THE EU TAX TREATMENT COMPETITION FOR KNOWLEDGE BASED CAPITAL – THE SPECIAL CASE OF R&D

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Abstract

Globalization spurs the diffusion of knowledge and encourages firms to incorporate investments in innovation in their portfolios because knowledge based capital (research & development, intellectual property, organisational capital, skills etc.) is a key driver for competitiveness on all levels. This article aims to emphasize the differences in the R&D tax policy mix as a proxy for the knowledge based capital and analyse some R&D indicators for a number of 20 EU member states in order to sort and classify those countries in terms of R&D tax policy effectiveness. The results show that a higher corporate tax level even if is offset by a high tax subsidy does not lead to a high level business enterprise expenditure on R&D as a percentage of value added in industry. Moreover this paper highlights the need for designing a tax policy that promotes innovation and gauges the loopholes of the tax system that activate profit shifting strategies.

Keywords: *tax policy, competitiveness, knowledge-based-capital, cluster research, R&D, EU*

JEL Classification: *H25*

Introduction

The discrepancies in the income of developed countries are in part due to intangible assets besides the stock of labour and tangible capital resources (Caselli, 2005), so the future of the economy belongs to KBC (knowledge based capital) based economies.

Corrado et al. (2005) classified the KBC assets as belonging to one of the three categories: computerised information (software, database), innovative property (R&D, copyright and license costs, new financial products, new architectural and engineering designs) and economic competencies (brand-building advertisement, market research, workers training, management consulting, organizational capital). The key advantage of KBC based economies is the lack of constraints, as in the case of tangible capital that embedded features as rival use and scarcity.

Taxation is a flexible policy instrument through which governments can influence entrepreneurial decisions related to research, development and innovation. Thus, governments have designed R&D tax policies that spur their country's competitiveness and boost the country's attractiveness as a location for innovation.

In this article the focus will be on the R&D tax policy and other R&D related indicators due to the fact that R&D activities are the most popular area and proxy for KBC and have a higher share in value chains' creation.

This paper comprises a literature review regarding the impact of tax policy on R&D spending and a cross-country comparison which emphasizes the differences in the R&D policy mix and a cluster analysis of the R&D tax policy and other R&D indicators for a number of 20 EU states with the aim of capturing the effectiveness of these schemes.

Literature review

A fiscal instrument to foster R&D activity is represented by R&D tax incentives. R&D tax incentives are market-based instruments and could take the form of expenditure-based schemes (R&D tax credits, tax allowances and payroll withholding tax credits for R&D wages) or income-based schemes (a preferential tax rate for the taxable income derived from KBS). The generosity of R&D tax incentives is in an inverse relation to the B-index, that rate of pre-tax return required for 1$ of R&D expenditure, that depends on the R&D tax incentives and the corporate income tax rate. (Warda, 2001)

R&D tax incentives are positively correlated to private sector R&D spending for those countries that have a predictable policy environment and do not engage in reversal policy. The direct government support for private R&D has been positively correlated to private sector R&D spending from 2000 onwards. (Westmore, 2013)

Lokshin and Mohnen (2012) considered that incremental tax credits (the eligibility of R&D expenditures that exceed a specific amount) are more effective in terms of R&D spending than the volume-based tax credits.

Da Rin et al. (2011) concluded that higher corporate tax rates can diminish firm entry rates and thus KBC investment. Moreover KBC-based firms are disadvantaged because the corporate tax regimes support debt financing through interest payments deductions while these firms rely more on equity financing that is not tax deductible. (OECD, 2009a).

High marginal tax rates can reduce the after tax return of KBC investments but in the case of carry forward loses, a high proportion of the tax risk is shared with the government and the firm is encouraged to make this kind of investments. (Myles, 2009)

Regarding the R&D tax incentive policy effectiveness it was asserted that only incremental R&D tax incentives stimulate R&D (Duguet, 2007). A cost effectiveness analysis of R&D tax incentive policy was done by Pierre Mohnen and Boris Lokshin (2012) who concluded that the cost effectiveness ratio can fall below one for level-based tax incentives because governments support R&D activities that would be made regardless of the R&D tax policy. In such a situation the net welfare gain (the social return of R&D is greater than the compliance, administration, and opportunity costs of public funding) should be assessed in order to establish if the R&D tax incentive policy is efficient.

The R&D tax incentives may influence the behaviour of firms by decreasing the volume of R&D in the favour of increasing the price of R&D by establishing higher wages for R&D personnel and thus diminishing the effectiveness of R&D tax incentives between 10% (Lokshin and Mohnen, 2008) and 30% (Haegeland and Møen (2007). Also, Jaumotte and Pain (2005a) asserted that R&D subsidies were used for raising the wages and not for greater innovation creation.

Another consequence related to the R&D tax incentives and distorting company behaviour is the R&D duplication or current non-R&D activities labelled as R&D activities (Hall and Van Reenen, 2000).

The location decision for R&D is dependent on a set of factors such as the availability of a skilled workforce, engineers and scientists, strong intellectual property rights, higher industry-science linkages besides R&D tax incentives. Only when the factors are equalled weighted between several locations, the R&D tax incentive scheme measured by the B-index has a higher power in establishing the location of an R&D project.

Moreover, in terms of corporate tax burden effects on the location of intellectual property, Dischinger and Riedel (2010) found that a reduced volume of intangible assets is associated with an increase in the tax burden in subsidiaries of multinational groups (a decrease in the average tax difference to other affiliates by 1 percentage point raises the subsidiary's level of intangible assets by 1.6%). So a higher tax rate not compensated by a sufficient tax subsidy can decrease patenting activity.

Methodology of research

The purpose of this research is twofold: a cross-country comparison which emphasizes the differences in the R&D policy mix and a cluster analysis of the R&D tax policy and other R&D indicators for a number of 20 EU member states with the aim of capturing the effectiveness of these schemes.

Several indicators were considered to be included in the cluster analysis: the tax subsidy for large firms (computed as 1-B-index; it is considered that if the difference between 1 and B-index is positive the result represents a tax subsidy, while a negative result means tax burden); the business enterprise expenditure on R&D as a percentage of value added in industry, the level of corporate taxation (taking into account the overall corporate tax level: corporate profit tax, labour tax and contribution and other taxes), FDI and technology transfer propensity and other non-fiscal factors that affect the decision to invest in R&D such as: the level of cluster development, the availability of scientists and engineers. The clustering variables were selected with the scope to adequately capture the relations between them.

The variables considered for this study were controlled for autocorrelation before conducting the cluster analysis. The data were taken from the OECD database and from the Global Competitiveness Report and refer to the year 2012.

The cluster analysis was conducted in order to sort and classify our collected data into groups and highlight the similarities within the same group. We chose a hierarchical approach and as an algorithm, Ward's method, which minimizes the mean square distance between the centre of a cluster and each member and does not raise the inconvenient of creating very small clusters.

Results and discussions

Regarding the type of R&D that the governments want to stimulate, every country has a different mix of direct and indirect R&D support.

The indirect government support through R&D tax incentives take the form of tax credits, allowances from taxable income, tax deferrals (depreciation allowances and current deduction) etc. (see table no.1). The R&D tax incentives have the advantage of

promoting industry, company and regional neutrality, which is not the case for the direct support such as grants which are offered for specific projects.

Through the R&D tax incentive policy according to the level of the R&D activities, the corporate income taxes or employer's social security contributions are diminished, and thus so is the cost of doing R&D.

There are two types of tax incentives: the volume-based incentives, found in most countries, costlier in administration and less prone to fluctuations and incremental-based incentives, which are more efficient for government but imply complexity in implementation. Incremental tax credits have the benefit of stimulating additional R&D. From a policy point of view, a volume-based scheme would be more appropriate if the objective is to increase the overall level of R&D in the country, while an incremental-based scheme may be considered if the objective is to support firms with high R&D growth. A combination of volume and incremental tax incentives (hybrid schemes) may be considered when the objective is to maintain the level of R&D and reward high growth of R&D (Criscuolo et al., 2009). As of 2013, Ireland, Italy, Portugal and Spain use a mixed system of volume-based and incremental tax credits.

Table No. 1. Overview of available incentives for R&D, patents and training costs for 14 EU countries (Belgium, Czech Republic, France, Germany, Hungary, Ireland, Luxembourg, Netherlands, Poland, Romania, Slovak Republic, Slovenia, Spain, United Kingdom) in 2013

Type of incentives	Countries
Cash grants	Belgium, Czech Republic, France, Germany, Hungary, Ireland, Luxembourg, Netherlands, Poland, Slovak Republic, Slovenia, United Kingdom
Financial support	Ireland, Slovenia
Loans	Belgium, France, Germany, Luxembourg, Slovenia
Infrastructure/land preferential price	Czech Republic, Slovak Republic, Slovenia
Accelerated depreciation on R&D assets	France, Ireland, Luxembourg, Netherlands, Romania, United Kingdom
Income tax withholding incentives	Belgium, Netherlands
Patent-related incentives	Belgium, France, Hungary, Luxembourg, Slovak Republic, Netherlands, Spain, United Kingdom
Training costs incentives	Czech Republic
Wages related tax incentives for R&D services incurred abroad	France, Ireland, Spain, United Kingdom
Reduced tax-rates	France, Hungary, Netherlands
Reduced social security contributions	Belgium, France, Hungary, Netherlands
Tax deduction and super deduction (eligible R&D costs are deducted twice: once as operating costs but also as spread deduction: as a percentage of the annual depreciation amount)	Belgium, Czech Republic, Hungary, Netherlands, Poland, Romania, Slovenia, United Kingdom
Tax credits	Belgium, France, Hungary, Ireland,

	Netherlands, Slovak Republic, Spain, United Kingdom
Tax exemptions	Belgium, Ireland, Luxembourg, Poland, Spain
Tax holiday	Czech Republic, France, Slovak Republic
VAT reimbursement	Belgium
Carry-forward	Belgium, Czech Republic, France, Hungary, Ireland, Netherlands, Poland, Slovak Republic, Slovenia, Spain, United Kingdom
Refundable	Belgium, France, Ireland, United Kingdom

Source: Made by the author based on 2014 Global Survey of R&D Tax Incentives (2014)

Some countries have introduced fiscal measures to stimulate innovation more broadly by extending the eligible base to expenses in advanced technology solutions (such as "green" technology in Belgium) and acquisition of intangibles such as patents, licences, know-how and design (e.g. Spain, Poland).

Tax incentives are more generous for SMEs in France, Netherlands, United Kingdom, so they incur a higher tax subsidy. According to carry-over and refundable provisions of the R&D tax treatment, the tax subsidy for large or SME loss making firm could be lower than in case of firm that does not incur losses. R&D target-specific tax incentives are found in Hungary in case of collaboration, in France for new claimants and in Belgium, France, Netherlands for young firms and start-ups. France, Ireland, Netherlands, Spain and the United Kingdom impose limits on the amounts that can be claimed for R&D projects. There are some countries that do not provide any R&D tax incentives: Estonia, Germany and Sweden.

Regarding the second goal of highlighting the features of 20 EU member states countries in terms of R&D related indicators, a cluster analysis was conducted. After a heuristic approach the number of clusters was determined to be 5. The clusters are described by the following features (see table no.2).

Table No. 2. Features of the clusters

	Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**
Business enterprise expenditure on R&D (% of value added in industry)	L-M	L	H	H	M
Tax subsidy for large firms	M-H	N,L,M,H	L-M	N	M-H
Level of corporate taxation	H	M	V.L-L.	L-M	V.L.-L
FDI and technology transfer	M	M-H	M	M	M
State of cluster development	M-H	L-M	M	H	M-H
Availability of scientists and engineers	M	M	M	H	M

Legend: L (low), M(medium), H(high), L-M (low-medium), M-H(medium-high), V.L. (very low)

Source: Made by the author based on the results of cluster analysis

Cluster no.1 comprises: Austria, Belgium, France, Italy, cluster no.2 consists of Czech Republic, Greece, Hungary, Poland, Portugal, Slovak Republic, cluster no. 3 is formed from Denmark, Slovenia, cluster no.4 is compounded from Finland, Germany, Sweden and in cluster no.5 Ireland, Luxembourg, Netherlands, Spain and the United Kingdom can be found.

In the table no.2 it can be observed that for those countries with the lowest level of corporate taxation and almost the same level for indicators such as FDI and technology transfer, state of cluster development and availability of scientists and engineers (cluster 3 and cluster 5), the level of business enterprise expenditure on R&D as percentage of value added in industry is different but not in a way that was expected. So, the level of tax subsidy does not seem to have any influence on the level of business enterprise expenditure on R&D as a percentage of value added in industry in case of a very low corporate tax level (a higher business enterprise expenditure on R&D as a percentage of value added in industry while the tax subsidy is low or medium and a medium business enterprise expenditure on R&D as a percentage of value added in industry while the tax subsidy is medium or high).

As it can be found in the literature, the cluster analysis results show that a higher corporate tax level even if is offset by a high tax subsidy does not lead to a high level business enterprise expenditure on R&D as a percentage of value added in industry, all other indicators being the same. Is it the case of cluster number 1: Austria, Belgium, France and Italy. Moreover, those countries represented by cluster 4 (Finland, Germany, Sweden) that are characterized by a low or medium tax corporate level and do not benefit from tax subsidy (tax subsidy is negative which means tax burden), but point higher than the other countries in terms of the state of cluster development and availability of scientists and engineers, exhibit a high level of business enterprise expenditure on R&D as a percentage of value added in industry.

There is also another category of countries (cluster 2: Czech Republic, Greece, Hungary, Poland, Portugal, Slovak Republic) that irrespective of the level of tax subsidy (it is also applicable to tax burden) and with a medium level of corporate taxation display a low level of business enterprise expenditure on R&D as percentage of value added in industry which is also correlated with a medium to high level of FDI and technology transfer.

An explanation for these results could be related to the lack of R&D tax policy effectiveness and thus an increase in the price of R&D by raising wages for R&D personel and not for greater innovation creation, in accordance with the evidence offered by Jaumotte and Pain (2005) and Lokshin and Mohnen (2008). Moreover it appears that the R&D funds offered as direct government support for R&D (grants, loans, loan guarantees and procurement contracts) are more properly used in additional R&D generation such is the case of Finland, Germany and Sweden than the indirect R&D support through tax incentives offered in addition to the direct support for some other countries.

The study limitation is considered to be the limited availability of the R&D tax related indicators, so the analysis was conducted only for 20 EU state members and not for the entire EU and only for one year, 2012. Moreover, some data were estimated or provisional.

Conclusions

Governments support business R&D because they see these investments as having consequences on the long-term growth of economies and on national competitiveness.

R&D tax incentives reduce the marginal cost of R&D activities and produce outcomes other than increased R&D: decisions to begin investing in R&D for the first time; changes in the productivity of R&D; changes in the wages of researchers; and social welfare improvements (taking into consideration all direct and indirect economic effects of the policy). However, these outcomes are rarely assessed in policy evaluations.

For these reasons, the tax policy related to investment in knowledge-based capital (computerised information, innovative property and economic competencies) should be designed in a manner that will promote innovation based growth. Such a tax policy that stimulates firms to use volume-based tax credits is to offer a higher tax reduction in the first years of implementing a R&D project. Another strategy that contributes to retaining human talent is by offering tax credit for R&D wages which lessen the tax wedge. But such a provision can be subject to manipulation, higher wages for R&D workers without a higher level of innovation.

The features of the R&D tax policy should be designed with the aim of alleviating the fiscal costs (tax burdens can be diminished especially through volume-based incentives and tax credits) and also the negative consequences of a tax minimization action. One of the cases is represented by multinational firms that enhance their innovation processes by transferring R&D outputs in different locations in order to minimize their tax burden and maximize their returns. Other channels for profit shifting are given by the tax treatment of patents, especially the growing role of patent donations and tax reductions on royalty payments.

R&D tax incentives provisions introduced in the tax laws are seen as confusing the tax system because there is no list of the eligible R&D expenditures. An effective measure would be the accurate labelling of those activities that could be as R&D activities and a clear presentation of those R&D expenditures that could be eligible.

Regarding the preferential regime for R&D, domestic firms involved in R&D activities are in a disadvantaged competitive position in relation to MNEs in the absence of different tax limits and rates for R&D policy. Also young firms face a drawback, as being in the first years of their existence they can incur losses, so no taxable income from which they can deduct R&D tax incentives. For these reasons the R&D tax incentives should be refundable in cash and the losses should be allowed to be carried forward.

The R&D tax incentive policies should be assessed regularly in terms of their effectiveness in achieving their targets by focusing on R&D eligibility, the criteria for firms that qualify for an R&D tax incentive, the treatment of those firms that are R&D highly lucrative and also carry-forward provisions.

The fiscal incentive schemes parameters (bracket limits or the bracket income) and also the fiscal incentive scheme's beneficiaries (starting firms, small and medium sized enterprises, a specific industry sector) are changing over time thus adding to the existing complexity and predictability. To counteract this problem, the R&D tax policy should be stable (in force for a certain number of years) and should be doubled by predictability and high transparency in the policy changes.

Further studies should take into account the interaction between R&D tax incentives and direct subsidies for R&D, in terms of administrative and compliance costs too (R&D tax incentives have smaller costs than governmental direct support).

Because the aim of this research was also to provide some evidence about the effectiveness of R&D tax policy and the cluster analysis that was made for R&D tax policy and other R&D indicators for a number of 20 EU states questioned the effectiveness of R&D tax policy for some countries, further inquiry is needed to explore the tax policy effectiveness related to KBC by querying other data related to KBC: the share of innovative products in total sales, the propensity to come up with new products, new to the company or new to the market, productivity and profitability and R&D spillovers (the negative ones: market stealing, obsolescence and the positive ones: rent or knowledge externalities).

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