focus on domestic firms, for political as well as economic reasons.
- 8.13 Differing domestic economic factors and considerations mean that there are inherent difficulties in a comparative piece such as this, as it is extremely difficult to compare like-for-like across a broad range of countries. In attempting to do so in a meaningful way, the following analysis has focused primarily on comparing the most fundamental components of tax incentives for R&D, and in the conclusion has also attempted to look at the appropriateness and competitiveness of the Irish tax credit in its entirety.

³⁸ <http://www.oecd.org/science/sci-tech/41090260.pdf>

- 8.14 In addition, what follows includes reference to some points that were raised in the submissions received by the Department as part of the review, and summarised in Chapter 6 and, where appropriate, has attempted to address them.

Important Notice

- 8.15 The details contained in this section of the review are a summary of the detailed research undertaken and are intended to provide a general guide only. It is not intended that they in any way be read as a criticism of the policies in place in other jurisdiction: the purpose of this report is to serve as a basis for framing policy options in relation to Ireland only.
- 8.16 Despite best efforts, this section of the report should not be taken as a definitive statement of the R&D tax incentives available globally. This is not an exhaustive list of all the details of particular regimes and the absence of any particular information should not be taken to mean that they do not exist, merely that they did not feature in our research.
- 8.17 It should be noted that what follows is based on a number of sources (see bibliography at Annex 1) and so will each piece of data collected will not necessarily have an individual reference.
- 8.18 The information contained in this analysis is based on the best and most up-to-date information available to the Department as of July 2013. The establishment of the reliability of the sources by reference to other evidence was not sought. The information contained herein should not be used as a substitute for external professional advice.
- 8.19 Any quotations or external references to this report shall require the express consent of the Department of Finance.

Research Findings: General Options

- 8.20 Based on the research undertaken, the different supports may be categorised broadly by reference to the actual policy tool: namely using the tax code, or by providing direct funding. The tax supports are then sub-categorised by reference to the basis and point in time that the support is given: either expenditure based, which typically is given before or during the R&D process; or income based, which is typically given in respect of income arising post R&D.

Tax Incentives

Front End, Expenditure Based

- 8.21 This type of incentive applies in the years when firms are undertaking the actual R&D and compensate them for the costs they have incurred as a result of undertaking this activity. The amount of funding available with this approach is typically demand lead, and dependent on the amount of R&D that is undertaken.
- 8.22 Basic, Enhanced Deduction
This method allows a firm to deduct the amount that they have spent on specified and defined R&D activities, from their tax computation in a specific period of time - most commonly from their Corporation Tax ('CT') computation. The value of the relief is measurable typically by reference to the rate of CT that would otherwise be

due to be paid. For example, Brazil gives a super deduction equal to 160% of the total amount of R&D expenditure in a year.

8.23 Tax Credit

This method allows a firm to reduce the amount of CT they are due to pay, based on a specified percentage of the amount that they have spent on defined R&D activities. For example, Austria's tax credit gives 10% off the amount of CT that is otherwise due to be paid in a given year.

Back End, Income Based

8.24 This type of incentive relates to the income generated from the results of the R&D activities – namely the Intellectual Property created

8.25 'Patent Box' (also known as 'innovation box')

This is a type of tax incentive that provides a reduced corporate income tax rate for certain defined income arising from the exploitation of Intellectual Property ('IP'). The reduced rate is typically arrived at through a deduction or the exemption of qualified IP income (such as royalties). The types of intellectual property that may qualify typically include patents, designs, and copyrights. They may also include additional intangibles that are the result of approved R&D activities. The special treatment and resulting lower rate typically also applies to acquired IP and there are few restrictions on the location of the R&D that resulted in the qualifying IP activities.

Direct Funding

8.26 This relates to direct funding by government to firms towards the cost of R&D activity. This includes grants and other forms of aid as well as loans or direct equity investments. The amount of funding available is typically well-defined.

Other

8.27 There are other types of incentives, such as the granting of capital allowances (expenditure based) or the granting of tax holidays (during which lower or nil income taxes are applied). However they did not form part of the analysis for the purposes of this review.

8.28 The comparative study contained herein has focussed mainly on front end expenditure based tax incentives. It has concentrated particularly on tax credits for R&D, but has also looked at some other methods which allow a current rate reduction, such as the basic and super deductions for R&D expenditure.

8.29 The following table summarises the countries which were examined at and broadly the types of incentives that they have for R&D³⁹:

³⁹ The countries examined at in detail were: Australia, Austria, Belgium, Canada, France, Hungary, Israel, Portugal, Singapore, South Korea, Spain, UK and the US.

Types of Tax Incentives				
Country	R&D Tax Credit	R&D Super Deduction	Reduced Rate	Income Exemption ⁴⁰
Australia				
Austria				
Belgium				
Brazil				
Canada				
China				
Czech Republic				
France				
Hungary				
Germany				
India				
Ireland				
Israel				
Japan				
Luxembourg				
Mexico				
Netherlands				
Portugal				
Puerto Rico				
Russia				
Singapore				
South Africa				
South Korea				
Switzerland				
Spain				
Turkey				
UK				
US				
Table # Source: Various: See Bibliography at Annex 1				

- 8.30 The research focussed mainly on developed countries. 19 are members of the OECD, 7 are in the G8 and 12 are Member States of the EU.

General Observations

- 8.31 The research identified that there is no such thing as a perfect one-size-fits-all tax incentive for R&D that would suit all countries and all firms. Instead, this section

⁴⁰ Including patent/innovation box

has extrapolated what makes policy in relation to tax incentives appropriate for individual tax systems and therefore ensures value for money for taxpayers.

- 8.32 The operation of the single market has an impact on the tax incentives for countries that operate within the EU/EEA. The EU rules on State Aid restrict such country's ability to fully capture the benefit of their tax incentives. A clear example of this can be seen in relation to the approach to outsourcing.
- 8.33 There may be a general limitation on the benefits of having a tax credit in a jurisdiction with a relatively low headline rate of Corporation Tax, such as Ireland. From a firms' perspective, it may be logical to put their high cost activity (such as R&D) in jurisdictions where they are subject to a higher rate of tax. That is because the deduction for that expenditure before their taxable profits is therefore of greater value. This may well illustrate that in order for a tax incentive to be of value in an already competitive Corporation Tax environment, it is important that it is of the highest standard. This serves to reinforce the importance of this international comparison.

Research Findings: Elements of Expenditure Based Regimes

- 8.34 What follows is a dissection of some selected components of the tax incentives for R&D. There is a particular focus on those that apply to tax credits, but not exclusively so. A later section analyses how the whole of Ireland's tax credit for R&D compares internationally. It is important to be cognisant that much of the benefits a regime will flow from this overall support, and not necessarily the individual components.
- 8.35 The following elements have been identified for comparison:

Rate

Scope: Eligible Activity: Definition of R&D and Location of R&D

Scope: Qualifying Expenditure: Direct and Indirect

Transferability of Incentives

Rate

- 8.36 The following table summarises the rates of tax credit which are applied in the countries surveyed:

Country	Headline CT Rate	Applicable Rate	Conditions for Rate
Australia	30%	45%	Turnover < €13.5m
		40%	Turnover > €13.5m
Austria	25%	10%	General Rate, no cap
Belgium	33.99%	15.5%	Converted from deduction
		22.5%	Total depreciation of R&D expenditure
Canada	11-31%	15%	General Rate
		35%	First €2m, for small Canadian-controlled companies
France	34.43%	30%	First €100m
		5%	Amounts over €100m

		40% & 35%	First time claimants, 40% year 1, 35% year 2
Hungary	10-19%	8-15%	Investments over €340,000
Ireland	12.5%,	25%	Expenditure over 2003 base year The first €200,000 of expenditure qualifies without reference to this base year
Portugal	25%	32.5%	General Rate
		42.5%	SMEs, certain circumstances
		50%	Incremental, amount that exceeds average amount spent in previous 2 years, max €1.5m
Puerto Rico	20-30%	50%	General Rate
South Korea	11-24.2%	25 or 50%	SMEs, Greater of 25% of current year expenditure OR 50% incremental versus average spend over previous 4 years
		30%	SMEs, current year expenditure, if government approved
		7%	SMEs, purchase of defined IP from Korean resident
		3% or 40%	Non-SMEs, greater of 40% incremental versus average spend over 4 years OR 3% current year plus additional rate, capped at 6%
		20%	Non-SMEs, current year expenditure, if government approved
		10%	Investment in R&D plant & machinery
Spain	30%	25%	General Rate, subject to an overall limit: if amount of R&D expenditure > 10% tax due, credit limited to 50% gross tax due, if <10%, then may offset 25% of tax due
		42%	Additional, incremental versus average spend in previous 2 years (same limit as above)
		17%	Wages paid to dedicated R&D researchers (same limit as above)
		8%	Investment in fixed assets (excluding real estate) (same limit as above)
		12%	Research activities that result in technological innovation, capped at €1m for licences & patents (same limit as above)
UK⁴¹	23%	24.75%	Applicable to SMEs in loss making position only
US	15-35%	20%	Incremental versus base amount (min 50% of current year expenditure)
		14%	Simplified incremental versus 50% of the average expenditure in previous 3 years or 6% if no such spend

Table 5
Source: Various: See Bibliography at Annex 1

8.37 There is a considerable variation in the rate given for R&D Tax Credits – from 7% to 50%. Most countries have a general rate within the 10-30% range. Only 2 have a single rate applied with no restrictions.

⁴¹ The UK has a super deduction for large companies

- 8.38 Based on the above, the tax credit worth 25% in Ireland looks favourable, especially when compared with other European countries as well as countries that apply only one general rate.
- 8.39 It is also clear from the above table that many countries have more than one rate, and that most seek to qualify the rates that apply in some way⁴². According to the research this was typically by reference to:
- the size of the company (based on turnover or other definitions of a Small or Medium sized Enterprise 'SME')
 - the type of the company (start-up, 'innovative' etc)
 - ownership of the company (whether foreign or domestic)
 - the amount of times a company has availed of the credit
 - the amount of expenditure incurred:
 - incremental spend over a base period of time
 - a cap on expenditure that can avail of a rate
 - a minimum amount of investment
 - the type of expenditure incurred (in some cases a different rate applies to wages, equipment, patents)
 - the trading position of the company (e.g. loss making)
- 8.40 The above qualifications illustrate how different countries seek to target their tax credit. Applying different rates may be useful as a means to support different firms by reference to their size, sector or industry they operate in as part of an overarching government policy, or to control the costs of their tax expenditures.
- 8.41 Ireland has an incremental approach by reference to the amount of expenditure in 2003. Only expenditure that is greater than the amount spent in 2003 is eligible for the 25% rate, and only the first €200,000 spent on R&D in a given year is eligible for the tax credit without reference to the base year criteria. The approach in Ireland effectively requires a minimum amount of spend for companies who performed R&D in 2003 and a single, general rate for all other companies.
- 8.42 Many of the submissions received referred to how the Irish regime is out of step by having an incremental approach, when most countries adopt a full volume basis. Based on this research, nearly all countries set out conditions for the application of different rates⁴³. With regard to the type of conditions applied, Ireland is also not an outlier in adopting an incremental approach as the tax credit in Spain, the US and South Korea is based on incremental expenditure. It is notable that the incremental approach in these other countries appears more complicated than that in Ireland.

Scope : Eligible R&D Activity

- 8.43 The definition of what actually will be deemed to be Research & Development ('R&D') for the purposes of tax incentives is an important factor in determining availability and applicability, aside from the ways that countries qualify the rate that applies..

⁴² This qualification is separate to the different definitions of what constitutes R&D for the purposes of the tax incentives, which are considered later in this section.

⁴³ Only Austria, Canada, Portugal and Puerto Rico have a general rate applicable to all firms.

Definition

- 8.44 Most jurisdictions broadly rely on the definitions of eligible activity as contained in the OECD Frascati Manual⁴⁴. This relates, broadly to basic research, applied research and experimental research and requires “an appreciable element of novelty and the resolution of scientific and/or technological uncertainty”⁴⁵.
- 8.45 Generally, differences arise in how countries interpret and apply these standards to their applicable tax incentives.
- 8.46 The following table summarises the approach to the definition of R&D in the countries researched:

Country	Definition
Australia	Experimental activities, outcome cannot be determined in advance, based on current knowledge, information & experience, conducted for the purpose of gathering new knowledge
Austria	Frascati, basic and applied research
Belgium	No specific definition, though refs to Frascati, Requires advance approval - innovative on Belgian market & no negative environmental impact
Canada	Advance the understanding of scientific relation or technologies, address known scientific or technological obstacles & incorporate a systematic investigation by qualified personnel
France	Frascati, advancement, uncertain, scientific
Hungary	Cion Regulation (EC) no 800/2008
Ireland	Frascati, systematic, investigative or experimental activities, science or technology, basic, applied and experimental development
Spain	acquiring new knowledge & understanding in science & technology, development is application of results of research
UK	Frascati, advance in science or technology, resolution of uncertainty
US	Technological, to eliminate uncertainty, relating to function as opposed to cosmetic, involves a process of experimentation
Table 6 Source: Various: See Bibliography at Annex 1	

- 8.47 The following table summarises the approach to activities that are explicitly included or excluded as being defined as R&D for the purposes of the tax incentives⁴⁶ :

Country	Explicitly Included	Explicitly Excluded
Australia		Software development on internal processes

⁴⁴ http://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002_9789264199040-en

⁴⁵ At p34

⁴⁶ Note: a blank box should not be interpreted as meaning that such regimes do not have any exclusions, just that they did not feature in the research

Austria	Software development	
Canada	Experimental development, applied research	
France	Basic research, applied research, development activities, technological innovations	
Hungary	Basic research, applied research, experimental research	
Ireland	Natural Sciences, Engineering & technology, medical science, Agricultural Sciences	
South Korea	Manpower training, development of technology (e.g. trademarks) for company	
Spain	Software development, substantial improvement of existing methods	
UK	technological innovations which lead to intangible assets like copyright, production know-how	
US	Software, with an additional test	
Table 7 Source: Various: See Bibliography at Annex 1		

8.48 Most countries rely on the standards set out by the OECD Frascati Manual which has meant that the focus internationally is mainly on science and technology. There are also differences in relation to the inclusion of R&D carried out to improve existing products, systems or processes, which Ireland allows generally.⁴⁷

8.49 From the research undertaken, it is clear that subtle differences arise as to what constitutes R&D, even when using an OECD framework for definitions. All countries and regimes encounter complications when trying to manage the parameters of where science and technology meet tax legislation. This is unsurprising, given that innovative activity is cutting-edge by its very nature and a constantly evolving process. It is therefore notable that all countries encounter the same challenge in this area.

Location

8.50 The following table summarises the approach to the location of R&D in the countries researched:

⁴⁷This relates to 'appreciable' improvements where they seek to achieve scientific or technological advancement and involve the resolution of scientific or technological uncertainty

Country	Location of R&D restricted to country (or EU/EEA as applicable)
Australia	Yes
Austria	Yes
Belgium	Yes
Canada	Yes
France	Yes
Hungary	No
Ireland	Yes
Portugal	No, so long as benefit accrues to Portuguese company
Singapore	Yes
South Korea	Yes
Spain	Yes
UK	No, but benefit must accrue to company subject to UK CT
US	Yes
Table 8 Source: Various: See Bibliography at Annex 1	

- 8.51 Most countries seek to ensure that the R&D must be carried out within their country⁴⁸. A number of EU countries only limit the R&D to within the EU/EEA, presumably because of the operation of the single market.
- 8.52 Considering the economic rationale behind such tax incentives, it is perhaps not surprising that countries would therefore seek to fully capture the benefit of the tax incentive.
- 8.53 From the above it is clear that Ireland is in step internationally in relation to the location of the R&D being carried out in the State or EU/EEA as applicable.

Scope : Qualifying Expenditure

- 8.54 Aside from the definition of what actually constitutes R&D, differences arise in relation to the treatment of the expenditure incurred by companies carrying on R&D, and whether or not it qualifies for the tax credit.
- 8.55 The types of expenditure that qualify for tax incentives have been looked at under the following headings:
- Direct
 - Indirect
 - Outsourced

⁴⁸ Consideration is given later in this chapter to the rules around the amount of outsourcing that qualifies as expenditure.

Direct

- 8.56 This relates to expenditure directly related and attributable to eligible R&D activities, e.g. the cost of direct labour and materials.

Indirect

- 8.57 This relates to overheads also still attributable to R&D activities, though not directly incurred – e.g. office space, light and heat.

- 8.58 The following table summarises the general approach to direct and indirect costs.⁴⁹

Qualifying Expenditure		
Country	Included	Excluded
Australia	Direct costs - staff costs Indirect costs directly related to core activities	Building costs, interest payments
Austria	Capital investment, cost of finance, overheads, leasing	
Belgium	Direct costs - wages & salaries, Some indirect costs - overheads, depreciation	
Canada	Direct costs Indirect costs	Capital expenditure on property, lease payments, overheads restricted to 55% of salary costs
France	Direct costs - staff costs	Indirect costs limited to 75% R&D staff costs, materials
Hungary	Direct costs - wages, equipment, materials	
Ireland	Direct costs – wages, materials Indirect R&D costs - Royalties, plant & machinery, capital expenditure including buildings, overheads	
Portugal	Directors costs, direct wages for R&D (capped at 90% for non-SMEs)	Buildings, Land (from 50% rate)
Puerto Rico	Direct costs Indirect - Capital Expenditure	
South Korea	Labour, materials, rent for R&D equipment, training costs	R&D service companies
Spain	Direct costs - wages, investments	Indirect costs Supplies
UK	Direct costs - wages, power, materials Fees to volunteers in clinical trials, 65% of payment to staff provider for R&D staff (directly)	Capital expenditure, land, patents, patent protection
US	Direct costs - wages, supplies	Capital, overheads
Table 9 Source: Various: See Bibliography at Annex 1		

⁴⁹ Note: a blank box should not be interpreted as meaning that such regimes do not have any exclusions, just that they did not feature in the research

- 8.59 All the countries researched generally allowed direct expenditure for R&D activities to qualify for the credit, with some exceptions for materials and supplies. Ireland allows all direct costs to be included.
- 8.60 Many countries do not include indirect expenditure. Of those that do, there are also restrictions such as in France who exclude the cost of materials and limit indirect costs to 75% of staff costs. Australia also limit indirect costs to include only activities directly related to core activities. Capital expenditure was excluded in some circumstances, and few countries allow expenditure on land or buildings to qualify.
- 8.61 Ireland allows many indirect costs so long as they are incurred “in the carrying on of R&D”, including buildings and so performs well by international standards in this area.

Outsourced

- 8.62 This is expenditure incurred by entering into an outsourcing arrangement with a third-party who undertakes R&D on behalf of the company claiming the credit. It includes subcontractors. This is a supplementary exception to the rules discussed above relating to the location of the R&D activity generally.
- 8.63 The following table summarises the approach firstly as to whether or not outsourcing is allowed generally, and any applicable limits that apply:

Country	Subcontracting	
	Allowed	Limits
Australia	Yes	Must be within Australia ⁵⁰
Austria	Yes	Must be within EU / EEA, max amount allowed to be claimed is €100k
Belgium	Yes	If outside Belgium, must retain associated IP in Belgium
Canada	Yes	80% of total costs, capital expenditure not allowed, only 10% of total salary claimed can be outside Canada
France	Yes	Within EU / EEA, cap is €10m OR 3 times all other qualifying expenses, limit €2m if a related entity
Hungary	Yes	So long as not provided by another Hungarian entity
Ireland	Yes	10% of total qualifying expenditure, additional 5% if to universities, or €100k if greater
The Netherlands	No	
Portugal	Yes	Only 55% of wages of R&D personnel
Puerto Rico	No	
Singapore	No	
South Korea	Yes	Directly related to R&D, If to an academic institution must be in South

⁵⁰ There are some very restricted situations when it can be carried on outside Australia

		Korea
UK	Yes	SMEs allowed 65% of costs, large comps only universities, charities
US	Yes	65% contract labour only
Table 10 Source: Various: See Bibliography at Annex 1		

- 8.64 Nearly all the countries reviewed allow some degree of expenditure for outsourcing to be eligible for their tax incentive. It is notable, however, that no country allows an unlimited allowance for outsourcing, and some of the allowances referred to above relate only to certain rates of relief and do not apply across the board.
- 8.65 The inclusion of expenditure on outsourcing is qualified by a broad variety of factors including:
- the location of the activity
 - the location of the beneficial owner of the results of the R&D (Intellectual Property)
 - an overall cap on the total amount allowed
 - the amount of outsourcing allowed by reference to overall expenditure made domestically (e.g. 80% of total costs)
 - the type of outsourced expenditure (e.g. labour costs)
 - the type (size) of the company who is outsourcing
 - the type of institution who is being outsourced to (e.g. academic institution)
- 8.66 Ireland is not alone in having a limit on the amount of outsourced expenditure that is allowable for the tax credit. Most countries seek to limit the location of the outsourcing to within their own countries borders, or the EU/EEA as applicable. It is notable that Ireland allows the outsourcing to take place anywhere in the world.

Transferability of Incentives

- 8.67 The flexibility around how a company is able to use the benefits that arise from tax incentives for R&D varies across different regimes. Broadly speaking, companies may be allowed to do the following with any benefits of the incentive that they are unable to utilise fully:
- carry any unused benefit forward against a future tax liability
 - carry back unused benefit to off-set a past tax liability
 - to get a refund equal to the amount they that would otherwise be relieved in the event that there are no such liabilities to be offset
- 8.68 The following table summarises the approach in the countries:⁵¹

Country	Refundable	Carry Forward	Carry Back
Australia	If turnover < €13.5m	Yes	No
Austria	Yes		
Belgium	After 5 years	Indefinitely	
Canada	For small Canadian-controlled companies only & if not foreign controlled, capped at 40% of annual capital expenditure	20 years	3 years

⁵¹ Note: a blank box should not be interpreted as meaning that such regimes do not have any exclusions, just that they did not feature in the research

France	After 3 Years (General), immediately for SMEs, new companies, companies in financial difficulties	3 years	
Hungary		10 years	
Ireland	Yes, limited to 2 years worth of payroll liabilities or CT liability of previous 10 years	Indefinitely	1 year
Portugal		6 years	
Puerto Rico		No, but can be sold	
South Korea	No	5 years	No
Spain	No	18 years	No
UK	For SMEs in loss making position only	Indefinitely unless change in ownership/trade	No
US	No	20 years	1 year, 5 for SMEs
Table 11 Source: Various: See Bibliography at Annex 1			

- 8.69 Another example of the particular flexibility of the Irish scheme is the 'key employee' provision which allows the benefit of the tax credit to be transferred to a defined employee of the company.

The approach in Ireland with regard to how the benefit of the tax credit may be transferred is clearly very competitive. This was further supported by the response to the public consultation.

8.70 Research Findings: Ireland

Ireland: Profile

Headline rate of Corporation Tax ('CT') is 12.5%.

Ireland has a tax credit for R&D with a 25% rate. There is also a basic trading deduction for R&D expenditure, which brings the total value of the tax support for R&D to 37.5%.

This rate applies incrementally by reference to the amount spent in the 'base year' of 2003. This effectively requires a minimum amount of spend for companies who performed R&D in the State in 2003 and a single, general rate for all other companies.

The tax credit can be carried back one year and carried forward indefinitely.

Where there is no CT liability to be relieved, the tax credit is refundable from the year claimed. These refunds are payable in instalments over 3 years and are limited by reference to CT liability over the previous 10 years, or 2 years' worth of payroll taxes.

The definition of qualifying R&D comes from the Frascati Manual and includes basic, applied and experimental research. The definition is broad and is not limited to a particular sector or size of firm, but generally includes Natural science, Engineering technology, medical sciences and agricultural sciences.

Qualifying expenditure is broad and includes direct costs and indirect costs so long as they are incurred in the carrying on of R&D. It includes royalties, wages, supplies, plant & machinery. It also includes capital expenditure on buildings.

Outsourcing may take place anywhere in the world, but is limited to 10% of the overall eligible expenditure allowed with an additional 5% allowable for third level institutions.

There is no restriction on the location of any IP generated from the R&D carried out.

The taxpayer must apply for the credit within 9 months of the year end (with the annual CT return).

Ireland: International Comparison Summary

8.71 In general, the R&D Tax Credit in Ireland compares very favourably internationally.

This paper has already discussed how the individual components of tax incentives compare, and can be summarised as follows:

Ireland: Report Card			
Rate		The 25% rate performs well especially when compared with other European countries and countries that apply only one general rate. Ireland is no different from the vast majority of countries in seeking to set conditions for the rate to apply. Ireland is not alone in having an incremental approach, and indeed the Irish method is more straight-forward than most other countries.	✓
Scope: Eligible Activity	Definition of R&D	Ireland is broadly in line internationally, but in addition allows improvements to existing products, systems and processes.	✓
	Location of R&D	Ireland is in step internationally by generally requiring that the R&D be carried out in the State (or EU/EEA).	✓
Scope: Qualifying Expenditure	Direct	Ireland follows the broad international norm to include all direct costs of R&D.	✓
	Indirect	Ireland is one of a smaller number of countries who allow indirect costs to be included. In relation to capital expenditure on buildings and land, the Irish regime is one of the few countries who allow this expenditure to be eligible.	✓
	Outsourced	Ireland follows the international standard by having a limit on the amount of expenditure for outsourcing. The fact that the outsourcing can take place anywhere in the world is particularly favourable.	✓
Transferability		Ireland is one of the few countries that allow the benefits to be carried forward indefinitely, and to be carried back for one year. It is also one of the few countries that allow the incentive to be paid in cash (refunded), and further most countries set criteria for such payment.	✓
Additional Comments: The Irish system performs very strongly when compared with the approach taken in other jurisdictions. It does not seem unreasonable to refer to the Irish tax credit as 'best in class' internationally.			

8.72 The individual components of the R&D Tax Credit in Ireland perform very well in a comparison with the alternative approaches adopted in other jurisdictions. Ireland is particularly competitive in relation to the scope of qualifying expenditure and how companies are able to transfer and utilise the benefits afforded by the tax credit.

8.73 The Irish R&D Tax Credit at least matches the international standards set for certain components and for a significant number of others is among the most favourable. Therefore, looking at the R&D Tax Credit as a whole, when benchmarked against

the entirety of the tax incentives in other jurisdictions, Ireland is clearly extremely competitive.

- 8.74 As discussed at the start of the international comparison, this report has also attempted to look at what is 'best practice' in relation to tax policy.
- 8.75 The core elements that make up the Irish regime (i.e. the nature of the incentive, the rate, the activity and the type of expenditure allowed) are relatively straightforward. This is a major strength as it means it is very accessible and understandable.
- 8.76 The fact that the tax credit is available to all corporate tax payers operating in the State is a clear asset as it may apply regardless of the size of firm or sector in which they operate. This is important: as a small nation with an open economy, the policy in Ireland is to encourage any type of firm to innovate and perform R&D, regardless of sector or industry. So while it may appear that the incentive is not as targeted as the approach in some other countries, it is in fact a deliberate policy choice and is consistent with the overall corporation tax strategy. This approach keeps the Irish regime competitive for firms of all sizes, industry and origin.
- 8.77 All countries seek to tailor their tax incentives and it is important to emphasise that all the countries have set limits on their tax incentives in order to ensure that their domestic economy captures the benefits as far as possible. Ireland is no different in this regard, and on the whole has relatively few qualifications by comparison. Those that exist are very much in step with the rationale in other countries as Ireland seeks to capture the benefit of the tax credit by targeting employment (e.g. restriction on the payable credit by reference to payroll) or to managing the cost (e.g. base year).
- 8.78 Managing the costs of incentives for R&D is also particularly important from an Irish perspective, given the size and location of the state and the economic challenges it poses. The policy mix in Ireland has favoured a demand driven approach with regard to the allocation of resources, but concentrating mainly on tax incentives that are expenditure based in order to ensure the maximum amount of return from the state support.

Conclusion

- 8.79 It is clear from this analysis that no one system could be called 'perfect' and that relative competitiveness will depend on the type of firm or R&D activity they are trying to incentivise. Further, there are many complicating factors when comparing regimes across a broad range of countries with economies of various sizes and policy focuses. Despite this, the research conducted has found that on the most basic comparison, Ireland's regime is extremely competitive internationally.

That the Irish system is able to do this while also conforming with best practice in relation to tax policy is also noteworthy, as demonstrated by how it is consistent with the overall government strategy relating to the transparency and openness of our economy.

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Chapter 8

It should be noted that the information contained in this analysis is based on the best and most up-to-date information available to the Department at the time.

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Sráid Mhuirfean Uacht,
Baile Átha Cliath 2,
Éire.

Upper Merrion Street,
Dublin 2,
Ireland.

Telephone: (01) 676 7571
URL: <http://www.finance.gov.ie>
<http://www.taxpolicy.gov.ie>
Email: webmaster@finance.gov.ie
Twitter: @IRLDeptFinance