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**Master in Innovation and Technological
Entrepreneurship**

Portuguese R&D Tax Credit Program, SIFIDE II.
How companies use it?

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Dissertation

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Portuguese R&D Tax Credit Program, SIFIDE II. How companies use it?

I dedicate this conquest to my children, Dinis, Afonso and Martim, and to my wife, Marta.

Dedico esta conquista aos meus filhos, Dinis, Afonso e Martim, e à minha esposa, Marta.

Abstract

There is a growing awareness, both in policy makers and the business sector, that Research and Experimental Development (R&D), and Innovation activities are key factors for future economic growth and sustainability. This has led in recent year's countries to adopt support financing programs for such R&D and Innovation activities. The programs addressed to the business sector are of two kinds, direct support (mostly subsidies) or indirect support (mainly tax incentives).

Tax incentives programs have been increasing their relative importance in the total volume of public support to the business sector, over the direct support programs. In OECD and EU countries the tax incentives are applied generally in the form of a tax credit that is calculated with a rate applied to the companies R&D approved expenses.

Portugal has a Tax Credit Program running since 1997, the SIFIDE Program, which had several changes over the years. The current program, SIFIDE II, had its last update in 2014 and is expected to run until 2020.

An analysis of how companies in Portugal use this program was made by the use of the published data of the Portuguese Tax Authority (AT – Autoridade Tributária e Aduaneira) on the SIFIDE tax benefits to companies and by the crossing of this information with the Inquiry about the Scientific and Technological Potential (IPCTN) from the Portugal's Directorate General for Education and Science Statistics (DGEEC).

To understand the positioning of the Portuguese Tax Credit Program with other OECD and EU countries, namely, France, Spain and Italy, a benchmark analysis was prepared and presented in this study.

In a qualitative analysis approach, a set of interviews to some Portuguese companies that use the Tax Credit Program were made and are presented.

In the conclusions, suggestions for improvement of the program and future research guidelines are provided.

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“Learning is the only thing the mind never exhausts, never fears, and never regrets.”

“Aprender é a única coisa de que a mente nunca se cansa, nunca tem medo e nunca se arrepende”

(Leonardo da Vinci)

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Portuguese R&D Tax Credit Program, SIFIDE II. How companies use it?

1 INTRODUCTION

The European Commission R&D and Innovation policy clearly states that “Innovation is deemed to be a major driver of economic growth, employment and competitiveness. This view is reflected in most countries having some form of policy to provide incentive to perform Research & Development (R&D) investments” (European Commission – R&D and Innovation policy).

The Europe 2020 strategy sets as a target “improving the conditions for innovation, research and development” (European Council conclusions 17 June 2010), and for this established as an objective “increasing combined public and private investment in R&D to 3 % of GDP” by 2020 (European Commission, COM2014).

Research and Experimental Development (R&D) are activities that can lead to Innovation. The capability to use the knowledge produced by R&D activities by the business sector in order to develop innovative commercial products, is seen as a fundamental factor for company’s competitiveness, sustainability and business growth.

Government policies in most OECD countries for promotion and support of business R&D activities are divided in two kinds, direct support such as subsidies, or indirect support by tax incentives.

Portugal, as many other EU and OECD countries, uses a mix of direct support programs and a tax credit program as incentives for companies R&D and Innovation activities.

There are in Portugal a variety of R&D direct support programs, each one with a specific objective or addressed to some type of companies or project development stage, which provides some company-program fit.

In the case of the indirect support there is only available the Tax Credit Program, SIFIDE II, to which all kind of companies can submit their projects. This adds to the fact that companies prefer to apply to direct support programs rather than indirect support.

In the present work an analysis was made relatively to the R&D incentives in Portugal with a focus in:

- **The Portuguese Tax Credit Program, SIFIDE II. How companies use it?**

The followed methodology was of determining the “state of the art” by the exploration and analysis of the existing literature on R&D incentives, namely tax incentives. And understanding what activities are generally covered by these R&D support programs.

Next are presented the main R&D direct support programs currently running in Portugal, for setting up their coverage in the business sector.

Entering in the focus of this study, a deeper analysis of the Portuguese Tax Credit Programs is made, by reporting the evolution of the legislation, an analysis of the program execution, a comparison with existing programs in other countries and a qualitative analysis of the program by interviews conducted to companies that use SIFIDE II.

The work is finished with a description of the conclusions.

This dissertation is divided in the following chapters:

- a) **Literature Review** on the subject of R&D incentives – exploration of the OECD data and worldwide scientific published papers;
- b) **Definition of R&D and Innovation activities** – according to international accepted and used definitions, namely by the *Frascati Manual* (OECD, 2015) and the *Oslo Manual* (OECD, 2005);
- c) **R&D and Innovation direct support programs in Portugal** – description of the available direct support programs, and a segmentation of each program according to the type of company it is addressed to and project stage;
- d) **Portuguese Tax Credit Program (SIFIDE II)** – why was it created, description of the program evolutions and implemented changes over time, description of the current program, analysis of the program execution (according to available data) over the period 2010-2015.
- e) **Comparison with other EU and OECD R&D Tax Credit Programs** – benchmark of the Portuguese program with other EU and OECD countries, namely, France, Spain and Italy.
- f) **Interviews with companies** – a qualitative interview to some companies in order to have some feedback about the use of SIFIDE II program.
- g) **Conclusions** – conclusions, suggestions for improvement of the program and future research guidelines are provided.

Specific attention has been given to how these tax credit programs take into account the specificities of SMEs and Start-up's, as well as the way these companies address such programs.

2 LITERATURE REVIEW

The literature review was addressed by focusing in two areas:

- The OECD data, namely the “OECD Science, Technology and Industry Scoreboard 2015: R&D Tax Incentives”;
- Published articles about the subject – a search was made in scientific databases SCOPUS and EBRARY, by using key words such as **SMES, Startup, Tax incentives, Taxation and R&D;**

2.1 OECD SCIENCE, TECHNOLOGY AND INDUSTRY SCOREBOARD 2015: R&D TAX INCENTIVES

The development and innovation in fundamental science still relies mostly on the public sector or public funded institutions, but the development of efforts in order to transform it into new applications is mainly made by the private sector. More than 2/3 of the R&D investment of OECD countries is made by the business sector, and is aimed at knowledge-creating efforts that can result in innovations that transform markets and industries, in the benefit of the society.

According to OECD, in 2013, the gross domestic expenditure on R&D (GERD) was of about USD 1.13 trillion, which represents 2.4% of the total OECD GDP. And business R&D accounts for around 68% of the total R&D performed in the OECD area.

Support to the R&D activities by public sector to firms is assumed as an incentive with the intention to lighten the investments made, shorten the return of the investments and as financing to riskier projects, such as start-up companies.

Government policies worldwide provide a variety of instruments to support and promote business R&D (Research and Development). These incentives can be direct support, such as subsidies or buying R&D services, or by providing fiscal incentives. The tax incentives may be as allowances, credits, or even by advantageous tax treatment like allowing an accelerated depreciation of R&D capital expenditures.

Over the last years there has been a steadily rising number of countries that are giving preferential tax treatment to business R&D expenditures, both in OECD and non-OECD countries. In 2013 OECD statistics, 6.9% of business R&D were supported by direct public funds, and an additional support of 5.2% was given by governments as tax incentives.

Relative importance of tax incentives is increasing when compared to the public direct support on R&D, as shows a comparison of government incentives provided in 2013 and 2016 among 16 OECD countries.

The tax incentives can be accounted broadly as the percentage of tax relief per volume of R&D investment. In OECD countries that offer tax relief, there is a significant variation in the tax

incentives, according to firm size and profitability. OECD average tax subsidy rate are higher for SME's, than for large firms. Tax subsidy rates are about 19% for profitable and of 13% for loss-making SMEs, and of 13% for large profitable firms and of 10% for large loss-making companies. This difference is due to 12 out of the 46 OECD countries that give preferential tax treatment to SME's or young firms, when compared with large companies.

To overcome issues in the more standardized tax incentive types, some countries allow the carry-over of the tax reduction or offsetting payments to the tax authorities, for firms with low or no profits, which is relevant in the cases of new and innovative firms like start-ups. This allows young innovative firms to benefit in the near future from their R&D investments during the developing and launching stages.

Some countries also set limits to the eligible R&D volumes or tax incentives, for controlling the public finances burden and also for a more balanced distribution of the tax benefits.

Attention should also be addressed to countries that present differential treatment applied to SME's and young firms by providing them with more favourable conditions in the tax incentive programs.

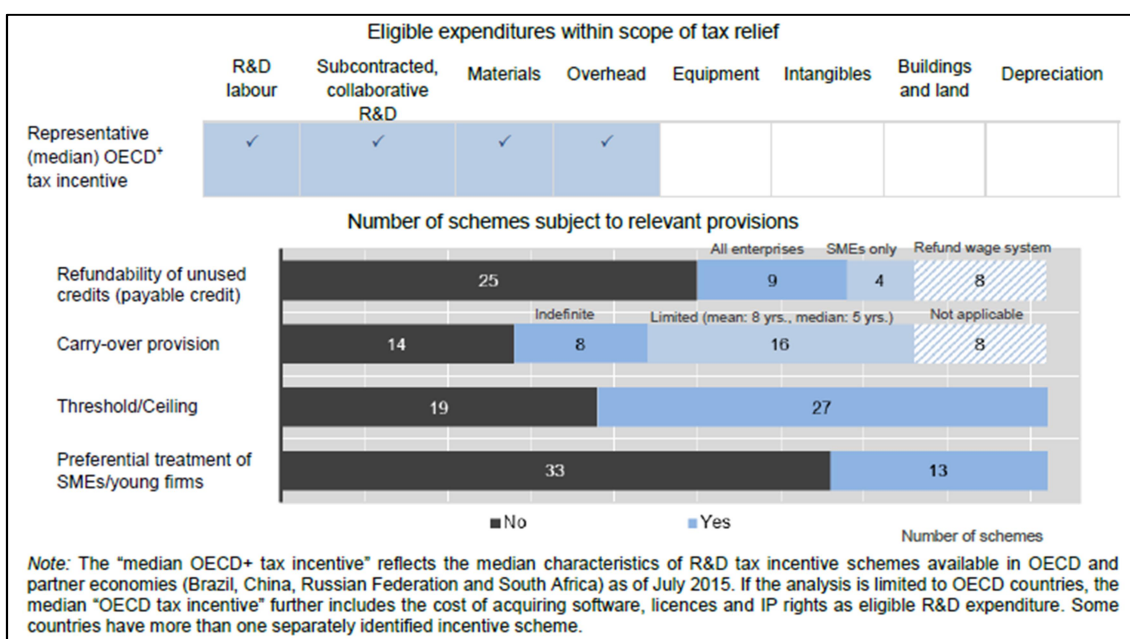


Figure 2.1 - Design of R&D tax incentive relief across OECD and partner economies, 2015
(Source: OECD, Measuring R&D Tax Incentives, 2015)

However the definitions of R&D expenditures eligible to tax benefits do change according to the specific country jurisdiction. Another issue is that the benefit if more focus in the financial costs of R&D to the company, rather than the cost that the firm itself incurred. This may lead to a double benefit, in the case of the firm that has contracted the services and in the company that has performed them.

Tax benefits can be in the form of an allowance, exemption, deduction or credit. The first three forms subtract the benefit value from the tax base before the tax base is calculated. The later one subtracts to the calculated tax value that the firm would have to pay if it did not had the

benefit. So in the case of the tax credit the amount of tax to be paid should be higher than the benefit itself.

In 2015 most OECD countries and partner economies use either a tax credit or a tax allowance.

Some countries target tax credits named as “incremental”, which are given over and above of a pre-defined baseline amount.

Portugal has a hybrid system which offers a volume and incremental tax credit. Other countries such as Spain and Korea also offer hybrid tax credits.

The hybrid system in Portugal has a base rate of tax credit, of 32.5%, applied to the yearly approved R&D activities expenses, and an incremental rate of 50%. The incremental rate is applied only to the difference between the current approved R&D expenditure and the simple average of the two previous years.

The incremental rate is aimed to support companies in their efforts for increasing R&D expenditure.

It is also not unusual to have some incentives that are addressed to some specific firms or types of research. In the Portuguese Tax Credit program SME's can benefit from the following exclusive conditions:

- increase of 15% in the base rate for firms with less than 2 years of existence;
- include expenses with the acquisition of patents for R&D activities.

See Annex 1 Table - Main features of R&D tax incentives provisions in selected OECD and non OECD countries, 2015.

OECD general policy recommendations on the use of R&D tax incentives:

With the available evidence, it is not generally possible to state unambiguously whether some tax relief design features should be recommended in favour or against. However existing evidence can inform national decisions concerning the optimal balance between direct and tax instruments, and can also help assess the trade-offs arising from introducing certain provisions aimed at managing the less desirable features of R&D tax incentives.

In previous work (OECD, 2013a; OECD, 2015d), OECD has made the following recommendations:

- R&D tax incentives should be carefully designed to take into account of heterogeneity among potential R&D performers and the position of “stand alone” firms without cross-border tax planning opportunities, as well as those of young, innovative firms without the profit-generating capacity on which to realise allowances or credits.
- Policymakers should consider balancing indirect support for business R&D (tax incentives) with the use of direct support measures to foster innovation support instrument interact with and complement each other. In some cases, direct instruments may be more appropriate.

- Governments should ensure that R&D incentive policies provide value for money, through effective ex-post evaluation linked to the ex-ante assessment of reforms and new initiatives.
- The effectiveness of R&D tax incentives depends upon the broader regulatory environment, in particular the broad taxation regime, and its stability and predictability over time.

2.2 STUDIES ON R&D POLICIES AND PUBLIC SUPPORT PROGRAMS

A study conducted in Spain (Corchuelo and Martínez-Ros, 2010) highlighted some issues concerning the type of firms that take more advantage of the R&D tax incentives, and in each way it influences the performance of R&D activities in Spain.

Globally, it was possible to notice that tax incentives knowledge is scarce, and that they are rarely used. However among the companies that make use of it, innovative large firms are more likely to use the fiscal incentives, on the other hand, SMEs use it more randomly as they are not aware of their benefits and encounter some obstacles to using them.

The policy effect is in average positive, but with significance in large firms only, especially in the high-tech sector firms were tax benefits increase R&D activities.

Within SME's companies, the ones with more innovative capacity, financially stable and that have received R&D subsidies, are more probable to make use of the fiscal benefits (Corchuelo and Martínez-Ros, 2010).

About whether which government programs are more suited for supporting R&D activities in firms, subsidies or tax incentives, another study in Spain (Busom, Corchuelo and Martínez-Ros, 2014), compared both types, and concluded that:

- Subsidies are more suitable for firms that do not have previous R&D activity (large firms or SMEs), and especially to young and knowledge intensive firms. These direct supports are also more appropriate in policies for increasing the number of companies with R&D activities.
- Tax incentives help firms that already are performing R&D to continue or increase their innovative activities.
- SMEs that face financing difficulties are more willing to receive subsidies and decrease interest in using tax incentives for R&D activities.

Tax incentives effects also vary across different firm sectors, it was noticed that high-tech firms have on average a smaller impact of tax credits than low-tech firms, and also tax credits have higher effect in SMEs and in the service sectors. Such effects are even enhanced with incremental tax credit programs. This can mean that R&D tax incentives policies, and especially if they are incremental, favour low-tech firms to catch up technologically instead of pushing further innovation in high-tech firms (Castellacci and Lie, 2015).

Public support for fostering SMEs R&D activities, either direct subsidies alone, or with tax benefits, strengthens innovation orientation of this kind of firms. And the effects of these policy measures make a difference in the firms that use them, when compared with firms that do not use any of the two instruments. Although the difference of effects of using only direct grants, or both grants and tax benefits is of little significance, suggesting that direct support is more suited to SMEs (Radas, Aniça, Tafro and Wagner, 2015).

Policies to support business R&D should be applied; however the design of these programs must take into consideration the existing tax system. A dynamic approach should be implemented in order to understand the co-dependency between the tax system and the R&D supports programs. In this way the incentives could be adjusted to its optimal level, nevertheless this is a major challenge in practice. However it is obvious that whenever a tax reform is implemented the R&D incentives must be adjusted (Noked, 2014).

A study about Japanese tax credit reform implemented in 2003 could found that an increase in the tax benefit has a positive effect on R&D expenditure, mainly for firms with higher debt-to-asset ratios (Kasahara, Shimotsu and Suzuki, 2014).

Tax incentives for R&D activities may probably be better accepted by the general public, as they are a government reasoned return for an initial private investment, rather than a subsidy that in the end might not have any return (Sadiq, 2014).

In Portugal a study (Carvalho, 2013) in the period 1998-2010, highlighted a sustainable growth of the public financing to business R&D in Portugal, and also an increase in the relative importance of the tax incentives over direct support. The present work has analysed the following period, 2010-2015.

A resume table of the main articles used in the literature review is available in Annex 2.

Portuguese R&D Tax Credit Program, SIFIDE II. How companies use it?

3 RESEARCH AND DEVELOPMENT (R&D), AND INNOVATION DEFINITIONS

What is Research and Development (R&D)? And what is Innovation?

The most internationally accepted and used definitions of R&D and R&D activities are the ones from the OECD Frascati Manual, although this is a side use of the manual. The Frascati Manual is a technical document that aims to provide a standard practice for surveys of research and development in order to allow the analysis of national research and innovation systems, for a better understanding of the role played by science, technology and innovation.

The first edition of the Frascati Manual is from 1963, and the sixth and current edition is from 2015.

Regarding Innovation, are internationally accepted and used the definitions from the OECD Oslo Manual. This manual provides guidelines for collecting and interpreting innovation data in the business enterprise sector, and is part of a series of methodological manuals known as the “Frascati Family”.

The first edition of the Oslo Manual is from 1992, and the third and current edition is from 2005.

3.1 RESEARCH AND EXPERIMENTAL DEVELOPMENT (R&D)

The general concept as is defined, “Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge” (Frascati Manual, OECD2015, p44)

A R&D activity is a set of actions that R&D performers undertake deliberately in order to create new knowledge. Usually a R&D project aggregates a series of R&D activities, which are organized and managed in order to achieve a predetermined goal, with well-defined objectives and expected final results.

An activity to be identified and considered as an R&D activity must comply with 5 core criteria, so the activity has to be:

- Novel;
- Creative;
- Uncertain;
- Systematic;
- Transferable and/or reproducible.

The R&D activity must fulfil all five core criteria; either the activity is being performed in a regular or occasional way.

Novel – “To be aimed at new findings” (Frascati Manual, OECD2015, p46)

The developed knowledge must be entirely new when compared with the previous existing level of knowledge. It is crucial to evaluate the novelty of the findings and of the produced knowledge.

Creative – “To be based on original, not obvious, concepts and hypotheses” (Frascati Manual, OECD2015, p47)

The R&D should deliver new ideas and new concepts that are a step forward regarding the existing knowledge. In creativity is inherent the human influence, so a researcher must be involved in this activities. Any routine change to products or processes is excluded. While different ways or methods to achieve the same final result, are considered creative.

Uncertain – “To be uncertain about the final outcome” (Frascati Manual, OECD2015, p47)

Every R&D is involved in uncertainty, the initial assumptions about results, costs involved or project duration, cannot be set accurately relative to the desired goals. There is a high degree of probability of not achieving the initially proposed objectives, or even be redirected to a different finding or result.

Systematic – “To be planned and budgeted” (Frascati Manual, OECD2015, p47)

The R&D activities must be conducted and managed in a formal way, which means that the activities must follow a plan, have a budget with the identification of the sources of funding, produce regular information about the several development stages and have a report of the achieved final results. The systematization should be adapted to the involved R&D activities, becoming more heavy or light according to the R&D project complexity.

Transferable and/or reproducible – “To lead to results that could be possibly reproduced” (Frascati Manual, OECD2015, p48)

The knowledge produced by the R&D activities should be possible to be replied by other researchers in the area, including projects that fail or achieve different results from the ones initially predicted. As the main objective of R&D is to increase the existing stock of knowledge, the findings must not be lost. The new knowledge should become accessible to others, either by public dissemination, by intellectual property protection, or when the information must be kept secret it is expected that records should be produced for future use.

Research and Experimental Development covers three kinds of activities, Basic Research, Applied Research and Experimental Development.

Basic Research are theoretical or experimental activities undertaken purely to expand primary knowledge, and do not have any objective final use or specific application in view. Basic Research can be subdivided into “pure basic research” the one that is more usually performed by Universities and Research Institutions, and “oriented basic research” which is more usual in the business sector. Oriented basic research although has no objective final use, is performed in a specific direction in order to expand a specific area of knowledge, with the expectation that it will allow to develop future business possibilities.

Applied Research, are investigation activities in new knowledge, focused in achieving a predetermined objective. This type of research is an expansion the existing knowledge by exploring its potential practical applicability. Applied research results intend to validate possible future uses of a specific knowledge. At this stage it is usual to use intellectual property instruments to protect the acquired knowledge.

Experimental development are systematic activities, based in existing research knowledge and practical experience, that allow the production of further knowledge which will be used to the creation of new products or processes, or the improvement of already existing products or processes. Experimental development can be confused with (but is not) product development, although it can be a stage of the product development process. In order to set an activity as experimental development it has to comply with the above described five core criteria, it must be novel, uncertain, creative, systematic and transferable.

The term “product” means a good or service, and the term “process” designates the transformation of inputs to outputs and their delivery.

These three activities although seem to have a natural order of appearance, in practice they are part of an interactive R&D system, with flows of knowledge and information among them.

3.2 INNOVATION IN THE BUSINESS SECTOR

Research and Experimental Development (R&D) activities are by its nature innovative activities, but in a firm many other non-R&D activities can be classified as innovative.

“An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace or external relations” (Oslo Manual, OECD 2005, p46)

Firms innovate in order to improve performance and acquire competitive advantages by implementing planned changes.

Innovative activities are characterized with several features such as:

- Uncertainty – there is always an associated risk and a degree of uncertainty about the final results and about the needed resources (human, cost and time). Innovative activities are not always successful in achieving the initially expected results.
- Investment – Innovative activities involve costs, such as: salaries, materials, services, acquisition of tangible or intangible assets. It is therefore necessary to establish the origin of the funding for such costs. Nevertheless these costs are expected to give origin to future returns.
- Spillovers – Not all potential of an innovation is fully explored by its creator or developer. Some firms can innovate benefiting from knowledge spillovers from other companies. Also it is considerably less costly to imitate than develop innovation.

- Utilization of new knowledge or a new use or combination of existing knowledge – The new knowledge can be created internally by the firm's development of innovation activities, or the firm can bring innovation from the outside into the firm. Nevertheless the carrying on of innovative activities by the firms by the use of new of knowledge or the combination of existing knowledge, are activities that should be clearly distinct from the firm regular routine activities.
- Competitive advantage – innovation is performed by firms in order to create a competitive advantage (or at least to maintain competitiveness). This can be done in the demand side (quality improvement, new products, new markets or new costumers), or on the side of costs (lowering costs in production, purchasing, distribution or transaction). The improvement of the firm's performance potentiates its capabilities of development of new products or services and also to produce and acquire new knowledge.

Companies can choose how they want to innovate, either alone with intramural activities or including external entities. The innovation external partners can be either by partnerships for the projects development, or using innovation already in use by others with a higher or lower degree of interaction with the exterior.

Innovation in a firm can be divided in four types: product, process, organizational and marketing.

Product innovation – The delivery of a totally new good or service. Or changes in an existing product which significantly upgrades its feature, or proposed uses. (Oslo Manual, OECD 2005, p48)

New products are goods and services that are quite different from the existing ones in terms of their features and/or type of use. These can use new knowledge or technologies, give a new use to existing knowledge or technologies, or even be a mix of existing knowledge and/or technologies.

Innovation in a product can also be an existing product that has received important improvements in its characteristics, or has a quite different proposed use.

As an example, one of the interviewed companies, 3DCork, develops products in cork, that usually are produced in wood, and by this extends the range of application of such products by a change in the product characteristics.

Process innovation – Application of new practices in the production or in the distribution of a good or service. Or important renovation of existing processes. (Oslo Manual, OECD 2005, p49)

New or important renovation of processes, include the adoption of new techniques, equipment and/or software. These upgrades in processes cover not only the ones directly related with the production and delivery of the firm products, but also all the other processes involved in the firm activity.

Again, and in the following of the above example, 3DCork, had to implement changes and adapt existing practices of production of wood products to its own production of similar cork products.

Organizational innovation – Application of new management procedures in the firm’s internal practices, workplace organization and the relationship with the exterior. (Oslo Manual, OECD 2005, p451)

These innovations are aimed at increasing the firm’s performance by reducing indirect costs, enhance productivity by workplace satisfaction, increasing firm’s know-how and lower the cost of supplies.

These organizational innovations are based in strategic decisions delivered by the management of the firm.

As an example of this, is the change that is being developed in the construction business over the last years, with the implementation of BIM (Building Information Modelling) technology to construction projects. BIM is a permanent updated database with all relevant project information, from the project conception, passing the design and construction phases, up to the operation and maintenance stage. The introduction of this organizational technology in a construction project, among others, allows an increase in productivity, decreases construction incompatibilities, and promotes the sustainability of the projects.

Marketing innovation – New or important changes in the marketing mix activities, such as product (design and packaging), placement, promotion and pricing. (Oslo Manual, OECD 2005, p49)

The innovation in marketing activities involves remodelling and new approaches, in order to better attend customer needs and/or address market trends. These can include also changes in the positioning of products and in the opening of new markets.

Innovation in the firms marketing activities can be applied both to new or existing products.

Over the last years, and with the increase of the use of the internet, social networks, and online shopping, there has been a large development of new marketing approaches in order to embrace this new type of costumers.

Portuguese R&D Tax Credit Program, SIFIDE II. How companies use it?

4 R&DI FINANCING PROGRAMS IN PORTUGAL – DIRECT SUPPORT

4.1 R&DI CURRENT PROGRAMS

Portugal has currently running a diverse number of R&D direct support programs and sub-programs, that have different objectives and are aimed to target different types of companies and address projects in different maturity stages. With this analysis is intended to demonstrate that the business sector in Portugal has a diversified range of choices in what concerns direct support programs for R&D activities.

Next are described the main R&D direct support programs in Portugal.

Horizon 2020:

Main instrument for financing research and innovation in the European Union (EU).

The H2020 has three main programmatic pillars with different scopes: Pillar I – Excellent Science; Pillar II: Industrial Leadership and Pillar III – Societal Challenges.

Within Pillar II, there are some programs specific for SME's, such as:

- SME's Instrument – a financing program exclusively dedicated to small and medium-sized enterprises, both individually or in a joint venture, mostly for the ones with a high potential for internationalization and innovation capabilities. Within this program companies can apply to foster innovative business projects, with high internationalization and growth potential, in a start-up business launch approach. The program was built in order to fill the gap between the idea development and the market stage; and it is divided in three phases:

- Phase I – Proof of concept – Idea → Concept;
- Phase II – Demonstration of commercial potential – Concept → Market maturity;
- Phase III – Go to market – Market maturity → Market launch.

Projects that applied to this program and were deemed to deserve funding but did not receive it due to budget limits are awarded the Seal of Excellence, as recognition of a high-quality project and support for the search of alternative funding sources.

- Fast Track to Innovation – this is a pilot-program focused in companies that participate in Horizon2020 for the first time. It aims for the acceleration of the commercialization of innovative ideas and concepts. It is suited for small international and collaborative joint-ventures and innovative projects.

- Access to risk finance – low cost loans for innovative SME's and for innovative projects.

Compete 2020:

The Compete 2020 Program is part of Portugal 2020 (a partnership agreement between Portugal and the European Commission that brings together the actions of the 5 European Structural and Investment Funds).

This Program has defined 6 priority lines of action within the scope of the "Competitiveness and Internationalization" domain of Portugal 2020. Its purpose is to contribute to the creation of a more competitive economy based on knowledge-intensive activities, relying on marketable or internationalized goods and services, and the strengthening of the qualification and export orientation of Portuguese companies. While also promoting the reduction of costs associated with greater efficiency of public services and the improvement of transport. With regard to the more specific area related to funding for Research & Development & Innovation, there are available the following main incentives:

A. Business Innovation and Entrepreneurship

- Innovation: Production of new goods and services; new processes or methods of manufacturing, logistics and distribution, marketing; initial investment for the production of marketable and internationalizable innovative goods and services.
- Entrepreneurship: SMEs with less than two years old in sectors with strong growth dynamics; investment related to the establishment of new and innovative businesses;

B. Qualification and Internationalization of SMEs

- Internationalization: Knowledge of foreign markets; Prospecting and presence in international markets; International marketing; Web presence; Development and international promotion of trademarks; Certifications for external markets; Organizational innovation in business practices and external relations.
- Qualification: Organizational innovation and management; Digital economy and ICT; Branding and design; Development and engineering of products, services and processes; Industrial property; Quality, knowledge transfer; Distribution and logistics; Eco innovation.

C. Research and technological development

- Intensification of Research and Technological Development (R&TD) in companies; Cooperation with the other entities of the R&TD system; Development of new products and services, especially in activities of a higher technological and knowledge levels; Reinforcement of economic recovery actions for successful R&D projects; National participation in R&TD international programs and initiatives.

Norte 2020:

NORTE 2020 is the financial instrument to support regional development in Northern Portugal, managed by CCDR-N, and also included in Portugal 2020.

Almost half of the available funds are aimed to the competitiveness of micro and small enterprises in the North region, with projects of internationalization, innovation and research. Among the other areas covered by this aid program, a significant proportion is intended for public initiatives in research, technological development and innovation.

Centro 2020:

The Operational Program for the Central Region (which integrates Portugal 2020) is based on a shared regional development strategy, built on a strong mobilization of all regional partners.

With the application of the EU funds included in this Operational Program, the Central Region aims to become an Innovation Follower, having as priorities, sustaining and reinforcing value creation and knowledge transfer, promoting a responsible, industrialized and exporting economic environment, capture and retain qualified and innovative talent, strengthen territorial cohesion, structure a polycentric network of medium-sized cities, give life and sustainability to existing infrastructures and consolidate institutional capabilities.

The Program is also a decisive instrument for the implementation of the Intelligent Specialization Strategy defined for the Central Region, in particular the three transversal objectives of the regional strategy: territorial cohesion, urban policy and sustainability and efficient use of resources. Defining the investments to support the competitiveness priorities (R&D and innovation), within the identified four Innovation Platforms - 1. Sustainable industrial solutions; 2. Valuation and efficient use of natural endogenous resources; 3. Technologies to serve the quality of life; and 4. Territorial innovation.

Lisboa 2020:

Operational Program of the Lisbon Region, integrated in the Portugal 2020.

This program allows SMEs access to financing, by own funds and external capital, and this is recommended in Priority Axis 2 - Reinforcing the Competitiveness of SMEs, in the following Investment Priorities:

1 - Promoting qualified and creative entrepreneurship:

- Its objective is to give financial support for projects of qualified and creative entrepreneurship, as well as the promotion of entrepreneurship, facilitating in particular the support for the economic exploitation of new ideas and encouraging the creation of new enterprises. There are available financial capitalization instruments, such as venture capital funds (VCF) and business angels (BA) financing lines, to invest in projects carried out by SMEs in the Lisbon region, in the business early stages (Seed and Startup).

2 - Reinforcement of SME entrepreneurship training for internationalization (to be implemented)

3 - Enhancing entrepreneurship capabilities in SMEs for the development of products and services

- Its objective is financial support to strengthen the capabilities of SMEs in the region to develop new products and services, as well as innovative projects in terms of processes, products, organization and marketing. There are available financial capitalization instruments, such as venture capital funds (VCF), for investment in projects carried out by SMEs in the Lisbon region.

Financial instruments for debt and guarantees have also been created through mutually guaranteed credit lines that finance projects carried out by SMEs to develop new products and services: Debt & Guarantee Fund.

Accelerator Programs:

There are in Portugal a number of specific business acceleration programs for innovative projects and ideas for Startups and Entrepreneurs, including: Lisbon Challenge; ASA – ANJE Startup Accelerator; Startup Porto Accelerator; Spin+, Everis Awards, etc.

These programs provide training / advice to better develop the business and award monetary prizes to the best business ideas for their future implementation.

Erasmus For Young Entrepreneurs:

Exchange program in which new entrepreneurs acquire knowledge for small business management, share experiences with experienced entrepreneurs from another country, cooperate with the foreign entrepreneur and acquire knowledge about other markets. Funding is provided to the participant through a grant.

Empreender 45-60:

This program is integrated in the North 2020, and is aimed at senior entrepreneurship, it encompasses several activities, from, international benchmarking on models of support to senior entrepreneurship, diagnosis of the state of the art and strategy of development of entrepreneurship and business awareness within this target audience, dissemination and training events (seminars, workshops and international congress on senior entrepreneurship), senior match business, and publication of project reports and outputs.

The Senior Match Business activity is a pilot project of an acceleration program for senior entrepreneurship, covering activities ranging from developing the idea to looking for funding to start the business. It is aimed at unemployed people with higher education qualifications with more than 45 years and with high professional experience in several areas of knowledge.

4.2 TARGET OF THE PROGRAMS

As described in the previous section of this chapter, there are a diversified number of programs for direct support of Research and Experimental Development, and Innovation running in Portugal. The features of the programs are in line with its final objectives, making each one in particular more fitted, or directed to comply with the development stage of the project/business and also addressed to the type of company, according to its size.

In the next figure a table was set with the distribution of the current direct support programs according to the company type and the entrepreneurial development stage of the project or business.

Company Type	Entrepreneurial development stage		
	Idea/Project	Implementation&Development	Exploration/Commercialization
Large Companies		Horizon 2020 : Societal Challenges & Industrial Leadership	
Mature SME's	COMPETE 2020 : Research and technological development		Norte 2020/Centro 2020
	COMPETE 2020 : Qualification and SME's Internationalization		
New / Innovative SME's	Horizon 2020 : Industrial Leadership - SME Instrument & Access to risk finance		
	Lisboa 2020		
Startups	COMPETE 2020: Business Innovation and Entrepreneurship		
Entrepreneurs	Accelerator Programs (Lisbon Challenge; ASA – ANJE Startup Accelerator; Startup Porto Accelerator; Spin+, Everis Awards, etc.)		
	Erasmus for Young Entrepreneurs		
	Empreender 45-60		

Figure 4.1 – Distribution of the direct support programs
(Source: Developed by the author)

According to the coloured area of influence of the diverse programs, we can see that the existing direct support programs in Portugal present a good coverage for the business sector needs, in terms of the nature of the company and business stage of the project.

As analysis about the current Portuguese R&D tax credit program, SIFIDE II, will be made in the next chapters.

5 PORTUGUESE R&D TAX INCENTIVE PROGRAM – “SIFIDE II - SISTEMA DE INCENTIVOS FISCAIS À I&D EMPRESARIAL”

5.1 PROGRAM DESCRIPTION

Portugal has an R&D tax incentive system implemented since 1997, the SIFIDE. The governmental decision for such program implementation, according to the text of the law (Decreto-Lei nº 292/97), was based in the following:

- Companies' productivity and competitiveness depend largely from its innovative capacity. And innovation also depends largely from the results of its internal promotion of R&D activities;
- The participation of the private corporate sector in the country's global R&D effort was reduced, and action would had to be taken to support and stimulate R&D activities;
- At that time Portugal was one of the few OECD countries that had not a R&D tax incentive program implemented, and this was also viewed as a penalizing fact for the capture of investment, namely to our neighbour country Spain (which had already a R&D Tax Credit program implemented since 1995).

This program has passed through several changes over time. The main changes were the progressive increase in:

- base rate value - from 8% to 32.5%;
- incremental rate - from 30% to 50%;
- incremental rate limit - from 250k€ to 1.5M€;
- carry over limit - from 3 to 8 years.

In 2011 the SIFIDE II was implemented with the introduction of some legislation changes to make it more attractive for companies. Special conditions for qualified investigation personnel (PhD's) and exclusive conditions for SME's were implemented.

The last and current version was published in 2014.

In annex 3 is shown the evolution of the SIFIDE Program over time.

Eligible expenses include research in new scientific or technologic knowledge; and the development of the research or other scientific or technologic knowledge with the aim to create, or substantially improve, raw materials, products, services or manufacturing processes.

Considered eligible expenses are broadly the following:

1. Costs with tangible fixed assets, in new condition, and in the proportion of its use in the R&D activities;
2. Expenses with personnel involved in the R&D activities, at least with a high school degree. Expenses with personnel with a PhD are considered at a 120% rate;
3. Expenses with managing personnel involved in the R&D activities;
4. Operating expenses up to a maximum of 55% of the expenses of item 2 above;

5. Outsourced R&D activities to public entities, or others which are recognized by the government;
6. Equity in R&D institutions or participation in investment funds for financing R&D firms, which are recognized by the government;
7. Fees for patent filling and patent maintenance;
8. Expenses with the acquisition of patents for R&D activities (exclusive for SME's);
9. Expenses with audits to R&D activities;
10. Expenses with R&D activities that already had a financial direct support from public entities are not considered.

The current program is a tax credit with a base rate of 32.5 % of the firms R&D eligible expenses. It allows also an extra incremental tax deduction of 50% of the difference between the current expenditure and the simple average of the two previous years, up to a 1.5M€ limit.

For SME's with less than two years, the base tax deduction has an increase of 15%, as they cannot apply to the incremental tax deduction.

If in a given fiscal period the firm's normal calculated tax value is lower than the tax credit obtained, the program allows the carry-over of this difference up to the next eight fiscal periods.

The current conditions of the tax incentive system are expected to run until 2020.

The information is available in <http://sifide.ani.pt/>, but only in Portuguese.

5.2 SIFIDE II - TAX CREDIT 2010 TO 2015

For an evaluation of this program it was possible to gather information available in the Portuguese Tax Authority website, from 2010 to 2015.

The Portuguese SIFIDE II program, allowed a total of about 516 M€ of tax credit in the period from 2010 to 2015.

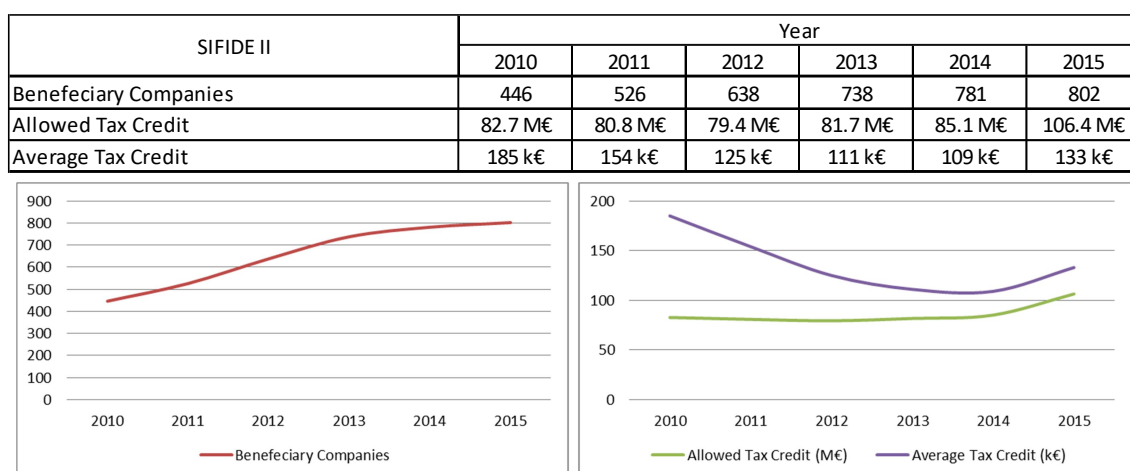


Figure 5.1 – Tax credit 2010 to 2015

(Source: <http://info.portaldasfinancas.gov.pt/pt/dgci/divulgacao/estatisticas/Estatisticas++contribuintes+com+benef%C3%ADcios+fiscais.htm>)

According to the above statistics, there was a significant increase in the number of companies that were allowed R&D tax credit, which almost doubled from 2010 to 2015. The allowed tax credit, after a period of some stagnation from 2010 to 2013 (period in which Portugal was under the external economic assistance program), had a steady increase in the last two years, with a 25% increase from 2014 to 2015, which has reached 106.4 M€ in 2015.

On the other hand the average tax credit was diminishing until 2014 (109k€), and inverted this tendency in 2015, with a 133k€ average value per company. But still not reaching the 185k€ average amount of 2010. This might be a consequence of the increase of the number of companies that benefit from the program, as more companies (including SME's) with lower R&D expenditure apply to this program.

For the analysis of the allowed tax credit distribution among the beneficiary companies the next table was computed with the 1% and 10% top companies' representation.

Table 5-1 - Tax credit 2010 to 2015 – Top 1% and Top 10%

(Source: <http://info.portaldasfinancas.gov.pt/pt/dgci/divulgacao/estatisticas/Estatisticas+-+contribuintes-com+benef%C3%ADcios+fiscais.htm>)

SIFIDE II	Year					
	2010	2011	2012	2013	2014	2015
Top 1% - Number of companies	4	5	6	7	8	8
Top 1% - Allowed Tax Credit	20.6 M€	18.6 M€	23.7 M€	17.3 M€	21.8 M€	39.5 M€
Top 1% - Tax Credit Share	25.0%	23.1%	29.8%	21.2%	25.6%	37.1%
Top 10% - Number of companies	45	53	64	74	78	80
Top 10% - Allowed Tax Credit	57.9 M€	51.5 M€	50.1 M€	51.6 M€	53.1 M€	74.6 M€
Top 10% - Tax Credit Share	70.0%	63.8%	63.1%	63.1%	62.4%	70.2%

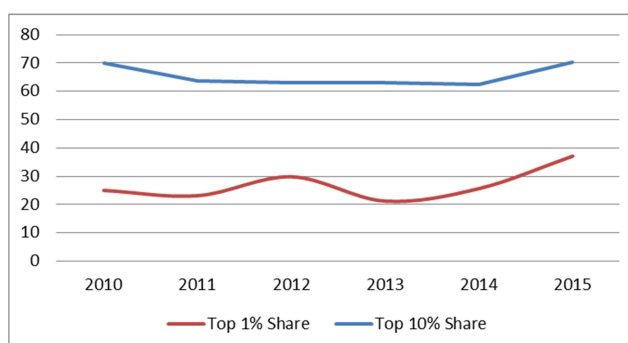


Figure 5.2 – Tax credit 2010 to 2015 – Top 1% and Top 10% Share

(Source: <http://info.portaldasfinancas.gov.pt/pt/dgci/divulgacao/estatisticas/Estatisticas+-+contribuintes-com+benef%C3%ADcios+fiscais.htm>)

As we can state from the above figures, the top 1% companies from 2010 to 2015 represent 1/4 to 1/3 of the allowed tax credit. And the top 10% companies represent around 2/3 of the allowed tax credit, which leaves only around 1/3 for the remaining 90% companies...

This numbers show that there is a huge discrepancy in the distribution of the tax credit among the beneficiary companies.

As a remark, and an add value in the SIFIDE published statistics would be the information about the type of companies such as their size and R&D expenditure, the conceded tax credit and used tax credit amounts, the average tax credit carry over time lapse, and unused tax credit due to extinguished companies.

5.3 R&D EXPENDITURE OF COMPANIES

For analysing the evolution of R&D investment in Portugal, during the period 2010 to 2015, it was used the published data of the Inquiry about the Scientific and Technological Potential (IPCTN) from the Portugal's Directorate General for Education and Science Statistics (DGEEC).

The IPCTN gives information about the R&D expenditure in Portugal, which includes a list of the top 100 companies and another with the top 100 SME's, by declared R&D expenditure. Some information is not disclosed to the public due to the lack of permission from the companies.

A resume of the IPCTN data for companies R&D expenditure from 2010 to 2015 is shown in the next table.

Table 5-2 - IPCTN statistics resume 2010 to 2015

(Source: <http://www.dgeec.mec.pt/np4/206/>)

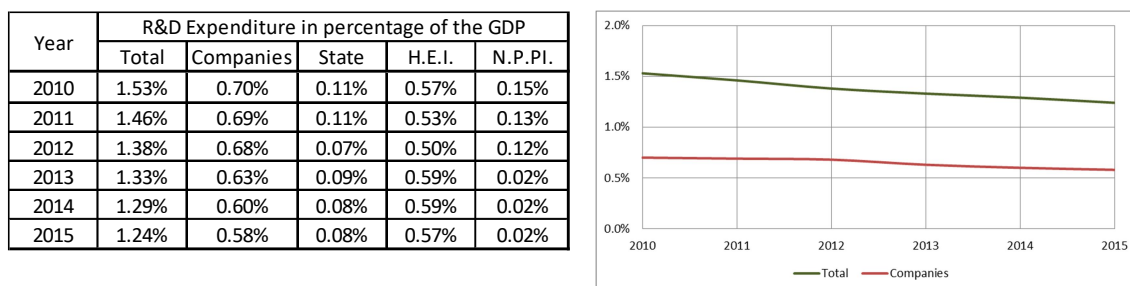
IPCTN	Year					
	2010	2011	2012	2013	2014	2015
Companies Internal R&D Expenditure	1266 M€	1216 M€	1153 M€	1073 M€	1036 M€	1037 M€
Number of Companies that have declared R&D Expenditure	1916	2318	2389	2436	2604	2627
Expenditure in Human Resources	40%	41%	42%	47%	50%	48%
R&D Expenditure in terms of GDP	0.73%	0.71%	0.68%	0.63%	0.60%	0.58%
Companies R&D Expenditure/ Total R&D Expenditure in Portugal	46%	47%	50%	48.0%	46.0%	46.0%
Top 100 - Companies with open information	71	70	63	58	50	53
Top 100 Companies R&D Expenditure (disclosed information)	962.2 M€	875.2 M€	818.6 M€	718.9 M€	652.7 M€	664.0 M€
Top 100 Companies R&D Expenditure/ Total Companies R&D Expenditure	76%	72%	71%	67%	63%	64%
Average R&D Expenditure Top 100 Companies	9.6 M€	8.8 M€	8.2 M€	7.2 M€	6.5 M€	6.6 M€
Number of SME's in the Top 100 Companies	35	35	35	35	30	36
Top 100 SME's - Companies with open information	59	63	56	46	32	31
Top 100 SME's R&D Expenditure (disclosed information)	120.2 M€	116.2 M€	107.3 M€	91.5 M€	69.2 M€	68.1 M€
Top 100 SME's R&D Expenditure/Total Companies R&D Expenditure	9%	10%	9%	9%	7%	7%
Average R&D Expenditure Top 100 SME's	2.0 M€	1.8 M€	1.9 M€	2.0 M€	2.2 M€	2.2 M€

In a global overview, the total amount of R&D expenditure in companies decreased from 2010 to 2014, and kept stabilized in 2015 to 1037M€. However, the total amount is still about 18% lower than the 1266M€ of 2010. This is in line with the country's total R&D expenditure that globally had the same behaviour, decreased from 2010 to 2014 and kept stabilized in 2015 (see table 5.3).

In the particular case of the total R&D expenditure of companies in Portugal, some attention should be paid to the specific case of the Group Portugal Telecom. This company has been in the top position since 2007, but with a significant decrease of R&D Expenditure since 2011, from 208M€ down to 53M€ in 2015. Some explanation to this can be the several changes in the shareholder composition in this company during the last years.

During the reported years companies in the second position declared values of R&D Expenditure only up to 55M€.

A decrease also exists in the R&D expenditure in terms of GDP, decreasing from 0.70% in 2010, to 0.58% of GDP in 2015. The country's total R&D expenditure in GDP percentage also steadily diminished in the studied period from 1.53% to 1.24%, as it is shown in the next figures.



H.E.I. - Higher Education Institutions
N.P.PI. - Non Profit Private Institutions

Figure 5.3 – R&D Expenditure in percentage of the GDP

(Source: <http://www.dgeec.mec.pt/np4/206/>)

In the next table a comparison was made between the Portuguese GDP and the country's R&D expenditure.

Table 5-3 – GDP and R&D Expenditure

(Source: <http://www.dgeec.mec.pt/np4/206/>)

Year	Portugal GDP		R&D Expenditure									
			Total		Companies		State		H.E.I.		N.P.PI.	
	M€	Var. (%)	M€	Var. (%)	M€	Var. (%)	M€	Var. (%)	M€	Var. (%)	M€	Var. (%)
2010	179,930	1.90%	2,758	-0.5%	1,266	-3.4%	196	-3.1%	1,017	0.3%	278	14.0%
2011	176,167	-1.83%	2,566	-6.9%	1,216	-3.9%	189	-3.5%	934	-8.1%	227	-18.5%
2012	168,398	-4.03%	2,320	-9.6%	1,153	-5.2%	124	-34.4%	846	-9.4%	197	-13.4%
2013	170,269	-1.13%	2,258	-2.7%	1,073	-7.0%	147	18.5%	1,008	19.2%	30	-84.7%
2014	173,079	0.89%	2,232	-1.2%	1,036	-3.4%	140	-5.0%	1,018	1.0%	38	27.5%
2015	179,504	1.58%	2,234	0.1%	1,037	0.1%	145	3.6%	1,018	0.0%	35	-8.0%

H.E.I. - Higher Education Institutions
N.P.PI. - Non Profit Private Institutions

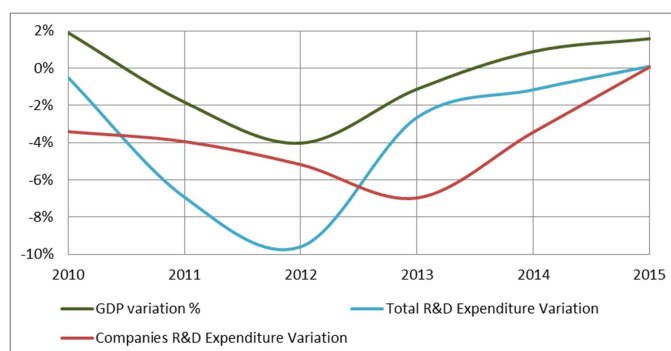


Figure 5.4 – GDP variation vs Total & Companies R&D Expenditure variation

(Source: <http://www.dgeec.mec.pt/np4/206/>)

In Figure 5.4 it can be noticed that both the Total and Companies R&D expenditure variation curves follow the GDP variation curve tendency, but the Companies curve with one year delay. The non-delay in the Total R&D expenditure variation curve is explained by the compensation given by the Higher Education Institutions expenditure that had a 19.2% increase in 2013.

But during this period the R&D expenditure variation both in Total as in the Companies was always lower than the GDP variation, which explains the reduction of the R&D Expenditure in percentage of the GDP, as shown in figure 5.3.

The weight of Companies investment in R&D activities was kept more or less stable during this last years, representing almost half of the of the country R&D expenditure. The State directly only represents around 6%, of the total R&D expenditure, and the Higher Education Institutions grew to 45% from 2013, and on the contrary the Non Profit Private Institutions expenditure was reduced to only 2% from 2013 (see table 5-4).

Table 5-4 – R&D Expenditure by type of Institutions

(Source: <http://www.dgeec.mec.pt/np4/206/>)

Year	R&D Expenditure								
	Total	Companies		State		H.E.I.		N.P.PI.	
	M€	M€	%	M€	%	M€	%	M€	%
2010	2,758	1,266	46%	196	7%	1,017	37%	278	10%
2011	2,566	1,216	47%	189	7%	934	36%	227	9%
2012	2,320	1,153	50%	124	5%	846	36%	197	8%
2013	2,258	1,073	48%	147	7%	1,008	45%	30	1%
2014	2,232	1,036	46%	140	6%	1,018	46%	38	2%
2015	2,234	1,037	46%	145	6%	1,018	46%	35	2%

Returning to table 5-2, and in the positive side, is the continuous increase of the number of companies that state that have R&D expenditure. This increase was of about 36% from 2010 to 2015.

Another interesting fact is that the weight of expenditure in Human Resources in R&D activities has increased from 40% in 2010 up to 50% in 2015, which might mean that companies are more aware and concerned about the qualifications of R&D personnel.

Regarding the Top 100 companies, not much can be assessed, as the number of companies that allow the public disclosure of their information has significantly decreased from 70 in 2010 down to around 50, in the last two years of the study.

Nevertheless, as a round average for the period 2010-2015, the top 100 companies with disclosed information, represent about 2/3 of the total expenditure from all companies, which is quite high, considering that these top 100 are less than 5% of the total number of companies that state that invest in R&D activities!

On the other hand, but using these figures with some care (because a lot of information is not disclosed), the average amount of R&D disclosed expenditure of the top 100 companies was continuously decreasing in the studied period. And total R&D expenditure increased from 2014 to 2015, and the value of 2015 is identical to 2013. This might suppose that the relative weight

of the top 100 companies is decreasing, which is good, as more companies and more money is being invested in R&D activities outside the top 100.

By the crossing of information between the top 100 companies with the top 100 SME's in R&D expenditure, according to the IPCTN data, about 1/3 of the top 100 companies are SME's. This figure has been maintained relatively stable across the studied period.

Another figure, that has to be used with some care due to lack of disclosed information, is that the average R&D disclosed expenditure in R&D of the top 100 SME's has been quite stable, and around 2M€ per year.

In the top 100 SME's there has been along the years a significant decrease in the number of SME's that allow public disclosure of their information. In 2015 less than 1/3 of the SME's have their information public. This decrease happens in both lists, top 100 companies and top 100 SME's. One should ask why companies are afraid of showing their numbers?

In annex 4, and as global overview, are presented the tables with the distribution by type of institution, of the expenditure by R&D activity.

In Portugal the Total R&D expenditure is distributed around 20% to Basic Research, 40% to Applied Research and another 40% to Experimental Research.

By type of institution, companies and as would be expected, spend more in Experimental Research (about 2/3 of their R&D expenditure) and around 1/3 in Applied Research, leaving a very residual amount to Basic Research.

The State invests more in Applied Research (around 2/3 of its expenditure), Higher Education Institutions spend around 85% of their R&D expenditure in Basic Research and Applied Research in an equal proportion. As for the Non Profit Private Institutions, they spend most of their R&D expense in Basic Research.

5.4 TAX CREDIT VS R&D EXPENDITURE

For overcoming the lack of information in the Tax Credit Program statistics about the size of the companies and their R&D expenditure, a cross of information was computed between the SIFIDE II statistics from the Portuguese Tax Authority, and the R&D statistics from the Inquiry About the Scientific and Technological Potential (IPCTN) from the Portugal's Directorate General for Education and Science Statistics (DGEEC).

Table 5-5 – Tax Credit vs R&D Expenditure - Global values

(Source: <http://www.dgeec.mec.pt/np4/206/>)

SIFIDE II vs IPCTN	Year					
	2010	2011	2012	2013	2014	2015
Allowed Tax Credit (1)	82.7 M€	80.8 M€	79.4 M€	81.7 M€	85.1 M€	106.4 M€
Companies Internal R&D Expenditure (2)	1266 M€	1216 M€	1153 M€	1073 M€	1036 M€	1037 M€
[(1) / (2)] x 100%	7%	7%	7%	8%	8%	10%

In a global overview, the return rate of the allowed tax credit comparatively with the R&D Expenditure of companies has steadily increased from 7% in 2010 up to 10% in 2015.

For a more detailed analysis, using the available data, the following tables were computed by identifying the companies that in a given year have R&D tax credit and in the same year are listed in the R&D expenditure top 100 companies.

Table 5-6 – Companies with Tax Credit and in the R&D Expenditure Top 100(Source: <http://www.dgeec.mec.pt/np4/206/>)

Companies with Tax Credit and in the R&D Expenditure Top 100						
SIFIDE II vs Investment in R&D	Year					
	2010	2011	2012	2013	2014	2015
Number of companies with Tax Credit and in the R&D top 100 (1)	25	26	24	28	31	33
Total Tax Credit of companies in the R&D top 100	37.6 M€	26.8 M€	15.0 M€	21.8 M€	19.7 M€	39.6 M€
Total I&D Expenditure of companies in (1)	173.8 M€	185.7 M€	145.7 M€	221.2 M€	222.7 M€	238.6 M€
Average R&D expenditure of companies in (1)	7.0 M€	7.1 M€	6.1 M€	7.9 M€	7.2 M	7.2 M€
Average Tax Credit of companies in (1)	1.5 M€	1.0 M€	625 k€	779 k€	635 k€	1.2 M€
Average rate of Tax Credit Benefit vs R&D Expenditure	22%	14%	10%	10%	9%	17%
Maximum Tax Credit return rate of top 100 R&D companies	94%	56%	124%	53%	58%	68%
Minimum Tax Credit return rate of top 100 R&D companies	<1%	<1%	1%	<1%	<1%	<1%
SME's						
Number of SME's with Tax Credit and in the R&D top 100 (2)	7	9	4	6	7	5
SME's percentage of (2)	28%	35%	17%	21%	23%	15%
Total Tax Credit of SME's in the R&D top 100	1.7 M€	2.2 M€	1.8 M€	2.0 M€	1.0 M€	1.6M€
Total I&D Expenditure of SME's in (2)	18.2 M€	22.6 M€	12.4 M€	16.9 M€	20.0 M€	14.0M€
Average R&D expenditure of SME's in (2)	2.6 M€	2.5 M€	3.1 M€	2.8 M€	2.9 M€	2.8 M€
Average Tax Credit of SME's in (2)	245.8 k€	241.3 k€	450 k€	335 k€	147 k€	320 k€
Average rate of Tax Credit Benefit vs R&D Expenditure, of SME's in (2)	9%	10%	15%	12%	5%	11%
Maximum Tax Credit return rate of top 100 R&D SME's in (2)	30%	24%	32%	40%	12%	33%
Minimum Tax Credit return rate of top 100 R&D SME's in (2)	<1%	<1%	1%	<1%	<1%	<1%
Large Companies						
Number of Large Companies with Tax Credit and in the R&D top 100 (3)	18	17	20	22	24	28
Large Companies percentage of (3)	72%	65%	83%	79%	77%	85%
Total Tax Credit of Large Companies in the R&D top 100	35.9 M€	25.6 M€	13.2 M€	19.8 M€	18.7 M€	38 M€
Total I&D Expenditure of Large Companies in (3)	155.5 M€	163.0 M€	133.2 M€	204.3 M€	202.7 M€	224.5 M€
Average R&D expenditure of Large Companies in (3)	8.6 M€	9.6 M€	6.7 M€	9.2 M€	8.4 M€	8.0 M€
Average Tax Credit of Large Companies in (3)	2.0 M€	1.4 M€	659 k€	900 k€	778 k€	1.4 M€
Average rate of Tax Credit Benefit vs R&D Expenditure, of Large Companies in (3)	23%	15%	10%	10%	9%	17%
Maximum Tax Credit return rate of top 100 R&D Large Companies in (3)	94%	56%	124%	53%	58%	68%
Minimum Tax Credit return rate of top 100 R&D Large Companies in (3)	4%	1	1%	<1%	<1%	1%

We can see that over the studied period, 2010 to 2015, the number of companies that benefit from the SIFIDE Tax Credit and that are in the Top 100 of R&D Expenditure, are in a steady and continuous growth from 25 to 33.

As for the cover rate of the of Tax Credit benefit over the R&D expenditure of these companies, in average it was of 22% in 2010, decreased continuously down to 9% in 2014, and went up to 17% in 2015. Considering the SIFIDE II base rate of 32.5%, these numbers still have margin to improve.

Individually for each company, the cover rates are quite variable, with some very high values mixed with very low values. Here it can exist some distortion due to companies that include tax credit from previous years in a given year, and others that carry-over its benefit to following fiscal years.

In this group of companies, and during the studied period, between 1/4 to 1/3 of them are SME's.

It is not clear in this group of companies which benefit more from the tax credit, large companies or SME's, because in some years large companies obtain a better coverage rate of the Tax Credit benefit over their R&D expenditure, in others it's the opposite, SME's have a better coverage rate.

6 COMPARISON WITH OTHER OECD R&D TAX CREDIT PROGRAMS – FRANCE, SPAIN AND ITALY

6.1 COMPARISON OF THE STUDIED COUNTRIES

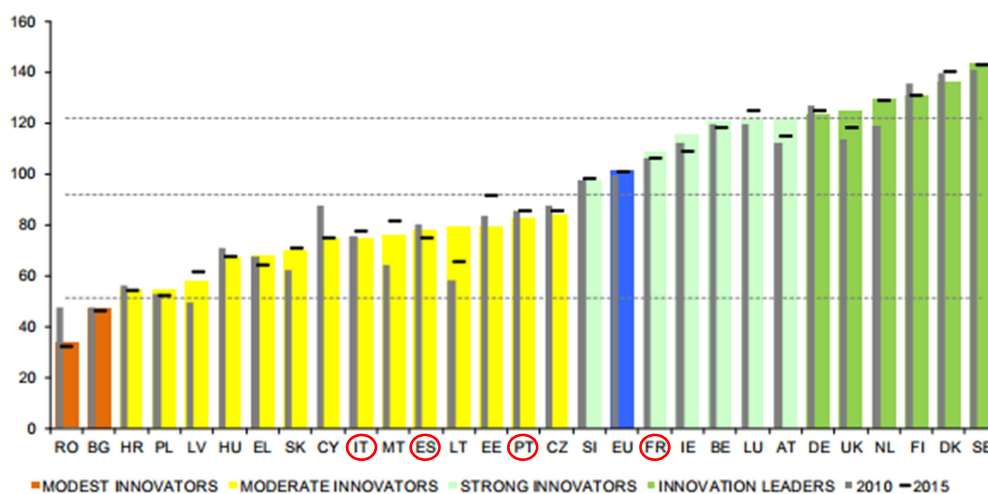
The studied countries Portugal, France, Spain and Italy, are both EU and OECD members.

Innovation Performance comparison:

The EU publishes since 2001 the European Innovation Scoreboard (EIS), for a comparison between countries in the EU, and also for setting benchmark of EU performance with other countries.

The innovation performance scores are calculated based on four main types of indicators (Framework conditions, Investments, Innovation activities and Impacts), which cover ten innovation dimensions, in a total of 27 different indicators. According to its performance score each country will be classified in one of the four performance groups, Innovation Leader, Strong Innovator, Moderate Innovator or Modest Innovator.

In the next figures is presented the EU member states performance in 2016 and the scores for each of the studied countries from 2010 to 2016.



Coloured columns show Member States' performance in 2016, using the most recent data for 27 indicators, relative to that of the EU in 2010. The horizontal hyphens show performance in 2015, using the next most recent data for 27 indicators, relative to that of the EU in 2010. Grey columns show Member States' performance in 2010 relative to that of the EU in 2010. For all years the same measurement methodology has been used. The dashed lines show the threshold values between the performance groups in 2016, comparing Member States' performance in 2016 relative to that of the EU in 2016.

Figure 6.1 - Performance of EU Member States' innovation systems
(Source: European Innovation Scoreboard 2017)

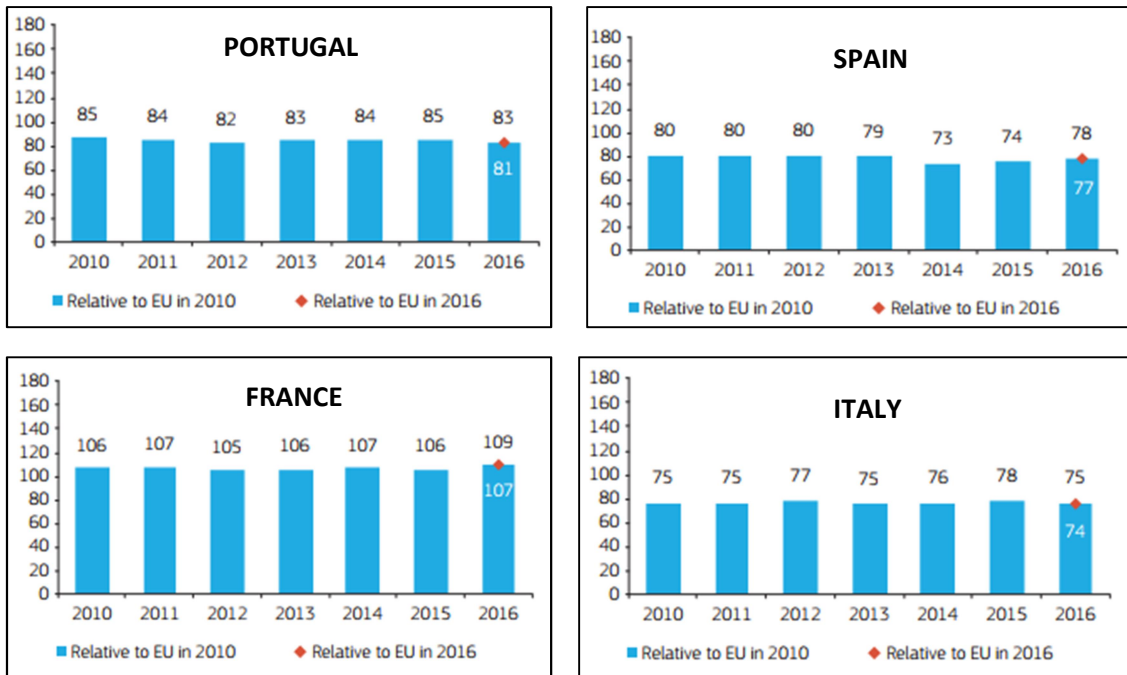


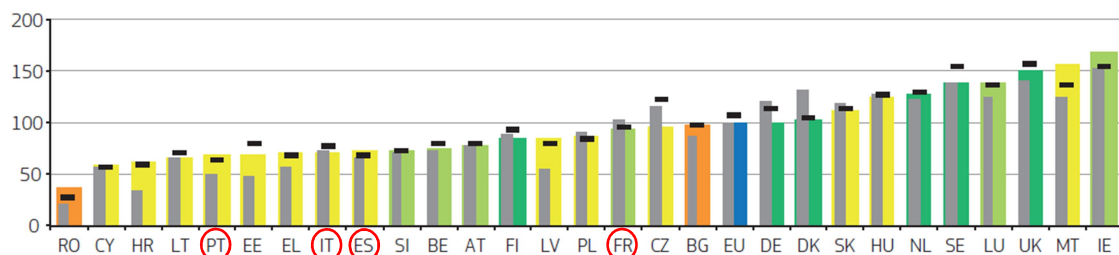
Figure 6.2 - Performance score of the studied countries' innovation systems

(Source: European Innovation Scoreboard 2017)

From the four studied countries, France is the one with the best performance score and is classified as a strong innovator. As for the other three countries, they are all positioned as innovation followers, and in the following descending order, Portugal, Spain and Italy.

In the period 2010-2016, in all four countries the performance scores were kept more or less stable. France had in this period a slight increase in 2016, while the other three countries in 2016 had a small score decrease, relative to all the previous years.

In figures 6.3 and 6.4 are shown the impacts indicators in terms of employment and sales.



Coloured columns show Member States' performance in 2016, using the most recent data for the indicators in this dimension, relative to that of the EU in 2010. The horizontal hyphens show performance in 2015, using the next most recent data for the indicators in this dimension, relative to that of the EU in 2010. Grey columns show performance in 2010 relative to that of the EU in 2010.

Figure 6.3 – Employment Impacts

(Source: European Innovation Scoreboard 2017)

In terms of impacts in employment, all four studied countries are below EU average, with France standing in the middle of the list, followed by Spain, Italy and Portugal but all three in the bottom part.

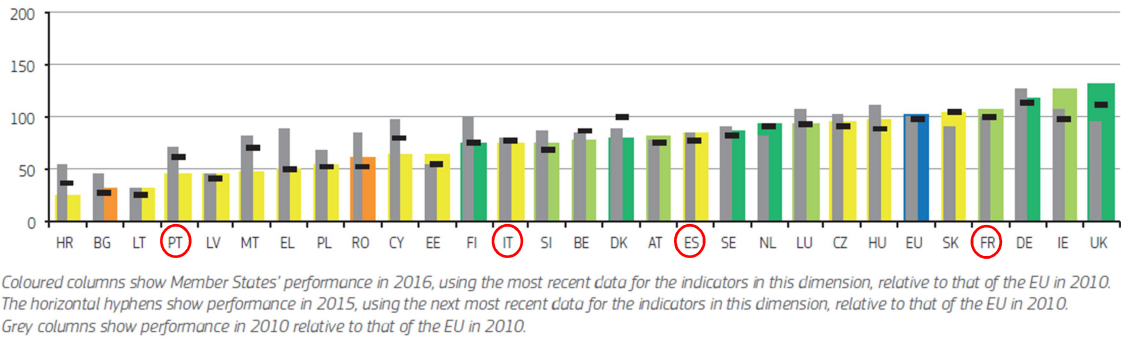


Figure 6.4 – Sales Impacts
(Source: European Innovation Scoreboard 2017)

As for the impacts in sales, France is near the lead and above EU average. Spain and Italy follow in the middle part of the list, and Portugal stands in the bottom part.

Therefore, France stands out clearly in terms of innovation performance and impacts in employment and sales, when compared to the other three countries.

R&D incentives comparison:

For this analysis it was used the OECD R&D Tax Incentives Indicators (<http://oe.cd/rdtax>) from March 2017. In the next figure is presented a global view of the type of public funding (direct or indirect support).

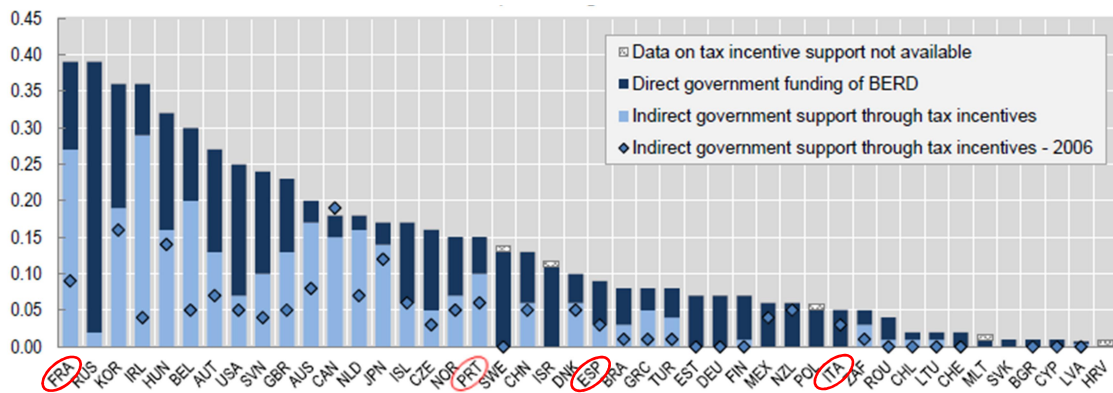


Figure 6.5 – Direct government funding of business R&D and tax incentives for R&D, 2014
As a percentage of GDP
(Source: OECD, R&D Tax Incentive Indicators, 2017)

According to this OECD ranking, France is in the top position, Portugal comes after in a position above the median. Spain is positioned close to the median, and Italy is more to the bottom tier.

Central Government support for business R&D in the studied countries (in 2014):

- France – 0.39% of GDP, in which 69% are tax incentives;
- Portugal – 0.15% of GDP, in which 67% are tax incentives;
- Spain – 0.09% of GDP, in which 33% are tax incentives;
- Italy – 0.05% of GDP, in which 6% are tax incentives.

As for the innovation performance, also France stands out clearly in terms of Central Government support for business R&D when compared to the other three countries.

6.2 FRENCH TAX INCENTIVE PROGRAMS – “CIR - CREDIT D’IMPOT RECHERCHE” AND “CII - CREDIT D’IMPOT INNOVATION”

In France the R&D tax incentive system CIR, was created in 1983, with continuous updates over time, the last one in 2014. The CII was implemented in 2013 and targets innovation, is exclusive for SME’s, and works together with the CIR.

These incentives are fundamental instruments for French public policies in order to foster research and innovation in firms, and increase the attractiveness of the French territories to investment in these areas.

The considered R&D expenses are in the areas of fundamental research, applied research and experimental development, in the case of innovation the considered expenses are for the development of prototypes or pilot installations for new products.

The CIR considers the following expenses in R&D: human and material resources affected to the projects; outsourced R&D work; patents and their defence, technological watch or standardization.

Applications to CIR are made by each individual project of the firm.

The eligible expenses, broadly, are:

- Depreciation of fixed assets, used in the research operations of the project;
- Personnel expenditure of researchers and research technicians exclusively involved in the project. Expenditure with PhD’s or equivalent degree, count for 200% in the first 24 months following the individual hiring in permanent contracts;
- Project operating costs: non-exclusive personnel costs at 50% (200% in the case of PhD’s as above), other direct and indirect costs at 75%;
- Subcontracted R&D operations in the private sector to organizations or individuals with a certificate of approval from the Ministry of Research. In the case of outsourcing to public organizations the costs are accounted at 200%;
- Fees for patent filling, patent maintenance, and expenses for patent defence;
- Some standardization expenses and also some technology watch expenses.

For the innovation expenses are considered: human and material resources, and outsourced works. A product, tangible or intangible property to be considered innovative must comply with both these dispositions:

- It must not be available in the market;

- It must distinguish from existing or previous ones, in terms of superior performance, eco-design, ergonomics or functionalities.

For the eligible expenses, firms can deduct 30% of R&D expenses up to 100 million euro limit; the tax is increased to 50% for overseas territories. For values over 100 million euro, the tax credit is set to 5% of the R&D expenses.

In the innovation expenses case, the tax credit is of 20%, up to a 400k€ limit per year. This tax is increased to 40% for overseas territories.

If the tax credit is higher than the tax to be played by the firm, the difference can be carried over up to the three following fiscal years. At the end of this period if any tax credit remaining value, will be refunded to the firm.

In some particular cases the firms can obtain an immediate refund:

- New firms, in its first year and the following four years;
- Start-ups and SME's;
- Firms subject to amicable settlement or safeguard procedure, court-ordered reorganisation or winding up, can obtain refund for tax credits obtained before entering the in the processes.

Any Firm can assign as collateral or a discount over a credit, the excess of the tax credits not yet charged or refunded (Mobilization of the CIR).

Any firm can also use the Pre-financing of the CIR, which allows them to have access to an advance cash contribution to cover their R&D expenses from the year they are incurred without waiting for the following year to recover the CIR. The Pre-financing can be granted by a funding agency or a bank.

The CIR also gives firms an option to request for an advance approval about the eligibility of an R&D project before its start. An answer should be given within three months, otherwise is assumed its agreement.

Another feature of the system is the request for control, in which firms can ask for a control over the CIR applied to their projects.

6.3 SPANISH TAX INCENTIVE PROGRAMS – “DEDUCCIONES FISCALES POR PROYECTOS DE INVESTIGACIÓN+DESARROLLO Y/O INNOVACION TECNOLÓGICA”

Spain has a tax credit program that is included in the country general tax law, this kind of incentive was introduced in 1995, and the current version is from 2014.

The eligible expenses are set in two main activities, Research&Development and Technological Innovation, and apply to all kind of firms.

In Research&Development are included activities of fundamental research and applied research in the scientific and technological scope, and the application of such research, or

other scientific or technological knowledge, in the development of new materials or products, setting of new production processes or systems, or for the substantial improvement of existing materials, products, production processes or systems.

For the Technological Innovation are included activities that result in technological advances that allow the creation of new products or new production processes, or a significant technological improvement of the existing ones.

The eligible expenses of the above mentioned activities are computed as follows:

- Research&Development:
 - o Direct costs (detached by project) – which include personnel, depreciations of assets directly related with each project, and outsourcing activities (buildings and land are excluded) – at a 25% rate;
 - o The costs with qualified investigation personnel fully dedicated to R&D activities have a 17% bonus rate increase, to the 25% rate above mentioned;
 - o In the case of firms that have an increase in the R&D expenses, when compared to the average of the two previous years, to the difference it will be applied a 42% rate;
 - o Depreciation of tangible and/or intangible assets exclusively for R&D activities (excluding buildings and land) at a 8% rate;
 - o Any financial direct support that the firm has received for R&D activities will be deducted from the tax credit.

- Technological Innovation:
 - o A 12% rate is applied to:
 - Activities of technological diagnostics regarding the guidance and definition of advanced technological solutions;
 - Industrial design and production process engineering;
 - Acquisition of IP, such as patents, licences, “know how” or designs (the eligible expenses in this item are limited to 1 million euro);
 - Costs for obtaining quality certificates, such as ISO 9000 series or similar.

The tax credit can be applied by the firm in the following 18 years to the fiscal year it occurred. In the case of new firms or non-profit firms, the above deadline will only start counting from the first year of positive results.

The tax credit, in a given fiscal year, is limited to 1 million euro for the Technological Innovation activities alone, and to 3 million euro for the Research&Development and Technological Innovation together.

If the firm R&D expenses in a given year exceed 10% of turnover, the tax credit for Research&Development activities can increase up to a limit of more 2 million euro, with the application of a 20% discount to the eligible expenses.

Firms that cannot use in a given year the total amount of its tax credit (under certain circumstances) can apply for a refund of the reminiscent values.

6.4 ITALIAN TAX INCENTIVE PROGRAMS – “CREDITO D’IMPOSTA R&S”

The Italian tax credit program was introduced in 2006, and the current program was updated in 2015 and will be in use until 2020.

The Italian R&D tax credit program aims at encourage firms to invest in R&D activities. The program is open to any firm, nevertheless they must invest in the qualified R&D activities at least 30k€ per year and also should maintain R&D qualifying costs between 2015 and 2020. The maximum annual credit by beneficiary is of 20 million euro from 2017 to 2020 (it was only 5 million euro in 2015 and 2016).

The eligible expenses are fundamental research, industrial research and experimental development. Broadly these are the considered expenses:

1. Personnel involved in the R&D activities*;
2. Depreciation of assets related with the R&D activities;
3. Outsourced R&D activities and R&D projects in joint-venture, with other firms, Universities or Research Institutes;
4. Technical expertise, industrial and biotechnological patents.

(* - in 2015 and 2016 PhD, or equivalent, personnel involved in the R&D activities could compute 50% of its costs in the eligible expenses, and other personnel would compute only 25%. From 2017 onwards there is no distinction between highly qualified personnel and non-highly qualified personnel expenses, being all costs with personnel computed at 50% for the eligible expenses.)

For the calculation of the eligible expenses, the rate is of 50% of the above considered expenses (1 to 4) from 2017 to 2020 (in 2015 and 2016 the expenses in 3 and 4 only were computed at 25% for the eligible expenses).

The tax credit is computed to 50% of the increase of the annual R&D eligible expenses of the firm, taking as a base the average annual R&D expenses incurred by the firm between 2012 and 2014.

New firms that were constituted after 2012, the average of the investment in R&D activities is calculated from the date of foundation of the firm.

The amount of tax credit can be used by the firm to either reduce the amount of annual income tax, for the regional tax of productive activities, or for social security contributions.

Firms that in a specific fiscal year have an income tax lower than the tax credit, the residual value can be used in subsequent fiscal periods.

For any doubts about specific aspects of the application of the tax credit legislation, one can address the questions to the *Agenzia delle Entrate* (Italian Investment Agency). Firms can also

ask to the *Ministero dello Sviluppo Economico* (Italian Ministry of Economic Development) for information about the eligibility of the R&D activities in which the firm wants to apply for the tax credit.

6.5 TAX CREDIT COMPARISON OF THE STUDIED COUNTRIES

For an easier understanding of the similarities and differences between the current tax credit programs of each country, a table was prepared and is shown in the annex 5.

The introduction of the tax incentives in these countries is very variable, in France this kind of program started in 1983, over ten years later Spain (1995) and Portugal (1997) implemented their programs. And it was necessary around another ten years to Italy to implement a R&D Tax Credit program.

About the considered activities, the Spanish and French programs consider along with the R&D activities, also Innovation activities, being a way to consider the innovation that is produced in companies that probably do not have a formal R&D system implemented, but are innovative. This is a feature that most likely benefits SMES's and new companies.

Relatively to the eligible R&D expenses they are more or less equivalent, apart from some particular costs that are increased to discriminate them positively. These increased costs include special conditions for qualified investigation personnel (Portugal, Spain and France) and special conditions for SME's (Portugal).

As for the applied base rates the most favourable is Portugal (32.5%), followed by France (30% up to 100M€ and 5% above 100M€) and Spain (25%). Italy's program does not have a base rate, only has an incremental rate of 50%. Portugal also has an incremental rate of 50% and Spain has a 42% incremental rate. Portugal legislation considers a 15% increase in the base rate for SME's with less than 2 years old, as they cannot apply to the incremental rate. France does not have an incremental rate.

Some countries also include limits to the allowed tax credit, Spain limits the credit to 3M€ (including the innovation tax credit part) and Portugal limits the incremental credit to 1.5M€.

About the innovation activities that are considered both in the Spanish and French programs, Spain has a more developed and targeted legislation. France has a 20% rate with a 400k€ limit and Spain has a 12% rate with a 1M€ limit.

All programs allow the carry over or the tax credit, Italy with no limit, Spain up to 18 years, Portugal up to 8 years, and France up to 3 years. In France after the 3 years carry over limit any residual credit is refunded to the company.

The Spanish program allows, under certain circumstances, that the unused tax credit to be refunded. The French program goes even further allowing an immediate refund of the tax credit to new firms up to four years, Startups and SME's, and to other firms under certain circumstances.

The French program also allows that a firm can assign the excess of the tax credit not yet charged or refunded, as collateral or a discount over a credit. Companies can also use the tax credit as a pre-financing grant over a funding agency or a bank.

In France the tax credit is never lost, as even if the company goes into a winding up process, the tax credit is assumed as an asset of the company.

As for the Italian program, it allows the tax credit to be used to pay for regional taxes or social security contributions.

As for other features that are considered important to take notice, are the in advance request to the eligibility of the R&D project before its start (France), or the eligibility of the R&D activities in which the firm wants to apply for the tax credit (Italy).

The French program allows companies to request for control over the tax credit applied to the projects.

7 INTERVIEWS WITH COMPANIES

In this study, we conduct a qualitative analysis in order to gather feedback from companies that have experience in the use of the Portuguese tax credit program (SIFIDE II), a set of interviews have been made to this purpose.

Traditionally companies are broadly divided in two main types, small and medium companies (SME's), and large firms. Over the last years there is a new type of companies that are set up in order to develop new businesses related to R&D and Innovation, which are the start-ups.

The path of companies for incorporating innovation is different, according to its type and maturity stage. In the next figure there is a representation of the starting point and expected future position, for each type of company, according to its Innovation vs Maturity.

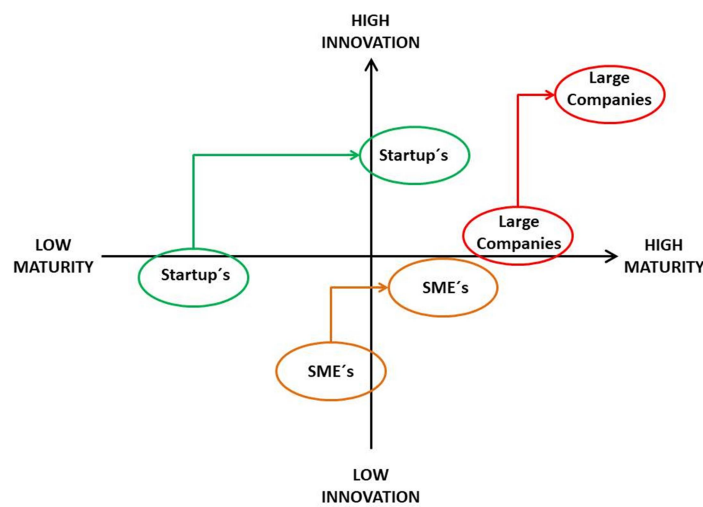


Figure 7.1 – Companies Path – Innovation vs Maturity
(Source: Developed by the author)

This indicates that each one of the three types of companies has different approaches for R&D and Innovation activities, which means that their view over the SIFIDE II also will be different. In the interviews it was possible to have feedback from companies 5 companies, 2 large companies, 1 SME, and 2 Start-up's. The interviews were made between 31 of July and 9 of September 2017.

The interviews occurred has a conversation in order not to induce the answers and to obtain an honest feedback, but a number of questions were set to use as a guide line common to all interviews and also in order to address all the intended aspects (see the interview questionnaire in annex 6).

The questionnaire was set with the objective of understanding, at first, if the companies had experience with the program and the type of projects they apply and why they apply. Followed by questions about the experience of going through the process, and finally understand the company's view about the program.

Here we sum-up and outline the main aspects of the answers to each question:

1 – The company uses (or has already used) the SIFIDE II tax credit program?

- Large companies – one uses SIFIDE II regularly and the other wants to use the R&D tax credit in a near future project that they are planning;
- SME – uses the program in a regular basis;
- Start-ups - one of the start-ups used it in 2014 and 2015, but decided not to apply in 2016, as they still have their tax credits unused. The other uses the program in a regular basis, but the process is made by a third company with connection to its main investor with no costs for the start-up. If they had to manage the application indoors they would not apply to the Tax Credit, because they have more important work to do than to lose time to apply to a Tax Credit that they do not know if they ever are going to use!

2 – Which kind of projects do you submit?

- Large Companies and SME - submit either individual projects, or projects developed in partnerships with other companies, research institutes or higher education institutions;
- Start-ups - submit the project in which they are developing their business.

3 – Reasons to submit applications?

- Large Companies and SME - To obtain a tax surplus for immediate use;
- Start-ups - To obtain a tax surplus for possible future use;
- All Companies - The existence of the program does not take any influence in the company's decision to do R&D;

4 – Difficulties in implementation?

- Large companies and SME - Difficulties in understanding if a project (or to what in a project) can be considered R&D according to the SIFIDE II specifications;
- All Companies:
 - o The elaboration and submission process is not difficult;
 - o Companies must have implemented a properly organized accounting system in order to have all R&D expenditures properly allocated.

5 – Barriers in use?

- SME and Start-ups:
 - o The managing entity of SIFIDE II should produce reports with more explicit information about the considered/not considered expenses, and the reason why. So that companies can improve their future applications;
 - o Difficulties in countering the managing entity decision;
 - o Difficulties in getting in direct contact with the managing entity;
- Large companies and SME - Lack of prior information on the possible acceptance of the project.

6 – Company perspective on SIFIDE II?

- All Companies:
 - o Important to promote R&D;
 - o PhD's increase rate is important;
 - o Can be used combined with other incentives programs;
 - o No limits in the number of R&D projects to submit or the amount of expenses;
 - o Useful for most companies in order to get a tax reduction;
 - o It does not change the company's decision to do or not a R&D Project. By itself does not create a trigger for a company to innovate;
- Start-ups - Should be adapted to new companies, especially for start-ups. In start-ups there may not have the opportunity of use the tax credit;

7 – Suggestions for amending / improving the current program;

- Large companies - Consider some changes in the incremental rate. Companies that have R&D activities in a regular basis do not have the opportunity to use this incremental rate as they have a relatively stable R&D expenditure.
- SME:
 - o Improvement of the managing entity reports information and feedback;
 - o Consider to include specific features to innovation activities;
- Start-ups:
 - o A procedure to obtain a possible refund of the tax credit;
 - o In the case of winding up of the company, the possibility of the unused tax credit not being lost and could be used as an asset at least to be able to pay for debt to the state such as social security contributions and other taxes.
 - o Use the tax credit to pay debt to the state such as social security contributions and other taxes;
 - o Be able to use the tax credit as a collateral for a loan or credit with a financial institution;
 - o Be able to request for an advance payment, over a reduction of the tax credit amount.

From the above we can summarize that companies see SIFIDE II as complementary tool for obtaining a tax surplus over R&D activities that they realize, and is not the trigger for the decision of development of R&D activities. Nevertheless the program is considered to have some impact in the promotion and spread of awareness about R&D activities.

The program is considered to be not difficult to apply for, although there are some doubts of the kind for activities/projects that the managing entity can consider as R&D.

Traditional SMEs, by their nature, are more inclined to develop indoor innovation activities or projects, rather than R&D activities.

The program must be adapted to the specificities of start-ups.

8 CONCLUSIONS

The present study was undertaken in order to provide an analysis of how companies use the R&D Portuguese Tax Credit Program, SIFIDE II, set up suggestions for improvements/amendments in the current program in order to make it more attractive and functional to the actual business reality.

This work is structured with a literature review which includes the OECD data and recommendations, and published scientific studies on this subject. A description of the internationally most accepted definitions of R&D and Innovation activities is presented in chapter 3. Chapter 4 addressed the diversity of R&D direct support programs that currently are running in Portugal, and how they cover the specificities of a diverse range of business types and project stages. In chapter 5 an analysis of the SIFIDE II Tax Credit Program is provided, starting with an historical overview of its evolution over the years since its implementation in 1997; and the exploration of the available data, in the studied period 2010-2015, from the Portuguese Tax Authority and from the IPCTN (Inquiry about the Scientific and Technological Potential). A comparison benchmark of the Portuguese Tax Credit Program with other OECD and EU countries (France, Spain and Italy) is provided in chapter 6. Finally in chapter 7 are presented the feedback of the interviewed companies about the SIFIDE II Program.

According to the Literature Review, political decision makers worldwide are increasingly aware that innovation is a key factor for a competitive and sustainable future growth of the economy. The European Commission has set clear objectives in his policies in order to foster R&D activities in the EU, and publishes periodic reports on the subject. OECD also gives special attention to these issues with periodic publications of statistical information, and sets recommendations about R&D policies.

In OECD countries, more than 2/3 of the R&D investment is made by the business sector, and the support to the R&D activities is assumed as an incentive to companies to start or maintain their R&D efforts.

Policies for support and promote business R&D are divided into two types, direct support (mainly subsidies) or indirect support by providing tax incentives (such as tax credits). In recent years, fiscal incentives have increased their relative importance when compared to direct support.

In OECD countries, there is a growing attention to provide differential treatment applied to SME's and young companies, by allowing more favourable conditions in the tax incentive programs.

The design of the support programs must have into consideration the existing tax system, and a dynamic approach and evaluation should be implemented in order to understand the co-dependency between the tax system and the R&D support programs. This way the incentives could be adjusted to its optimal level, however this is very difficult to implement in practice.

When companies apply to these programs they must specify the involved activities and its costs. The definitions of R&D or Innovation activities vary according to the specific country jurisdiction, but are normally based in the internationally accepted and used definitions of the

OECD Frascati Manual 2015 for R&D activities and in the OECD Oslo Manual 2005 for Innovation activities.

In the specific case of Portugal, a diversified number of programs for direct support of R&D and Innovation for companies are currently available. These direct support programs present a good coverage of the business sector, according to the firms' size or nature, and to the business stage of the project.

In the tax incentives side, Portugal has currently running, and until 2020, the SIFIDE II program which provides to companies a tax credit amount, over their R&D expenditure, that can be used to reduce the tax to pay due to the fiscal year profits.

In the studied period 2010 to 2015, there was a significant increase in the number of companies that were allowed the benefit of a R&D tax credit. The number almost doubled from 446 companies in 2010 to 802 in 2015.

Relatively to the global amount of conceded tax credit, the value increased around 28%, from 82.7M€ in 2010 to 106.4M€ in 2015. Nevertheless there is a high discrepancy in terms of the distribution of these credits, as the top 1% companies represent from 2010 and 2015 around 1/4 to 1/3 of the allowed tax credit, and the top 10% companies represent, in the same period, around 2/3 of the conceded tax credit. So the other 90% companies were allowed only 1/3 of the allowed tax credit!

In Portugal, the total amount of declared R&D expenditure in companies decreased about 18%, from 1266M€ in 2010 to 1037M€ 2015. And although the country's GDP returned to grow from 2014, the R&D expenditure in terms of GDP in the period 2010-2015 both in the business sector and globally decreased, from 0.70% to 0.58% and from 1.53% to 1.24%, respectively. This leaves Portugal even further away from the 3% target set by the European Commission to 2020.

During this period, the investment of companies in R&D activities represented almost half of the total R&D expenditure in Portugal. And there was also a continuous increase of the number of companies that declare R&D expenditure; from 2010 to 2015 the increase was of 36%.

In terms of R&D activities, the business sector spend about 2/3 of their R&D expenditure in Experimental Research, about 1/3 in Applied Research and only a residual amount in Basic Research. This is an expected result as companies are more close to market.

In a global overview, the return rate of the allowed tax credit comparatively with the R&D expenditure of companies has steadily increased from 7% up to 10% in 2015. As for the companies that benefit from the SIFIDE II tax credit and also are in the top 100 of R&D expenditure, its number has increased from 25 firms in 2010 to 33 in 2015, and the total cover rate of the sum of the tax benefits over the R&D expenditures was in average higher than the cover rate of the global overview, but there still is margin to improve this numbers.

The disclosure of more detailed information such as the size of the company and its R&D expenditure, the applied and conceded amount of tax credit, the used tax credit, the average

carry over time lapse and unused tax credit due to extinguished companies, would help in the interpretation of the figures and help the future improvement of the program itself. This could be achieved with the publication of a regular periodic report about the execution of the SIFIDE II program, similar to the one published in 2010 by the SIFIDE managing entity with the SIFIDE execution 2006-2008, "SISTEMA DE INCENTIVOS FISCAIS À I&D EMPRESARIAL: 2006 – 2008"⁴¹, available only in Portuguese.

According to the benchmarking of the tax credit programs with France, Spain and Italy, the SIFIDE II in its structure is in line with the French and Spanish programs, since the Italian programs is more restrictive.

The Portuguese program presents the higher base rate, with no tax credit limit. It also presents some specific conditions for PhD personnel and SMES.

Analysing the benchmarking of the SIFIDE II Program with the other countries programs, and crossing this with the feedback from the interviews with the companies, it is possible to suggest some amendments to the Portuguese tax credit program, such as:

- Request for an advance approval of the R&D project before its start;
- Adapt the program for start-ups including:
 - o A procedure for obtaining a possible in advance refund of the tax credit over a reduction of such credit, or;
 - o The possibility to use the tax credit to pay social security contributions or other taxes, or;
 - o Use the tax credit as a collateral for a loan or a credit with a financial institution;
- In the case of the winding up of the company, be able to use the tax credit as a company asset;
- Consider to include specific features in the SIFIDE II program, or create a specific program for innovation activities.

For further research is important not only to continuously evaluate this kind of study over the following years with an increase in the number of the sample, but also try to characterize the mix of R&D incentives (direct and indirect) that Portuguese companies apply and use in their benefit, and its evolution.

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Portuguese R&D Tax Credit Program, SIFIDE II. How companies use it?

10 ANNEXES

Annex 1 - Main features of R&D tax incentives provisions in selected OECD and non OECD countries, 2015

Expenditure-based R&D tax incentives			
Corporate income tax			Social security/payroll withholding tax
R&D tax credit		R&D tax allowance	
Volume	Incremental/hybrid		
<i>Taxable:</i> Australia, Canada, Chile, United Kingdom (large companies) <i>Non-taxable:</i> Austria, Belgium (incompatible with allowance), Denmark (deficit only), France, Iceland, Ireland, New Zealand (deficit only), Norway, Hungary	<i>Taxable:</i> United States (credit on fixed, indexed base and incremental for simplified credit) <i>Non-taxable:</i> Italy (Legge di Stabilit� 2015), Japan, Korea, Portugal, Spain	<i>Non-taxable:</i> Belgium, Brazil, China, Czech Republic (hybrid), Greece, Hungary, Netherlands, Poland (R&D Centres), Russian Federation, Slovenia, Slovak Republic (hybrid and volume-based), South Africa, Turkey (hybrid), United Kingdom	<i>Taxable:</i> Belgium, France, Netherlands, Hungary, Russian Federation, Spain, Sweden, Turkey
Treatment of excess claims			
Refund			
Australia (SMEs), Austria, Belgium (after five years), Canada (SMEs), Denmark, France (SMEs), Iceland, Ireland, New Zealand, Norway, United Kingdom (large companies)	Spain (reduced, payable credit optional)	United Kingdom (SMEs)	<i>Automatic refund through wage system</i>
Carry-forward			
Australia, Belgium, Canada, Chile, France, Ireland	Korea, Portugal, Spain (unreduced, non-payable credit), United States	Belgium, China, Czech Republic, Greece, Poland, Netherlands, Russian Federation, Slovenia, Slovak republic, South Africa, Turkey, United Kingdom	<i>Not applicable</i>
Enhanced tax credit/allowance rates or more favourable terms			
SMEs			
Australia, Canada, France, Norway	Italy (innovative start-ups), Japan, Korea, Portugal (start-ups)	United Kingdom	Belgium (young innovative firms), France (JEI/JEU), Netherlands (start-ups), Spain (innovative SMEs)
Collaboration			
France	Italy, Iceland, Japan	Hungary	Belgium
Limitation of benefits			
Threshold-dependent credit rates			
Canada (SMEs), France			Netherlands, Russian Federation
Ceilings on amount of eligible R&D expenditure or value of R&D tax relief			
<i>R&D expenditure:</i> Australia (floor and cap), Canada (SMEs), Chile, Denmark, Iceland, Norway <i>R&D tax relief:</i> Hungary, New Zealand (deficit only)	<i>R&D expenditure:</i> Italy (floor), Portugal (incremental) <i>R&D tax relief:</i> Italy, Japan, Korea (large firms), Spain, United States	<i>R&D tax relief:</i> Hungary (R&D collaboration), United Kingdom <i>R&D expenditure and R&D tax relief:</i> Slovak Republic (volume-based tax allowance)	<i>R&D expenditure:</i> Hungary <i>R&D tax relief:</i> France, Sweden, Turkey (five year limit)
Accelerated depreciation provisions for R&D capital			
Belgium, Brazil, Chile, China, Denmark, France, Israel (non R&D specific), Poland, Russian Federation, Spain, United Kingdom			
No expenditure-based R&D tax incentives			
Estonia, Finland, Germany, Luxembourg, Mexico, Switzerland			
Preferential tax treatment of income derived from R&D or other innovation activities			
Belgium, China, France, Greece, Hungary, Ireland, Israel, Italy, Korea, Luxembourg, Netherlands, Portugal, Russian Federation (Technology and Innovation Special Economic Zones), Spain, Switzerland (Canton of Nidwalden), Turkey (Technology Development Zones), United Kingdom			

Source: OECD, R&D Tax Incentives Database, www.oecd.org/sti/rd-tax-stats.htm, December 2015.

Annex 2 - Resume of the main articles

Ref. Nr.	Authors	Title	Year	Geographical Area of the Research	Cited by	Main Highlights for this research	Author Keywords
6	Corchuelo M. B., Martínez-Ros E.	Who Benefits from R&D Tax Policy?	2010	Spain	10	Tax incentives awareness in the industry is low; Large firms use more Tax incentives than SMEs; Tax incentives policies are in average positives.	R&D fiscal incentives; matching methods
7	Busom I., Corchuelo B., Martínez-Ros E.	Tax incentives... or subsidies for business R&D?	2014	Spain	6	Direct support is more suitable for firms that do not have previous R&D activity (large firms or SMEs); Tax incentives help firms to continue or increase R&D activities; SMEs in financing difficulties prefer subsidies than to make use of tax incentives for R&D activities.	Innovation; Policy mix; R&D; SMEs; Subsidies; Tax incentives
8	Castellacci F., Lie C.M.	Do the effects of R&D tax credits vary across industries? A meta-regression analysis	2015	OECD	4	Tax incentives effects vary across different firm sectors; Tax credits have higher effect in SMEs and in the service sectors.	Meta-regression analysis; R&D policy; R&D tax credits; Sectors
9	Radas S., Anić I.-D., Tafro A., Wagner V.	The effects of public support schemes on small and medium enterprises	2015	Croatia	2	Public support to R&D activities makes a difference in the firms that use it, when compared with firms that do not use it.	Absorptive capacity; Developing country; Direct grant; Innovation; R&D; SME; Subsidy; Tax incentive
10	Noked, N.	Integrated Tax Policy Approach to Designing Research & Development Tax Benefits	2014	OECD	5	The tax system and the R&D supports programs co-dependency must be understood in order to adjust the incentives into its optimal level.	
11	Kasahara, H., Shimotsu, K., Suzuki, M.	Does an R&D tax credit affect R&D expenditure? The Japanese R&D tax credit reform in 2003	2014	Japan	5	An increase in the tax benefit has a positive effect on R&D expenditure of firms.	R&D; Tax credit; Financial constraint; Japan
12	Sadiq, K.	Powering innovation through tax concessions: the changing research & development tax incentives	2014	Australia	0	Tax incentives for R&D activities may probably be better accepted by the general public, rather than subsidies.	
13	Thomson, R.	Measures of R&D Tax Incentives for OECD Countries, Review of Economics and Institutions	2013	OECD	5	Comparison of relative generosity of tax incentives among 26 OECD countries.	R&D; Tax incentives; Data

Annex 2 - Resume of the main articles

Ref. Nr.	Authors	Title	Year	Geographical Area of the Research	Cited by	Main Highlights for this research	Author Keywords
14	Baliamoune-Lutz, M.	Taxes and entrepreneurship in OECD countries	2015	OECD	5	How taxes and tax progressivity affect entrepreneurship.	
15	Bratten, B., Hulse, D. S.	Retroactive Tax Legislation, Reported Earnings, and Investors' Responses to Earnings "Surprises"	2016	USA	4	Retroactive extensions of temporary tax rules effects in firms earnings.	R&D credit; earnings expectations; effective tax rates
16	Carvalho, A	Financiamento Público à I&D Empresarial em Portugal (Public financing to business R&D in Portugal)	2013	Portugal		Discussion about the role and limits of public policies in stimulating R&D. Estimation of the weight of the public investment in business R&D in Portugal and the analyse of its evolution between 1997 and 2010.	

Annex 3 – Portuguese Tax Credit Program Evolution Over Time

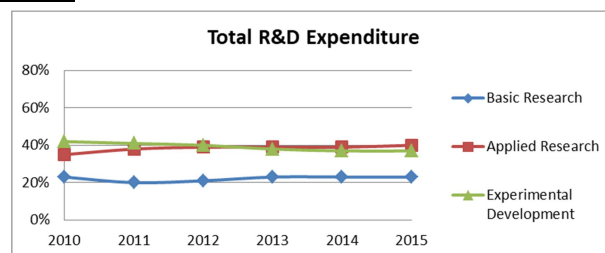
Tax Credit Program	SIFIDE				SIFIDE II	
	DL 292/97	DL 197/2001	Lei 40/2005	Lei 10/2009	Lei 55A/2010	DL 162/2014
Legislation	DL 292/97	DL 197/2001	Lei 40/2005	Lei 10/2009	Lei 55A/2010	DL 162/2014
Fiscal year of start	1997	2001	2005	2009	2011	2014
Fiscal year of end	2000	2003	2009	2010	2013	2020
Considered Activities	Research&Development	Research&Development	Research&Development	Research&Development	Research&Development	Research&Development
Eligible Expenses R&D	Costs with new tangible fixed assets	Costs with new tangible fixed assets	Costs with new tangible fixed assets	Costs with new tangible fixed assets	Costs with new tangible fixed assets	Costs with new tangible fixed assets
	Expenses with personnel	Expenses with personnel	Expenses with personnel	Expenses with personnel	Expenses with personnel	Expenses with personnel
	Operating expenses	Operating expenses	Operating expenses	Operating expenses	Operating expenses	Operating expenses
	Outsourced R&D activities	Outsourced R&D activities	Outsourced R&D activities	Outsourced R&D activities	Outsourced R&D activities	Outsourced R&D activities
	Fees for patent filling and patent maintenance	Fees for patent filling and patent maintenance				Fees for patent filling and patent maintenance
	Expenses with the acquisition of patents for R&D activities	Expenses with the acquisition of patents for R&D activities	Expenses with the acquisition of patents for R&D activities	Expenses with the acquisition of patents for R&D activities	Expenses with the acquisition of patents for R&D activities	
	Equity in R&D institutions or participation in investment funds for financing R&D firms	Equity in R&D institutions or participation in investment funds for financing R&D firms	Equity in R&D institutions or participation in investment funds for financing R&D firms	Equity in R&D institutions or participation in investment funds for financing R&D firms	Equity in R&D institutions or participation in investment funds for financing R&D firms	Equity in R&D institutions or participation in investment funds for financing R&D firms
	Expenses with managing personnel	Expenses with managing personnel	Expenses with managing personnel	Expenses with managing personnel	Expenses with managing personnel	Expenses with managing personnel
Expenses with audits to R&D activities	Expenses with audits to R&D activities	Expenses with audits to R&D activities	Expenses with audits to R&D activities	Expenses with audits to R&D activities	Expenses with audits to R&D activities	
R&D Base rate	8.0%	20.0%	20.0%	32.5%	32.5%	32.5%
R&D Incremental rate	30% (up to a 250k€ limit)	50% (up to a 500k€ limit)	50% (up to a 750k€ limit)	50% (up to a 1.5M€ limit)	50% (up to a 1.5M€ limit)	50% (up to a 1.5M€ limit)
Carry over of tax credit value to subsequent fiscal years	up to 3 years	up to 6 years	up to 6 years	up to 6 years	up to 6 years	up to 8 years
Special conditions for qualified investigation personnel	N/A	N/A	N/A	N/A	The incremental rate increases 20% for expenses with PhD personnel, and up to a limit of 1.8M€	Expenses with PhD personnel considered at a rate of 120%
Exclusive conditions for SME's	N/A	N/A	Fees for patent filling and patent maintenance	Fees for patent filling and patent maintenance	Increase of 10% in the base rate for firms with less than 2 years	Increase of 15% in the base rate for firms with less than 2 years
					Fees for patent filling and patent maintenance	Expenses with the acquisition of patents for R&D activities

 - Implemented changes.

Annex 4 – R&D Expenditure Distribution by Type of R&D activity

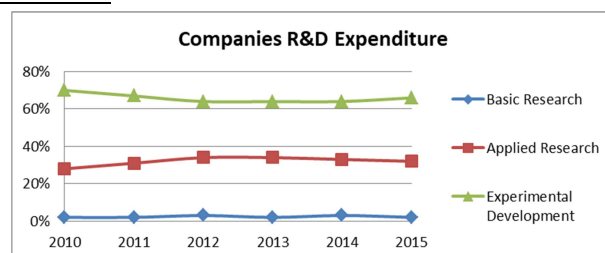
Total R&D Expenditure

R&D Activity	Total R&D Expenditure					
	2010	2011	2012	2013	2014	2015
Basic Research	23%	20%	21%	23%	23%	23%
Applied Research	35%	38%	39%	39%	39%	40%
Experimental Development	42%	41%	40%	38%	37%	37%



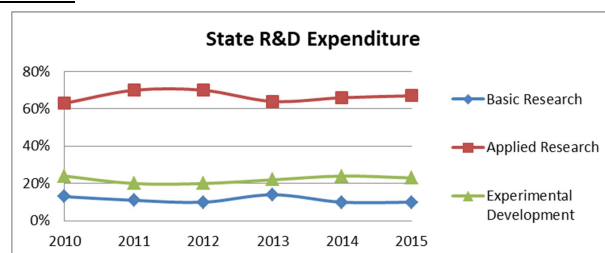
Companies R&D Expenditure

R&D Activity	Companies R&D Expenditure					
	2010	2011	2012	2013	2014	2015
Basic Research	2%	2%	3%	2%	3%	2%
Applied Research	28%	31%	34%	34%	33%	32%
Experimental Development	70%	67%	64%	64%	64%	66%



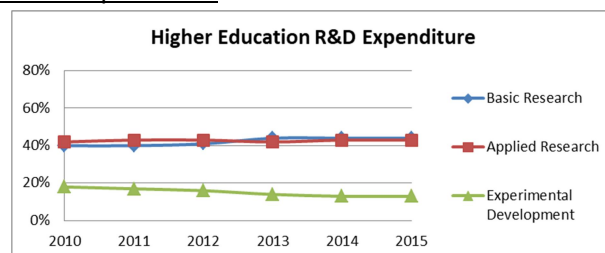
State R&D Expenditure

R&D Activity	State R&D Expenditure					
	2010	2011	2012	2013	2014	2015
Basic Research	13%	11%	10%	14%	10%	10%
Applied Research	63%	70%	70%	64%	66%	67%
Experimental Development	24%	20%	20%	22%	24%	23%



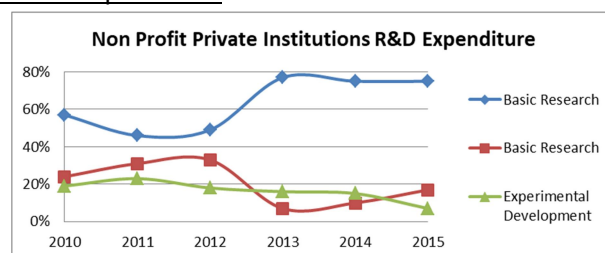
Higher Education Institutions R&D Expenditure

R&D Activity	Higher Education Institutions R&D Expenditure					
	2010	2011	2012	2013	2014	2015
Basic Research	40%	40%	41%	44%	44%	44%
Applied Research	42%	43%	43%	42%	43%	43%
Experimental Development	18%	17%	16%	14%	13%	13%



Non Profit Private Institutions R&D Expenditure

R&D Activity	Non Profit Private Institutions R&D Expenditure					
	2010	2011	2012	2013	2014	2015
Basic Research	57%	46%	49%	77%	75%	75%
Applied Research	24%	31%	33%	7%	10%	17%
Experimental Development	19%	23%	18%	16%	15%	7%



Annex 5 - R&D Tax Credit Programs Comparison

Tax Credit Programs	Country			
	Portugal	Spain	France	Italy
Introduction of tax incentives	1997	1995	1983	2006
Actual version	2014	2014	2014	2015
Considered Activities	Research&Development	Research&Development Innovation	Research&Development Innovation	Research&Development
Minimum expenditure in R&D	N/A	N/A	N/A	30k€
Eligible Expenses R&D	Costs with new tangible fixed assets	Depreciations of assets	Depreciation of fixed assets	Depreciations of assets
	Expenses with personnel	Personnel costs	Personnel expenditure	Personnel costs
	Operating expenses		Operating costs	
	Outsourced R&D activities	Outsourcing activities	Subcontracted R&D operations (outsourced activities to public entities have a 200% rate)	Outsourced R&D activities and R&D projects in joint-venture
	Fees for patent filling and patent maintenance	Depreciation of tangible and/or intangible assets (at a 8% rate)	Fees for patent filling, patent maintenance, and expenses for patent defence	Technical expertise, industrial and biotechnological patents
	Equity in R&D institutions or participation in investment funds for financing R&D firms		Some standardization expenses and some technology watch expenses	
	Expenses with managing personnel			
Expenses with audits to R&D activities				
R&D Base rate	32.50%	25%	30 % (up to 100M€ limit) 5% for values above the 100M€ limit	N/A
R&D Incremental rate	50% (up to a 1.5M€ limit)	42%	N/A	50%
Maximum allowed R&D tax credit	N/A	3M€ (together with the Innovation tax credit value)	N/A	30M€
Eligible Expenses Innovation	N/A	Technological diagnostics for guidance and definition of advanced technological solutions	Human and material resources	N/A
		Industrial design and production process engineering	Outsourced works	
		Acquisition of IP (patents, licences, "know how" or designs) (limited to 1M€)		
		Costs for obtaining quality certificates		
Innovation rate	N/A	12%	20%	N/A
Maximum allowed Innovation tax credit	N/A	1M€	400k€	N/A
Carry over of tax credit value to subsequent fiscal years	up to 8 years	up to 18 years	up to 3 years (refund of any residual value to the firm after the 3 years)	Yes
Special conditions for qualified investigation personnel	Expenses with PhD personnel considered at a rate of 120%	17% bonus rate for qualifies investigation personnel expenses	Expenses considered at 200% for the first 24 months of a permanent direct contract with a PhD.	N/A
Exclusive conditions for SME's	Increase of 15% in the base rate for firms with less than 2 years	N/A	N/A	N/A
	Expenses with the acquisition of patents for R&D activities			
Other program features	N/A	If the firm R&D expenses in a given year exceed 10% of turnover, the tax credit can increase up to a limit of more 2 million euro, with the application of a 20% discount to the eligible expenses.	Immediate refund of the tax credit (new firms up to four years) (startups and SME's) (other firms in particular conditions)	The base the for calculation of the incremental value os expenses is average annual R&D expenses incurred by the firm between 2012 and 2014
			Any Firm can assign the excess of the tax credits not yet charged or refunded as collateral or a discount over a credit	New firms will set as base the average of R&D expenses since its foudation
		Firms that cannot use in a given year the total amount of its tax credit can, (under certain circumstances, apply for a refund of the reminiscent values.	Pre-financing granted by a funding agency or a bank	The tax credit can be used either to reduce the amount of annual income tax, for the regional tax of productive activities, or for social security contributions
			Request for an advance approval about the eligibility of an R&D project before its start	Request for information about the eligibility of the R&D activities in which the firm wants to apply for the tax credit
End of current program	2020	N/A	N/A	2020

Annex 6 – Interview Questionnaire

Interview Questions

Company: _____ Size: _____

Interviewed person: _____ Function _____

1 - The company uses (or has already used) the SIFIDE II tax credit program?

2 - Which kind of projects do you submit?

3 - Reasons to submit applications?

4 – Difficulties in implementation?

5 - Barriers in use?

6 - Company perspective on SIFIDE II?

7 - Suggestions for amending / improving the current program;