



A Study on R&D Tax Incentives

Annex: Country fiches

FINAL REPORT

TAXUD/2013/DE/315
FWC No. TAXUD/2010/CC/104

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(Consortium leader)

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CAPP	CASE
CEPII	ETLA
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The Hague, 28 November 2014

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1 General data sources

Information on general characteristics of a country is composed from several references:

- Information about R&D expenditure is taken from Eurostat (2014). "Statistics on research and development: Research and development expenditure, by sectors of performance."¹ Accessed on: April 25, 2014

Available at:

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00001&plugin=1>

- Information about direct government expenditure on R&D and spending on R&D tax incentives is based on OECD (2014). "Summary description of R&D tax incentive schemes for OECD countries and selected economies, 2013".² Accessed on: April 25, 2014

Available at:

www.oecd.org/sti/rd-tax-stats.htm

- For non-OECD countries, information about government expenditure of direct and indirect support to R&D is not available. Instead, R&D expenditure in public sector (as % of GDP)³ is used. "Statistics on research and development: Research and development expenditure, by sectors of performance."⁴ Accessed on: April 25, 2014

Available at:

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00001&plugin=1>

- Data on Corporate income tax rates are retrieved from Taxation and Customs Union (2014). "Taxation trends in the European Union: Data for the EU Member States, Iceland and Norway" (*Table 4: Adjusted top statutory tax rate on corporate income 1995-2014*)⁵, p. 36

Available at:

http://ec.europa.eu/taxation_customs/taxation/gen_info/economic_analysis/tax_structures/index_en.htm

Principles of information usage

As a general principle, priority for information on R&D policy instruments was given to government sources. In case information was not available or missing, we rested on information provided by sub-governmental bodies. Lastly, we considered information available in reports of private sector institutions.

¹ The reference year is 2012

² The reference year is 2011

³ The reference years are 2011/12

⁴ The reference year is 2012

⁵ The reference year is 2014

2 Austria

2.1 General characteristics

R&D expenditure (% GDP)	2.84
Corporate income tax rate (%)	25
Public expenditure R&D tax incentives (%GDP)	0.1
Direct government funding of BERD (% GDP)	0.1
<i>Please refer to Chapter 1 for data sources</i>	

2.2 Instrument 1: Tax credit for R&D expenditures (Forschungsprämie)

There is currently one generic instrument – a volume-based tax credit for R&D expenditures, also called research premium (“Forschungsprämie”). Qualifying R&D expenditure includes wages and salaries for R&D, and also any directly related costs and capital investments (such as acquisition of premises for R&D). This instrument is defined by law in § 108c EStG (Income Tax Act). Previously (prior to 2011) there was also a concurrent Tax Allowance for R&D.

The tax credit has been set at 10 percent of R&D expenditures since 2011 (previously 8 percent); it applies to self-employed and companies such as partnerships that pay income tax, and also to firms liable for corporation tax. Since 2013 all own R&D applications are subject to scientific approval from the national research promotion agency FFG (Forschungsförderungsgesellschaft) on behalf of the Ministry of Finance, which administers tax revenue through its Finance Offices (Finanzamt). The approval procedure does not apply to R&D contracted out in the EU area, and since 2012 the limit for qualifying for the tax credit through this channel has been raised to EUR 1 million (previously EUR 100,000).

The instrument has not been evaluated yet. In 2009 there was an analysis of the entire R&D support system at the macro level (“Systemevaluierung”, 2009). The Systemevaluierung reported that the Austrian system of indirect research subsidies (as it was in 2009) was complex and characterised by several inconsistencies. It made distinctions between:

- the basis for claims: expenditures relating to inventions valuable to the economy versus expenditure as defined by the OECD’s Frascati manual;
- the focus of interventions: the “old” allowance scheme focuses on the economic results of R&D activities and thereby it classifies as an output-based measure, whereas the Frascati based schemes classify as input-based measures;
- the timing of close examination: the output-based claims are audited ex- ante, while input-based claims are audited ex-post;
- the eligibility for support relating to contract R&D: cap versus no cap;
- the type of benefits: tax allowances reduce the tax base, while tax credits reduce the tax liability by a certain share of the qualifying expenditures;
- the calculation of the allowance: volume-based schemes versus increment-based schemes;

-corporate structure of companies: the subsidy component is different of incorporated versus non-incorporated companies;

-the authority in charge of administration: Ministry of Economics versus Tax Authorities

2.3 Instrument 2: Tax Allowance (ended 2010)

Until the withdrawal after 2010, the tax allowance ("Forschungsfreibetrag") was additional to the then existing tax credit. Firms and self-employed could chose subsidies for some items of R&D expenditure via a tax allowance. Later this was set at 25 percent (Frascati definitions were applied).

There are no evaluations, but see the note on the "Systemevaluierung" above.

2.4 Other policy instruments

The FFG is the national promotional agency supporting firms' R&D projects. A variety of specific programmes aimed at companies, start-ups, universities, research institutes and "young talent" is available through this "one-stop shop". The agency is under the Ministry for Transport, Innovation and Technology (BMVIT) and the Ministry of Science, Research and Economy (BMWFW), but has contractual relationships with other institutions at home and abroad. The objective of FFG is sustained improvement of Austria as a business location.

Since 2013 the FFG has been given the role of assessing the scientific worthiness of claims for R&D tax credits by firms or individuals (apart from outsourced R&D) on behalf of the Finance Ministry.

2.5 Data availability

Austria participates in the CIS. R&D aggregate statistics are compiled uniformly, according to Frascati Manual definitions and the CIS is also uniform in this regard (Oslo Manual). Access to firm level data from the national statistical office "Statistics Austria" is – to date – only possible via remote computing. Within this procedure the researcher writes computer algorithms based on a dummy dataset and sends this code to the statistical office that carries out the computation on the real dataset and returns the output after the compliance with the data privacy law has been ensured. In practice, this process is burdensome in terms of time and costs. However, the firm level data of Statistics Austria do not include detailed tax-related information (i.e. information on tax credit and so forth).

2.6 Assessment

The Austrian system evolved over the years into a complex mix of instruments. It has now been simplified to a straight volume based tax credit regime more comparable to good practice in many other countries. There is no specific definition for the novelty requirement, other than being innovative for the firm, which is not considered best practice. Since the change in 2011 the take-up of tax credit has increased substantially: in 2012 the volume of tax credits rose to EUR 574.1 million from EUR 314.3 million in 2011, for the first time exceeding the level of direct support (e.g. R&D grants) of EUR 483 million. An increase had been expected, due to the rate rising to 10 percent, which may have attracted more small firms to undertake R&D. Monitoring R&D claims by the FFG introduced in 2013 has shown increased activity by SME's but until a rigorous evaluation takes place the beneficial effects on R&D will not be fully distinguished from possible deadweight loss.

The schemes are not differentiated in targeting across regions or firm size, in accordance with best practice considerations. Regarding implementation, Austria has modern application procedures but lacks public consultation and planned evaluation.

A proper evaluation of the R&D tax incentive system is complicated by limited accessibility to firm-level data. Due to data privacy laws no access is granted to tax related data on firm level in Austria. This problem has been made explicit in the 2009 Evaluation of Government Funding in Research, Technology Development and Innovation (RTDI).

2.7 References

WIFO, Prognos, Convelop and KMU Forschung Austria, 2009, Tax Incentive Schemes for R&D, Report 4 in Evaluation of Government Funding in RTDI from a Systems Perspective in Austria. *Study commissioned by BMWFJ and BMVIT.*

FFG Forschungsprämie. Accessed on: February 2014. Available at:
<https://www.ffg.at/forschungspraemie>

Austrian legal text (EStG §108c). Accessed on: February 2014. Available at:
http://www.jusline.at/108c_Pr%C3%A4mien_f%C3%BCr_Forschung_und_Bildung_%28Forschungspr%C3%A4mie_Bildungspr%C3%A4mie%29_EStG.html

Der Standard, 2013, Forschungsprämie steigt "explosionsartig". Accessed on: 5 March 2013. Available at:
<http://derstandard.at/1362107482087/Forschungspraemie-steigt-explosionsartig>.

Aiginger, K. Falk, R. and Reinstaller A., 2009, Systemevaluierung des österreichischen Innovationssystems. Available at:
<http://www.bmvit.gv.at/service/publikationen/innovation/forschungspolitik/downloads/systemevaluierung/kurzpraesentation.pdf>

3 Belgium

3.1 General characteristics

R&D expenditure (% GDP)	2.24 ^{(p)6}
Corporate income tax rate	34
Public expenditure on R&D tax incentives (% GDP)	0.18 (2010)
Direct government funding of BERD (% GDP)	0.09 (2010)
<i>Please refer to Chapter 1 for data sources</i>	

3.2 Instrument 1. In-house R&D investment deduction

Belgian tax law provides the opportunity to benefit from a special investment deduction for investments in research and development of new products and forward-looking technologies that are environment friendly (not harming the environment).

The investment deduction creates the possibility for taxpayers to claim a tax deduction - in addition to the normal tax depreciations - when making qualifying R&D investments.

The R&D investment deduction can be calculated on either the acquisition value (which will result in a one-shot-deduction), or on the yearly amortizations (which will result in a spread deduction).

In-house R&D investment deduction includes three types of qualifying investments:

- Tangible fixed assets used in in-house R&D activities: Newly acquired or in-house produced tangible fixed assets that are used by the company or establishment in its R&D center;
- Acquired intangible fixed assets used in in-house R&D: Newly acquired research & development, licenses and know-how and other intangible fixed assets that are used by the company in its R&D center;
- In-house developed intangible fixed assets: The intangible fixed assets that result from the R&D activities in the in-house R&D center.

It only includes those R&D development costs that can be capitalized as intangible fixed assets according to the Belgian accounting law.

General conditions:

- The assets must be fixed and amortizable over a period of at least three years;
- It must concern new assets. They can be either acquired from a third party or be self-developed;
- The assets must be exclusively used for professional purposes in Belgium.

One shot

The one-shot investment deduction is calculated as a percentage of the acquisition value of the asset. The one-shot deduction amounts to 14.5 percent of the acquisition value.

Annual amortization

The applicable rate amounts to 21.5 percent of the annual amortization applied to the assets.

⁶ (p): Provisional

Tax credit

Firms can also opt for a tax credit that is equivalent to the deduction. The choice of the companies between these two instruments is irrevocable.

3.3 Instrument 2. Payroll tax deduction for R&D wages

Payroll tax deduction for R&D wages is one of the main tax incentives in Belgium.

The deduction applies for:

- R&D personnel in companies that cooperate in research with a university, a higher education institution in the European Economic Area or a scientific institution registered by the Council of Ministers (as of October 2005);
- Young Innovative Companies (YIC) (as of July 2006). YIC is part of the set of measures developed by the Belgian Federal Government since 2003. It provides small businesses that qualify as 'Young Innovative Company' (small firms with at least 15 percent of R&D intensity), a partial exemption of wage tax to personnel involved in R&D activities.
- R&D personnel with a PhD degree in exact or applied sciences, doctor degree in (veterinary) medicine or a civil engineering degree (List 1) (as of January 2006);
- R&D personnel with a master's degree, with the exception of masters in social and human sciences (List 2).

In 2009, the government increased the payroll tax deduction (from 65 percent to 75 percent) and to 80 percent in June, 2013. The changes in the policy also simplified the scheme by applying a single rate (80 percent) for all categories of researchers (in-house researchers; those affiliated to eligible universities or public research organizations; and those affiliated to young innovative companies).

An evaluation of the R&D tax incentive system was carried out by Dumont (2013) (The Federal Planning Bureau: *Federal Plan bureau/Bureau Fédéral du Plan*). Dumont studies both the impact of payroll withholding tax deductions and subsidies in the period 2000-2009. Dumont concludes that the highest additionality was observed for the measure that provides incentives for cooperation and the measure that offers exemption from the advance payment for R&D personnel with a PhD degree (see above). The additionality was lower for YIC scheme and subsidies⁷. Dumont also found that the effect was lower for firms that used several instruments, e.g., combined payroll withholding tax incentives with subsidies (Dumont, 2013).

3.4 Instrument 3. Patent Income Deduction (PID)

In 2007, the government introduced the patent income deduction scheme. It allows to deduct (as an extra tax deduction in the tax return) 80 percent of qualifying gross patent income. Therefore, only 20 percent of gross patent income are taxed at the normal corporate tax rate, resulting in an effective tax rate of maximum 6.8 percent.

The measure aims to encourage Belgian companies and branches to play an active role in patent R&D and patent ownership.

Corporate taxpayers in Belgium that are involved in the development or further improvement of patents through an in-house R&D center are eligible for the PID. They include both Belgian companies and Belgian permanent establishments ("PE") of foreign companies. The company must be the owner, licensee, or usufruct holder of the patents for which it intends to claim the benefits of the PID.

⁷ The estimates for YIC were based on a very small sample

In order to benefit from the PID, the R&D center should qualify as a so-called "branch of activity" or "line of business". In essence, it should be a division of an entity that is capable of operating autonomously.

The law specifically notes that the R&D center can be located outside Belgium but it should belong to a Belgian legal entity.

3.5 Other policy instruments

Belgium is divided in three regions: Brussels, Flemish and Walloon regions. While one set of policies are coordinated at the federal level, also each region has its own R&D policy.

Walloon Region provide a wide range of R&D incentives in the form of fellowships, grants, subsidies, but not tax incentives. In the Brussels Region Innoviris, the organisation coordinating the subsidy policy of the Brussels-Capital Region, provides financial support for R&D projects. Support to industrial research projects can be proposed via a grant ranging between 50 percent and 70 percent, or via a recoverable advance of 60 percent to 80 percent.

3.6 Assessment

Belgium offers a variety of tax incentives, both input and output related. The input related tax incentives (in-house R&D investment deductions and payroll tax deductions for R&D wages) generally follow an advisable practice as being volume based, having a common rate across regions and legal entities and a possibility to receive a tax benefit even if the firm is not at a profit-position (for payroll withholding tax regimes such option is embedded in the design itself). On the other hand, the output related incentive- the Patent Income Deduction is not a recommendable practice, which is even more exacerbated by the fact that the tax deductibles include income that can be originated also from off-shored activities.

Considered as best practice is that Belgium offers a special tax incentive to "young innovative companies", though the measure has a scope for improvement, as the evaluation by Dumont (2013) showed that the BFTB for it was lower than it was for the other payroll withholding tax measures.

On the implementation side the Belgium R&D tax incentive system perform well, as firms can settle matters connected with the R&D tax incentives at one agency and the application procedure can be carried online. Furthermore, the schemes have been evaluated.

3.7 References

Belgian Science Policy Office, 2013, *Annual report on science and technology indicators for Belgium*. Available at:

http://www.belspo.be/belspo/organisation/Publ/pub_ostc/BRISTI/BRIST_Indic_2013_en.pdf.

Deloitte, 2012, *Taxation and Investment in Belgium*. Available at:

<http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-belgiumguide-2012.pdf>.

Dumont, M.,2013, The impact of subsidies and fiscal incentives on corporate R&D expenditures in Belgium (2001-2009), Federal Planning Bureau Working Paper 1-13

Erawatch – Platform on Research and Innovation Policies and Systems. Accessed on: February 2014. Available at:

<http://erawatch.jrc.ec.europa.eu/>.

Federal Public Service Finance, 2013, Tax Incentives For R&D Activities Thanks, but no thanks: Companies' Response to R&D tax Credits. Available at:
<http://iri.jrc.ec.europa.eu/>.

4 Bulgaria

4.1 General characteristics

R&D expenditure (% GDP)	0.64
Corporate income tax rate	10
Public expenditure R&D tax incentives (%GDP)	n/a
Public expenditure other innovation policy: R&D expenditure in public sector (% GDP)	0.24
<i>Please refer to Chapter 1 for data sources</i>	

4.2 Instrument 1. Accelerated tax depreciation

Accelerated depreciation allows to write-off 100 percent of tangible R&D assets acquired in the specific year (Ministry of Finance, 2012). The right of enterprises to claim R&D expenditures for tax credit is limited to R&D expenditures contracted exclusively from public research organizations. Private innovative enterprises have hardly benefited from the instrument because the private enterprises, especially SMEs, tend to be reluctant to collaborate with public research organizations.

4.3 Instrument 2: Remission of corporate tax

Remission of the corporate income tax in the amount of 50 percent of the tax on the receipts of the scientific research budgetary organizations, the state higher schools, the state and municipal schools of the public education system for their economic activity which is either directly connected with or helpful to the performance of their basic activity.

4.4 Instrument 3: R&D expenditure write-off

A taxable person shall be entitled to decrease the accounting financial result by the historical value of a fixed intangible asset (formed as a result of R&D activities). To date, there exists no government or academically administered evaluations of the incentive.

4.5 Other policy instruments

Direct non-tax support is provided by the Ministry of Economy, Energy and Tourism: mostly through the OP Competitiveness department and the almost inactive National Innovation Fund. According to a report by The World Bank (2013), in supporting the business environment and accordingly, innovation, Bulgaria depends largely on EU funds (World Bank, 2013a, Box 3.1: Use of public funds for innovation). Hence, the focus of different programs will be according to the ones put in EU agenda.

4.6 Data availability

The National Statistical Institute (NSI) provides firm-level data but in practice obtaining the information is complex. Data which would allow econometric evaluations of the R&D tax incentives are unavailable. Bulgaria participated in CIS 2010 that covers firm-level information on innovative performance and activity.

4.7 Assessment

The scope of the R&D that qualifies for tax incentives is very limited as the eligibility criteria in certain cases leave only publicly performed R&D eligible. The local experts are not aware of systematic targeting to sectors, although individual ministries might informally practice sectorial preferences.

There are no impact evaluations available with respect to implementation. However, according to the local experts, implementation lags behind best practices in other member states in Western or Northern Europe. The focus is on publicly performed R&D and implementation is governed and monitored by government bodies.

4.8 References

Goldberg, I., 2014, *R&D TAX Incentives*. [E-mail]. Message to: Filipov, C. 10th April 2014

Mantcheva, D. and R. Stefanow, Arc Consulting EOOD, 2011, Mini Country Report/ Bulgaria. Available at: <http://ec.europa.eu/enterprise/policies/>.

Ministry of Finance of the republic of Bulgaria. (n.d.) *Tax System*. Accessed at 20th November 2013. Available at: <http://www.minfin.bg/en/page/172>.

The World Bank.2013a, Input for Bulgaria's Research and Innovation Strategies for Smart Specialization under project BG161PO003-5.0.01-0003 "Effective Management of Operational Programme "Development of the Competitiveness of the Bulgarian Economy" 2007-2013" Accessed: 20th November 2013 Available at: <http://www.mi.government.bg/>

The World Bank, 2013b, Reimbursable Advisory Service Program on Innovation. Action Plan on Innovation Commercialization Services under project BG161PO003-5.0.01-0003 "Effective Management of Operational Programme "Development of the Competitiveness of the Bulgarian Economy" 2007-2013" Accessed: 20th November 2013. Available at: <http://www.mi.government.bg/files/useruploads/files/innovations/commercializationactionplan.pdf>.

5 Canada

5.1 General characteristics

R&D expenditure (% GDP)	1.69 ^{(p)8}
Corporate income tax rate	26.5 ⁹
Public expenditure R&D tax incentives (%GDP)	0.21
Direct government funding of BERD (% GDP)	0.04
<i>Please refer to Chapter 1 for data sources</i>	

5.2 Instrument 1. SR&ED - Investment tax credit

The Scientific Research and Experimental Development Tax Incentive Program (SR&ED) is a longstanding federal program aimed at stimulating R&D, established in 1944.

For tax year ending after 2013, the SR&ED Investment Tax credit is a 15 percent tax credit applied to all eligible costs undertaken in Canada by individuals or trusts, partnership or corporations. The tax credit is set against the federal tax due. For corporations the tax credit is not refundable, while for individuals and trusts the ITC is 40 percent refundable. As partnerships are not a taxpayer, usually the R&D expenditure must be calculated at the partnership level and then divided among the eligible members (trusts, corporations or individuals).¹⁰

For small "Canadian-controlled private corporations" (CCPC), a 35 percent tax credit applies.¹¹ CCPC are defined as:

- "Private corporation that is established in Canada;
- Not controlled by non-residents or government agencies; proprietorships, partnerships and trusts; and other corporations;
- All of its shares that are owned by a non-resident person, by a public corporation (other than a prescribed venture capital corporation), or by a corporation with a class of shares listed on a designated stock exchange, were

⁸Statistics Canada, 2014, *Gross Domestic Expenditures on Research and Development in Canada (GERD), and the Provinces – National estimates 2003 to 2013 and Provincial estimates 2007 to 2011*, Catalogue no. 88-221-X. Accessed on: February 2014. Available at:

http://www5.statcan.gc.ca/access_acces/alternative_alternatif.action?teng=t054-eng.pdf&tfra=t054-fra.pdf&l=eng&loc=t054-eng.pdf

⁹KPMG, 2014, *Corporate tax rates table*. Accessed on: February 2014. , Available at: <http://www.kpmg.com/global/en/services/tax/tax-tools-and-resources/pages/corporate-tax-rates-table.aspx>

¹⁰Canada Revenue Agency, *Who can claim SR&ED tax incentives and what are the benefits?* (2014). Accessed on October 10, 2014. Accessed on: February 2014.

Available at: <http://www.cra-arc.gc.ca/txcrdt/sred-rsde/clmng/whcnclmsrd-eng.html>

¹¹ *Ibid.*

owned by one person, that person would not own sufficient shares to control the corporation;

- No class of its shares of capital stock is listed on a designed stock exchange.”¹²

For small CCPC ITC is 100 percent refundable on qualified current expenditure. A maximum threshold for refundable expenditure is set at CAD 3 million of expenditure undertaken in Canada. On amount that exceeds the mentioned ceiling, CCPC is offered to receive a 15 percent non-refundable tax credit.

The possibilities for cash-back vary with particular firm characteristics. Generally, the tax credit can be carried backward for 3 years and carried forward for 20 years.

All administration is done by the Canada Revenue Agency. Electronic application is possible and the decision time for tax credits that qualify for cash-back is 120 days.

As the SR&ED was one of the first R&D tax incentives in the world, it has been evaluated by academics and the government on several occasions. Government evaluations appear to be performed irregularly. Econometric impact studies generally consider the combined effect of the tax credit, possibilities for accelerated depreciation, and other innovation policies including the sometimes elaborate R&D tax incentives at the provincial level. The SR&ED is found to stimulate R&D expenditure for SMEs, but not for large companies. Results are vulnerable to selection and endogeneity bias.

5.3 Instrument 2. Provincial R&D tax incentives

Canada’s provinces levy an income tax of their own and as a consequence most of them also have R&D tax incentives. The majority of provinces have tax credits that resemble the federal SR&ED tax credit, but with lower rates. The CRA administrates the tax credits for most provinces.

Ontario and especially Quebec have a more complex system of R&D tax incentives. Besides a tax credit for R&D expenditure, Ontario also has a specific tax credit for expenditure on research performed by public research institutes and some additional general R&D tax credits.

Quebec has a complex and generous system of R&D tax incentives comprising R&D wage tax credits (with special rate for pharmaceuticals), income tax credits for private expenditure on research performed by public institutes, on dues and fees paid to a research consortium, and on pre-competitive research by private partnerships.

There do not appear to be evaluation studies that distinguish the impact of the federal R&D tax incentives from the provincial incentives. Baghana and Mohnen (2009) use a sample of firms operating Quebec and find that the combined effect of federal and provincial tax incentives stimulates R&D expenditure for SMEs, but not for large companies.

5.4 Other policy instruments

R&D tax incentives make up a sizable portion of Canada’s total expenditure on innovation policy. Estimates of the share of the federal tax incentive SR&ED in total federal expenditure on innovation range between 70 and 80 percent (Jenkins et al. 2011, OECD). The three largest non-tax instruments are the Industrial Research

¹²Canada Revenue Agency, Canadian-controlled private corporations (2014). Accessed on: October 10 , 2014. Available at: <http://www.cra-arc.gc.ca/tx/bsnss/tpcs/crprtns/typs/ccpc-eng.html>

Assistance Program (IRAP), the Strategic Aerospace and Defence Initiative (SADI) and the National Research Councils (NRCs).

The IRAP provides advisory services and funding for support high-risk R&D projects by SMEs, as well as technical and commercialization advice to non-profit and post-secondary educational institutions. The SADI provides repayable contributions for commercial R&D projects in the aerospace, space, defence and security sectors. There are seventeen NRC institutes, performing sector-specific basic and applied research for business and the public sector.

Federal and provincial subsidies have to be deducted from R&D expenditures when making a claim for the SR&ED tax credit.

5.5 Data availability

Canada performs very well in terms of data availability. This is reflected in the relatively large number of different empirical studies. Firm-level empirical analysis of Canada's R&D tax credit is common and was first performed in the 1990s. Statistics Canada has a reputation as one of the world's best statistical offices. R&D expenditure is reports in accordance with the OECD's Frascati Manual. Access to its micro-data is organized through the Canadian Centre for Data Development and Economic Research (CDER).

5.6 Assessment

The scope of the national SR&ED instruments can be considered good practise: the tax credit scheme is volume-based input related schemes with novelty requirement "new to the world".

Canada's combination of national and provincial incentive schemes imply substantial regional targeting. In particular the provinces of Quebec and Ontario have elaborate tax incentives that target local firms. At the national level, R&D tax incentives have more favourable conditions for Canadian controlled firms. These types of targeting are not recommendable as they put firms from other provinces and countries at a disadvantage. Possibilities for cash refunds are more generous for small firms wich can be considered good practise.

The way in which Canada's R&D tax incentives are implemented can be considered good practise. Decision times for eligibility are less than 120 days in many cases, application can be done electronically and for most provinces there is a one-stop procedure combining both the national an provincial schemes. The SR&ED is very stable over time, but frequent and substantial changes occur in some provinces. Evaluations are common but not planned.

5.7 References

Jenkins, T., A. Gupta, D. Naylor, N. Robinson, M. Leroux and B. Dahlby, 2011, Innovation Canada: A Call to Action, Review of Federal Support to Research and Development – Expert Panel Report. Available at: www.rd-review.ca

Canada Revenue Agency, Who can claim SR&ED tax incentives and what are the benefits? (2014). Accessed on October 10, 2014. Available at: <http://www.cra-arc.gc.ca/txcrdt/sred-rsde/clmng/whcnclmsrd-eng.html>

Canada Revenue Agency, Canadian-controlled private corporations, 2014. Accessed on: October 10 , 2014. Available at: <http://www.cra-arc.gc.ca/tx/bsnss/tpcs/crprtns/typs/ccpc-eng.html>

6 Croatia

6.1 General characteristics

R&D expenditure (% GDP)	0.75
Corporate income tax rate	20
Public expenditure R&D tax incentives (%GDP)	n/a
Public expenditure other innovation policy: R&D expenditure in public sector (% GDP)	0.53
<i>Please refer to Chapter 1 for data sources</i>	

6.2 Instrument 1. Enhanced allowance for R&D

The Act on the Amendments to the Scientific Activity and Higher Education Act (NN 46/2007), provides that the eligible R&D and innovation expenses are for basic research, development, technical feasibility studies and innovation. Profit tax can be additionally reduced by lowering the profit tax base by 150 percent of fundamental research projects, 125 percent of industrial research and 100 percent for development. Within the R&D tax incentive scheme, a preferential tax treatment is also available to those activities that are performed prior to starting an applied or development project, and that are aimed at assessing, whether there is sufficient technical expertise to carry the project.¹³ Small and medium sized enterprises can receive up 75 percent super deduction, while large firms 65 percent. Overall, the deduction can be applied for up to 50 percent of eligible costs for SMEs and 40 percent to large companies.¹⁴

Aralica and Botrić (2013) used "matching techniques" to evaluate the effectiveness of the tax incentives for R&D in Croatia. In a sample of 96 firms they found positive effects on product innovation but not on process innovation. They also found that R&D tax incentives resulted in higher R&D expenditure.

Aralica, Botrić and Švaljek (2011) use both a qualitative (firm survey) and quantitative (Heckman two-step estimation method) approach to analyze the impact of R&D tax incentives. While they found that the beneficiary pool is highly heterogeneous, overall, the tax incentives resulted in higher R&D expenditure and innovative performance, as measured by a variable whether the firm "introduced in the market new of significantly improved product" (based on CIS survey). Based on survey responses, they also estimate bang-for-the-buck (BFTB); on average the R&D tax incentives resulted in a BFTB of 1.19. Hence, on average, the increase of R&D expenditures outweighed the government costs in terms of foregone tax revenue.

Švaljek (2012) provides statistical overview of the R&D tax incentives. She found that, according to the available data for 2008 and 2009, R&D tax incentives resulted in considerable savings for their beneficiaries, pushing the effective profit tax rate significantly below the statutory rate. The distribution of financial benefits from R&D tax credits was pronouncedly unequal, with large firms having above proportional

¹³Deloitte (2014) *Global Survey of R&D Tax Incentives*

¹⁴The Act on the Amendments to the Scientific Activity and Higher Education Act (Official Gazette No. 46/2007)

share in the total R&D expenditure claimed. At the same time, small firms accounted for the largest share of beneficiaries.

In terms of sectoral distribution, most of R&D expenditure was claimed in electronics and communication sectors (in 2008: 22 percent and in 2009: 44.8 percent of all tax incentives); and pharmaceutical industry (in 2008: 55.5 percent and in 2009: 17.3 percent) (Švaljek, 2012).

6.3 Other policy instruments

To strengthen science excellence and internationally competitive research teams, in 2011 the Croatian Science Foundation (CSF) introduced Research Projects Programme and the Collaborative Research Programmes.

In May 2010, the programme "Proof of Concept" (PoC) was started to assist entrepreneurs and researchers to verify commercial viability of their ideas. The World Bank project RAZUM (soft loan mechanism) is designed to motivate more private R&D spending. The focus is particularly on the later stages of product development and risk reduction that firms often face in the innovation process. By March 2010, the RAZUM program was supporting 16 projects with a total of about EUR 11.5 million (about EUR 7.5 million of the funding came from STP and the rest from the Government). The private sector provided additional EUR 9.3 million of R&D funding.

The World Bank's SPREAD Program is a grants scheme to foster joint research between the private sector and public research organizations. The limit is 50 percent of the total project cost and a maximum of EURO 120,000 per project. The program is managed by the Business Innovation Center of Croatia (BICRO), a Government-owned limited liability company.

6.4 Data availability

There is relatively good base for further evaluations of the R&D tax scheme since generally firm level data is available. Despite the fact that Croatia joined EU in 2013, since 2004 the business innovation surveys are conducted in line with the Eurostat methodology. However, as indicated in the study by Aralica & Botrić (2013), the quality of data can be improved: there were many missing fields and gaps that put certain limitations to obtained analysis.

6.5 Assessment

Croatia's R&D tax allowance regime follows best practice in that it is volume based and the R&D is defined according to Frascati Manual; the novelty requirement being "new to the world". This scheme stands out because it links the super deduction rate with a project's novelty. Projects that have higher level of novelty, receive higher level of tax benefits and vice versa. In this way, those activities that are likely to have the largest gap between social and private returns, and for which market failures are most profound, receive a higher tax benefit. The option to receive a tax benefit for technical feasibility projects can be important for more financially constrained firms that see opportunities for R&D, as a tax benefit is available for the first stages of the R&D project.

According to advisable practice, the scheme has a generic approach, it does not target the support to specific regions, legal entities or activities. Small firms can receive a more beneficial tax treatment at some instances.

While the R&D tax incentive regime in Croatia has drawbacks when it comes to organisation, Croatia's government Croatia aims for a very short decision time on applications (30 days).

According to best practice, the R&D tax allowance in Croatia has already been evaluated on several occasions. To our knowledge, Croatia is the only new EU-member state that has undertaken also econometric analysis.

6.6 References

Aralica, Z. and V. Botrić, 2013, Evaluation of Research and Development Tax Incentives Scheme in Croatia. *Ekonomska Istraživanja-Economic Research*, vol. 26(3): 63-80. Available at: <http://hrcak.srce.hr/file/160765>.

Aralica, Z., V. Botrić and S. Švaljek, 2011, Evaluation of the Tax Incentives Aimed at Stimulating R&D Projects in the Business Sector: Preliminary results, Institute of Economics, Zagreb.

Deloitte, 2013, Global Survey of R&D Tax Incentives. Available at: <http://www.deloitte.com/>.

Goldberg, I., 2014, *R&D Tax evaluations Review - your paper* [E-mail]. Message to: Aralica, Z., Ministry of Science, Education and Sports (Technology Department). May 30 2014.

Goldberg I., 2014, *R&D tax incentives*. [E-mail]. Message to: Skočilić, Ž., Ministry of Science, Education and Sports (Technology Department). 20th April 2014.

Švaljek, S. 2012, *R&D Tax Incentives In Croatia: Beneficiaries And Their Benefits* Zagreb: Institute Of Economics. Available at: <http://ebookbrowse.net/svaljek-pdf-d381015339>.

Švarc, J. n.d., *ERAWATCH Country Reports 2012: Croatia*. Available at: <http://www.kooperation-international.de/>.

7 Cyprus

7.1 General characteristics

R&D expenditure (% GDP)	0.46 ^(p)
Corporate income tax rate	12.5
Public expenditure R&D tax incentives (%GDP)	n/a
Public expenditure other innovation policy: R&D expenditure in public sector (% GDP)	0.34
<i>Please refer to Chapter 1 for data sources</i>	

7.2 Instrument 1. Enhanced allowance

In 2013-14 Cyprus introduced an R&D related tax incentive scheme for the development or acquisition of intangible assets. The benefit is equal to 20 percent of the acquisition cost per year, available for 5 years.

Given its very recent nature, there is no evidence as to the impact of the policy on business practise in Cyprus.

7.3 Instrument 2. Patent Box

A 80 percent deduction in business income tax is applied for the net profit from the exploitation or disposal of intangible assets. This also includes the compensation from irregular use.

7.4 Data availability

Cyprus does not conduct firm-level evaluations of R&D tax incentives. The Cypriot government does not release firm-level data for scientific studies. However, the national statistical office in Cyprus collects and reports more aggregate data on R&D activities in the national economy on regular basis.

7.5 Assessment

While Cyprus is a marginal user of tax incentives for purposes of R&D, it offers both input and output related tax incentives. The novelty requirement appears to be weakly enforced in Cyprus. The patent box is not considered advisable practice.

There is limited or no information at all with respect to targeting and implementation of R&D incentives. There are no official government websites available governing the application process. The scope is limited and practise is poor in terms of instruments adopted.

Generally, the way the system is set up may result in a significant deviation from what is considered best practise. According to the latest tax report from Deloitte (2014), recent developments in Cyprus suggest that Cyprus is now seeking to align its incentives more with the rest of the EU. Potentially these incentives, given their current form, could have an impact on local innovation in services.

7.6 References

Deloitte, 2014, *Cyprus Tax Facts 2014*. Accessed: 10th March 2014. Available at: <http://www.deloitte.com/assets/Dcom-Cyprus/>.

Republic of Cyprus Statistical Service, 2013, *Research and Development*. Accessed on: 10th March 2014. Available at: <http://www.mof.gov.cy/mof/cystat/statistics.nsf/>.

Web Portal of the Republic of Cyprus. Accessed on 10th March 2014. Available from: www.cyprus.gov.cy.

8 Czech Republic

8.1 General characteristics

R&D expenditure (% GDP)	1.88 ^(p)
Corporate income tax rate	19
Public expenditure R&D tax incentives (%GDP)	0.05
Direct government funding of BERD (% GDP)	0.14
<i>Please refer to Chapter 1 for data sources</i>	

8.2 Instrument 1. Enhanced allowance

Up to 100 percent of the R&D costs are deductible as a special tax allowance which implies that these costs are deducted twice for tax purposes – once as a normal tax deductible cost and then as a special tax allowance. Moreover, it is possible to deduct 110 percent of the R&D costs' increase from the tax base and also services in the area of R&D purchased from public universities and research institutions since 1 January 2014.

R&D is defined similarly as in the Frascati Manual. Eligible are those projects that "involve experimental or theoretical works, design or drawing works, calculations, proposed technologies, or the making of a functional sample or a product prototype or its part (Deloitte, 2014). Both current expenditure (e.g., wages, operating expenses), also depreciation of "tangible movable property used in direct relation to the project" (Deloitte, 2014).

Unutilized deduction can be carried forward and used during the following three tax years.

8.3 Instrument 2. R&D Centres: 10 years of corporate income tax relief

The Amendment to the Act on Investment Incentives offers investors, that invest in new investment projects in R&D Centres, a corporate income tax relief for up to 10 years and a transfer of land at a discount (Act No. 72/2000 Coll., on Investment Incentives and on the Amendment of Certain Acts¹⁵).

8.4 Other policy instruments

The main providers of R&D funding are the Grant Agency of the Czech Republic (GA CR) and the Technology Agency of the Czech Republic (TA CR) that allocate grants to research and experimental development projects. The EC Operational Programme: Research And Development For Innovation also provides grants for R&D and innovation activities.

¹⁵ Investment and Business Development Agency, *Investment Incentives Act*, Accessed: March 12, 2014. Available at: www.czechinvest.org

8.5 Data availability

Firm-level data is generally available. However, there are no recent studies that have evaluated the R&D tax incentives using the firm-level data, indicating of possible gaps in the data. More aggregate statistics on R&D are available, and they are reported to the EU on regular basis.

8.6 Assessment

The Czech Republic offers R&D tax incentive in a form of tax allowance and a tax break for those investors investing in R&D centres. The application of novelty requirement appears to be somewhere vague, however R&D definition is similar to that in Frascati Manual- considered advisable practice.

The super deduction has a very generic approach, it is not targeted to any specific legal entity, type of firm or activity. While generic approach is considered advisable practice, not having a possibility to receive the benefit in case a firm does not have taxable income, may disproportionately harm young firms.

In terms of implementation the Czech system is still at an early stage of development. Decision time for application is rather long. However, the government has presented a commitment to improve the administrative practice in the near future.

8.7 References

Czechinvest investment and business development agency, n.d., *R&D*. Accessed on: 20 April 2014 . Available at:
<http://www.czechinvest.org/en/r-d>.

Deloitte, 2014, *Global Survey of R&D Tax Incentives*. Accessed on: 15 April 2014
Available on:
<http://www.deloitte.com>.

Ernst & Young, n.d., *Worldwide R&D incentives reference guide 2013–2014*. Accessed on 9 April 2014. Available on:
<http://www.ey.com>.

Goldberg, I., 2014, *R&D tax incentive* [E-mail]. Message to: Navratilova, M., CzechInvest – Investment and Business Development Agency, Financial Support Section (Senior project manager). 10 April 2014.

Lengyel, B. and V. Cadil, 2009, Innovation policy challenges in transition countries: foreign business R&D in the Czech Republic and Hungary, *Transition Studies Review*. [Online] vol. 16(1): 174-188. Accessed on 8 April 2014. Available on:
<http://link.springer.com/article/10.1007/s11300-009-0046-5>

Ministry of Education, Youth and Sports of The Czech Republic, 2008, *Operational Programme. Research And Development For Innovation*. Accessed on: 11 April 2014. Available on:
www.msmt.cz/file/471_1_1/.

Price Waterhouse Coopers, n.d., *Tax and Legal Services, Czech Republic, Study on the impact of R&D tax incentives on investments of private companies into R&D*. Accessed on: 30 April 2014. Available on:
<http://www.pwc.com/cz/en/>.

Prnka, T. et al., Ministry of Education, Youth and Sports, 2009, *State Supported R&D in the Czech Republic. Short Guidebook 2009*. Accessed on: 17 April 2014. Available from:

www.msmt.cz/file/471_1_1/.

Research and Development council of the government of the Czech Republic, n.d., *Year-book 2000*. Available at:

<http://www.vyzkum.cz/FrontClanek.aspx?idsekce=10163>.

Srholec, M., n.d., *Erawatch Country Reports 2012: Czech Republic*. Available on: <http://www.kooperation-international.de/>.

9 Denmark

9.1 General characteristics

R&D expenditure (% GDP)	2.98 ^(ep)
Corporate income tax rate ¹⁶	24.5
Public expenditure R&D tax incentives (%GDP)	0.05
Direct government funding of BERD (% GDP)	0.05
<i>Please refer to Chapter 1 for data sources</i>	

9.2 Instrument 1. R&D tax credit scheme "Skattekreditordningen"

The Danish R&D tax credit scheme called "Skattekreditordningen" was implemented in January 2012 and is intended to be a temporary measure during the financial and economic recession.

Before the Skattekreditordningen was introduced, several interest organisations were heard. The R&D tax credit scheme is part of the Government's growth plan for Denmark, which was proposed in April 2013.

Skattekreditordningen can be used both by companies and self-employed. To be eligible, entity must be loss-making. The benefit applies to the part of the losses that can be attributed to R&D activities. If the company is part of a group, the consolidated taxable income must also be negative.

During the years 2012, 2013 and 2014 a firm could apply for 25 percent tax credit, set against the deficit that had occurred from R&D expenses. In 2015 the rate will be 23.5 percent and in 2016- 22 percent.¹⁷ The maximum R&D expenses for a firm in 2012 and 2013 were DKK 5 million and the maximum deduction was DKK 1.25 million a year. In 2014, the ceiling has been raised to DKK 25 million (around EUR 3.36 million).

Hence, the maximum annual payment that firms could receive in 2012 and 2013 was DKK 1.25 million; in 2014 it was DKK 6.25 million; in 2015 DKK 5.875 million and in 2016 DKK 5.5 million (around EUR 740,000). For companies that are part of a group, the maximum ceiling applies to the consolidated eligible expenditure (the sum of all group members).

The reduction in the corporate tax rate will not apply to profits from oil and gas extraction. Correspondingly, the new tax credit rules do not concern expenditures for search of raw materials or expenditures for obtaining, for example, machines which are used in the search of raw materials.

Tax Authorities are paying the tax credits every year in November (the next year after the application has been received). If the income year is a shorter period than 12 months, the amount which will be paid is reduced in the same proportion.

¹⁶Danish government has planned to gradually decrease the corporate tax rate from 25 percent to 22 percent in 2016

¹⁷Note that in the same period the corporate tax rate will also be decreased

In the first year of the tax credit, around 600 applications were received and DKK 300 million (around EUR 40.3 million) were paid out as tax credit, which is close to the planned government approximations.¹⁸

9.3 Instrument 2: Accelerated capital amortization

Already before the Skatte kreditordningen, firms were able to deduct their R&D expenses in the same year as they have occurred. This right to deduct came into force in 1973 and is still in use.

Accelerated capital amortization is provided as follows:

- The purchase price of machinery, equipment and ships acquired for R&D purposes may be deducted in full in the year of acquisition.
- A full deduction in the year of acquisition generally is available for patents and know-how, irrespective of the economic life or the amount of purchase price.

9.4 Instrument 3: Low tax regime for foreign R&D employees

There is also a special low income tax regime (26 percent) for foreign researchers and key employees. Taxation under "Forskertskatteordningen" can be applied during five years.

9.5 Other policy instruments

The direct support to R&D and innovation activities in firms has increased during the recession. It is aimed mainly to SMEs. Examples of the instruments are:

- A Business Innovation Fund (budget of EUR 100 million in 2010-2012) for supporting innovation and market maturity within the green and welfare areas. The Fund has since then been converted into the Market Development Fund.
- Research vouchers (budget of EUR 6.6 million 2012) for collaborative R&D projects with SMEs and public research institutions.
- Knowledge pilots (budget of EUR 3.2 million 2012) for hiring highly educated employees, who execute development and innovation projects in SMEs.
- The Innovation Network Denmark Programme, (yearly budget on average EUR 10.7 million in 2010-2012) which aims for supporting innovation networks in SMEs.

9.6 Data availability

Statistics Denmark has a database available on the internet, in which one can find data on "Enterprises expenses for own R&D total" for the time period 2007-2012. Data can be found for different branches. Data is also available on basic research, applied research and development work for the years 2007-2010. The collection of data on R&D expenditure and innovation in Denmark is done according to the norms for research statistics by the EU and OECD, as described in the Frascati Manual. No separate data on R&D tax credits or applications is yet available (the first tax credits in Denmark were paid in November 2013).

¹⁸Based on information provided by Danish representative Rasmus Igum in the Second Working group meeting on "Exchange of good practices on R&D tax incentives" (30.09.2014)

9.7 Assessment

The main tax subsidy instruments are oriented to R&D expenses, but there is also a possibility for a full deduction of purchasing costs of patents and know-how in the year of acquisition.

The tax credit that is purely in the form of a “negative tax”, applied to the loss that was incurred in R&D activities, represents a unique approach in an international context. It is targeted to liquidity constrained firms and sets a maximum ceiling of benefit, which indirectly targets the support to young and small companies. Providing additional support to young firms is considered best practice, as they typically face larger obstacles to obtain finance. The negative tax can strengthen the liquidity of those small firms in the start-up phase, when R&D activities have not yet resulted in any income.

The negative income tax does not have regional or legal form restrictions, but it is not applied in the search for raw materials.

The application with the request for payment is given to the Tax Authorities electronically together with the tax return for the same year. The tax credits from a previous year are paid in November, which means that the lag between losses made and compensation received is rather long, as it can take up to two years. Such long lag is viewed as a non-recommendable practice, as additional finance for liquidity constrained companies is crucial.

According to best practice, a public consultation was used, when the instrument was planned. The government has also planned to organize an assessment on the performance of the tax credit.

9.8 References

Beierholm Statsautoriseret Revisionspartnerselskab (2013) Innovation – Skattemessige regler for fradrag for virksomheders udgifter til forskning og udvikling.

Erawatch, 2012, Erawatch country reports Denmark, prepared by Christoph Grimpe. Available on:

http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/reports/countries/dk/report_0006?tab=reports&country=dk

Finansministeriet, 2012, Vækstplan DK, Staerke virksomheder, flere job, 2012/13:18 (growth plan for Denmark). Copenhagen.

Statistics Denmark, Statistics on Research and Development, (R&D Statistics) – Business Sector. Available on:

<http://www.dst.dk/en/Statistik/dokumentation/Declarations/statistics-on-research-and-development---r-d-statistics----business-sector.aspx>

Skatteministeriet, 2007, LBK nr 1191 af 11/10/2007 – Bekendtgørelse af lov om skattemæssige afskrivninger (afskrivningsloven), §5 & §6, stk.1, nr.3; Udgifter till erhvervelse af knowhow eller patentrettigheder §40 stk.2 & §41 stk.1. Copenhagen.

Skatteministeriet, 2010, LBK nr 1403 af 07/12/2010 – Bekendtgørelse af kildeskatteloven, §§ 48E – 48F. Copenhagen.

Skatteministeriet, 2010, LOV nr 1565 af 21/12/2010 – Lov om ændring af kildeskatteloven og ligningsloven (Ændring af skatteordningen for udenlandske forskere og nogle medarbejdere). Copenhagen.

Skatteministeriet, 2011, L29 af 21/11/2011 – Forslag til lov om ændring af ligningsloven –resumé (Skatte kreditter for forsknings- og udviklingsaktiviteter). Copenhagen.

Skatteministeriet, 2013, LBK nr 405 af 22/04/2013 – Bekendtgørelse af lov om påligningen af indkomstskat til staten (ligningsloven), §8B & §8X. Copenhagen.

Skatteministeriet, 2014, Fuldmægtig Sune Fomsgaard 13/02/2014: svar på spørgsmål vedrørende skatte kreditordningen. Copenhagen.

10 Estonia

10.1 General characteristics

R&D expenditure (% GDP)	2.18 ^(p)
Corporate income tax rate	21
Public expenditure on R&D tax incentives (% GDP)	0
Direct government funding of BERD (% GDP)	0.10
<i>Please refer to Chapter 1 for data sources</i>	

Currently, Estonia does not offer any R&D tax incentives. The support to R&D and innovation is based on innovation framework policies and direct policy measures.

10.2 Other policy instruments¹⁹

Essentially the only tax policy that indirectly supports investments in R&D is the zero corporate tax regime for those profits that are re-invested into the development of the company. Hence, even though, the policy does not differentiate between R&D and other investments, the policy motivates companies to use profits for development.

There are several programs that provide direct support to high-growth, technologically oriented enterprises, e.g., the Technology Competence Centres, Research and Development support, the HEIs- business collaboration development. Additionally, such policies as Innovation vouchers, Cluster development programme and Involvement of Development specialist are also available.

In order to motivate firms to start undertaking R&D activities and increase extramural R&D, two programs have been launched: (1) the awareness programme for creative industries; (2) Testing and semi-industrial laboratories support programme.

The government of Estonia has also announced a commitment to support the Baltic Innovation Fund (BIF) (a inter-governmental initiative between Estonia, Latvia and Estonia), which provides support to equity investments into high-growth potential SMEs in the Baltic countries.

10.3 Assessment

While Estonia does not offer any type of R&D tax incentives, the growth of innovative performance of Estonia has been one of the most rapid among all EU member states. The growth rate of R&D intensity and excellence in Science and Technology (S&T) between 2000 and 2011 was 13.31 percent and 11.7 percent (accordingly), which was highest among all EU member states (EC, 2013).

However, further development can be challenged by the composition of industrial sector, which mainly consists of basic subcontracting manufacturing (EC, 2013). In order to promote the international competitiveness of the sector, the government should review the policies that motivate productivity and the increase of added value. R&D tax incentives may be one of such measures.

¹⁹Information rests on Erawatch, 2014. Accessed on: October, 2014. Available at: http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/ee/country?section=PolicyMix&subsection=InteractionBetweenKnowledgeTrianglePolicies

10.4 **References**

Ruttas-Küttim R., 2014, Erawatch Country Reports 2013: Estonia, JRC Science and Policy Reports, European Commission.

European Commission, Erawatch: Estonia, n.d., Interaction between Knowledge Triangle Policies. Accessed on: October 12, 2014. Available at:

http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/ee/country?section=PolicyMix&subsection=InteractionBetweenKnowledgeTrianglePolicies

European Commission, 2013, Research and Innovation Performance in EU Member states and Associated countries. Available at:

[http://ec.europa.eu/research/innovation-union/pdf/state-of-the-union/2012/innovation union progress at country level 2013.pdf](http://ec.europa.eu/research/innovation-union/pdf/state-of-the-union/2012/innovation_union_progress_at_country_level_2013.pdf)

11 Finland

11.1 General characteristics

R&D expenditure (% GDP)	3.55
Corporate income tax rate	20
Public expenditure R&D tax incentives (% GDP)	0 (2011)
Direct government funding of BERD (% GDP)	0.08
<i>Please refer to Chapter 1 for data sources</i>	

In Finland the public support to companies consists almost fully of direct subsidies. The incentive effect of the accelerated depreciations is small and the new possibility of making additional deduction on wages is quantitatively restricted and lasts just two years.

11.2 Instrument 1. Additional deduction for R&D wages

At the beginning of 2013 Finland introduced a temporary R&D tax relief. The background of the introduction of such relief was the economic recession, which, as it appeared, was discouraging research and development activities in the companies.

The R&D tax incentive offers an additional 100 percent deduction for R&D personnel wages, set against the corporate tax. The eligible R&D is defined as basic, industrial and experimental research activities; similar to Frascati Manual. The eligibility precondition is that the planned R&D project aims to create a product or process innovation or studies methods of developing those.

Application is carried together with tax return statement. If the company meets the conditions, it is allowed to decrease the withholding tax during the year.

Companies that use the payroll withholding tax incentive, are also allowed to use R&D subsidies. However, the wage costs must be excluded from the eligible costs for subsidies. The tax relief does not cover sub-contracted R&D expenditures.

The target group is restricted because it excludes single proprietors and limited partnerships. There are no industry restrictions. The incentive scheme has a set minimum level of benefit that companies must reach to qualify for the scheme. It also has a benefit ceiling. If a company's fiscal year profit is negative the deduction can be carried forward.

Originally, it was planned that the tax relief will be available three years (2013-2015). However, in the spring 2013 the government decided to shorten the incentive's duration to two years. At the same time, the government also decided to reduce the corporate income tax rate to 20 percent. This unforeseen change reduced the attractiveness of the instrument.

The tax law obligates performing a follow-up assessment. Evaluation has started in September 2014 and will be finished in February 2016. Tax Administration's data from tax year 2013 shows that 550 companies have submitted applications. The total applied amount was EUR 63.6 million. This can be compared to the estimate of Ministry of Finance, which expected that new instrument reduces corporate income tax returns by EUR 155 million per year. Reasons for the low number of claims are likely to be the novelty of the system, lack of information and the ongoing recession.

The influence of the new instruments to public finances can be rather high, if fully exploited by eligible companies. Estimate by the Ministry of Finance showed that the new instrument reduces corporate income tax returns by around EUR 155 million per year. According to available statistical data, it appears that in 2013 this number is likely to be substantially smaller.

11.3 Instrument 2. Accelerated depreciation

Accelerate depreciation was introduced around 1993. For R&D expenditure, other than investments in buildings, firms can claim a 100 percent deduction. Normally, the value of machines and equipments can be depreciated at a 25 percent yearly rate.

For investments in buildings connected with R&D activities, firms can apply an accelerated depreciation at a yearly 20 percent rate (normally, it would be 7 percent).

11.4 Other policy instruments

Direct subsidies are dominant in the R&D policy mix in Finland. The total public sector expenditure on R&D through direct subsidies was estimated to be EUR 650 million/yearly.

The different programs are aimed to supporting innovative start-ups, SMEs, as well as larger companies that have significant external impacts or if the company is reorganizing its core activities (Erawatch, *Finland: Interaction between Knowledge Triangle Policies*, n.d.).

Recent study by Koski and Pajarinen (2013) did not find any statistically significant effect the subsidies have had on productivity. However, Koski and Pajarinen (2011) found that R&D subsidies temporary positive impact on employment.

11.5 Data availability

Anonymized firm-level R&D data is available for research purposes, but accessing it requires an agreement with Statistics Finland. The researcher can analyze the data remotely or carry out the analysis in Research Laboratory, which is located in the head office of Statistics of Finland.

11.6 Assessment

The Finnish R&D tax incentive scheme is temporary and in force for the period between 2013 and 2014. The R&D tax incentive is based on R&D personnel costs and allows double deduction for tax purposes (enhanced allowance). A second tax subsidy scheme offers accelerated depreciation related to capital costs. In terms of scope, providing incentive for personnel costs is viewed as best practice. In terms of targeting, the tax incentive does not perform according to best practice.

According to targeting, the R&D tax scheme does not perform according to best practice. The scheme is available only to SMEs. Single proprietors and limited partnerships are also excluded. A minimum amount of R&D expenditure is necessary to be able to qualify. A maximum ceiling also applies. A carry forward is possible, however, a cash refund is not available in case a firm does not have taxable income. This may restrict the support to those more liquidity constrained companies.

On implementation side the policy instrument performs well. A public consultation was carried and the scheme will be evaluated. The application can be submitted electronically and a one-stop agency is available. The decision time depends on yearly financial statements: if the company's application is approved, tax reductions will be credited on monthly basis.

11.7 References

Koski, Heli and Mika Pajarinen, 2011, "Do Business Subsidies Facilitate Employment Growth?" ETLA Discussion Papers 1235, The Research Institute of the Finnish Economy.

Koski, Heli and Mika Pajarinen, 2014, Subsidies, the shadow of death and labor productivity, *Journal of Industry, Competition and Trade*, forthcoming. Available at: <http://dx.doi.org/10.1007/s10842-014-0177-1>

Könnölä T.,2014, Erawatch, Country Reports 2013: Finland, European Commission.

12 France

12.1 General characteristics

R&D expenditure (% GDP)	2.29 ^(p)
Corporate income tax rate	38
Public expenditure on R&D tax incentives (% GDP)	0.26
Direct government funding of BERD (% GDP)	0.12
<i>Please refer to Chapter 1 for data sources</i>	

12.2 Instrument 1. Research tax credit (Crédit Impôt Recherche)

Research tax credit (Crédit Impôt Recherche (CIR)) was introduced already in 1983. Initially, CIR had an incremental base. In 2004, a volume-based component was introduced alongside. As from 2008, CIR is fully volume-based.

Currently, CIR is a 30 percent tax credit for the first EUR 100 million of eligible R&D expenditure, and 5 percent above that.

R&D is defined according to OECD Frascati Manual. Hence, the novelty requirement is "new to the world". Eligible expenditure include R&D personnel costs, general and administrative costs, contract costs, cost of technological monitoring, depreciation allowances for assets used for R&D activity in France, costs of patenting, et al.²⁰

If a company does not taxable income, after a three-year period it can receive the research tax credit in the form of a cash rebate. SMEs, young companies and liquidity constrained companies are able to receive immediate refunds for unutilized credits.

There are regular evaluations of the tax credit. Some preliminary microeconomic studies concluded that the effect of the incentive is positive on R&D activity (Mulkay and Mairesse, 2011; Lhuillery et al., 2013). Further, Cahu et al. (2010) estimate that the long-term macroeconomic effect of the reform is equal to an increase of GDP between 0.3-0.6%.

The National Assembly asked to the *Cour des Comptes* (Revenue court) for an assessment of the CIR reform in 2013. They concluded that the impact of the reform on firm R&D activities has been positive. Also, the popularity of the scheme between 2007 and 2011, increased substantially; the number of companies using CIR policy doubled, passing from 9,800 to 19,700 companies (an increase of 101 percent). Over the same period, the declared spending increased from EUR 15,4 billion in 2007 and EUR 18,4 billion in 2011.

In terms of government costs, according to the *Cour des Comptes*, the mechanism lead to an increase in the R&D beyond the expectations of the government. As a

²⁰Ministère des Finances et des Comptes publics, *Crédit d'impôt pour dépenses de recherche*. Accessed on: October 12, 2014. Available at: http://www.impots.gouv.fr/portal/dgi/public/popup?espId=2&typePage=cpr02&docOid=documentstandard_4533

result, the policy costs were vastly underestimated. Furthermore, the report points out that the option for immediate refund increases the risk of fraud.

12.3 Instrument 2. Jeune entreprise innovante (JEI)

Jeune entreprise innovante (Young innovative enterprise, JEI) scheme is targeted towards young innovative firms (JEI). JEI are defined as independent SMEs, which are younger than eight years and whose R&D expenditure covers at least 15 per cent of the total expenses. Firms that have been created as a result of merger or reorganization of companies that would not qualify as JEI, or that are formed as an extension of existing business, are excluded. SMEs are defined in accordance with EC recommendations: firms having less than 250 employees, with either an annual turnover below EUR 50 million or the total balance sheet not exceeding EUR 43 million.

As from January 2012, firms are free of corporate tax in the first year of participation in the scheme. In the second year, firms receive a 50 percent reduction in the corporate tax. Starting from the third year, no discount is provided to the corporate tax payment.

As from January 2014, qualifying firms are exempt from the social security contributions for eight years. Per establishment, the ceiling of the benefit is five times the amount of annual social security contributions. In 2014, this represented EUR 187,740. Per salary, the maximum amount that can be received is 4.5 times the minimum salary.²¹

Furthermore, by decision of local authorities, firms having JEI status may be exempt for seven years of the property tax on buildings (*taxe foncière sur les propriétés bâties (TFPB)*) and territorial economic contributions (*contribution économique territoriale (CET)*).

Additionally, it offers an exemption on option gains from sale of shares or units of a firm participating in the JEI scheme. Capital gains are taxed at a progressive rate after applying an allowance, which is determined according to the time period the shares were held in the company. The allowance is set to 50 percent, if shares were held up to four years; 65 percent if the duration was between four and eight years and 85 percent if they were held between eight and ten years.²²

Firms can receive an immediate refund and benefit from the scheme even if they do not obtain profits.

R&D is defined according to OECD Frascati Manual. Eligible expenditure is essentially the same as for CIR.²³ The scheme is non-discriminatory in terms of sectors and geographical location.

During the 2004-2010 period, around 4,400 enterprises benefited from the JEI scheme. In terms of government costs, this represented around EUR 798 million as foregone tax revenue from social security contributions and corporate tax (Hallépée and Garcia, 2012).

²¹Ministère de l'éducation nationale, de l'enseignement supérieur et de la recherche, Appui aux entreprises innovantes. Accessed on August, 2014. Available at: <http://www.enseignementsup-recherche.gouv.fr/cid5738/le-statut-de-la-jeune-entreprise-innovante-jei.html>

²² *Ibid.*

²³See detailed list at: Sénat, Projet de loi de finances pour 2014: Recherche et enseignement supérieur. Accessed on August, 2014. Available at: www.senat.fr/rap/l13-156-322/l13-156-32221.html#fn90

JEI was evaluated by Hallépée and Garcia (2012). They found the scheme lead to an increase in employment, higher wages and an increase in the survival rate. In a longer run (five years), they find that the treated firms had stronger sales increase and growth of added value. Nevertheless, they also found that only less than half of the beneficiary firms were profitable, which is not especially surprising taking into account the age of the firms.

Overall, Hallépée and Garcia (2012) concluded that the increased R&D investments by the beneficiary firms were higher than the budget cost of the scheme, resulting in a bang-for-the-buck (BFTB) above one.

12.4 Instrument 3. Innovation Tax Credit (Crédit d'Impôt Innovation)

The Finance Act of 2013 introduced an extension to CIR through the innovation tax credit (Crédit Impôt Innovation, CII). CII is available to qualifying SMEs and is intended for expenditure on downstream activities, e.g. prototypes and pilot assets.

The rate of CII is 20 percent and a ceiling of eligible expenditure is set at EUR 400,000; firms can receive up to EUR 80,000 as tax reduction.

Eligible expenses include the design of prototypes or pilot plants for new products, which are not eligible for the CIR. The new product is defined as a tangible or intangible property that meets both of the two conditions:

- the product is not available on the market;
- the product is distinguishable from prior or existing products through enhanced performance on a technical level, eco-design, ergonomics or functionality.

As part of the CIR, it can be offset against the corporate income tax or refunded in case a firm is not profitable.

12.5 Instrument 4. Patent Box²⁴

Capital gains from the sale of patents, patentable technologies (or improvements in those) and net income from licensing are taxed at reduced 15 percent rate. In order to qualify for the tax benefit, the product or technology must have been under the ownership of French company for a minimum of two years. Furthermore, the sale of the product or technology to a related entity does not qualify for the tax benefit.

²⁴ Section fully rests on "Article 39 terdecies: Modifié par Ordonnance n°2013-676 du 25 juillet 2013 - art. 42" Available at: <http://www.legifrance.gouv.fr/affichCodeArticle.do?cidTexte=LEGITEXT000006069577&idArticle=LEGIARTI000006307690&dateTexte=&categorieLien=cid>

12.6 Other policy instruments²⁵

bpiFrance

bpiFrance is a public investment bank targeted at financing R&D and innovation, especially within SMEs with high-growth potential. It was introduced in December 2012.

The main products of bpiFrance involve (Erawatch, 2014):

- *"Equity investment.* Aims at attracting investors to companies (the idea of 'business angels');
- *Contract participatory development.* Assists companies to build their own funds for development projects;
- *Pre-financing of the CIR.* For innovative SMEs to have immediate cash to cover R&D expenses for current fiscal year. An interest rate applies.
- *Pre-financing of Crédit d'impôt pour la compétitivité et l'emploi (tax credit for all firms with tax liability in France and employees).* Works the same as with CIR- immediate cash-refund;
- *Guaranteed cash loans.* Providing guarantees to any bank that lends to medium term (two to seven years) to an SME. It aims to alleviate bank's short-term debt;
- *Innovation loan.* Supports SMEs in financing their industrial and commercial development in France or abroad. Available even in the absence of collateral;
- *Bpifrance export loan."*

Policies to support the knowledge triangle

There are several programs that aim to improve the cooperation between the research, innovation and education (the knowledge triangle). Examples of such policy measures are the Investment for the future plans fund Sociétés d'Accélération du Transfert de Technologies (SATT) and Instituts de Recherche Technologique, Instituts pour la Transition Energétique (IRT/ITE) (Erawatch, 2014).

While SATT are publicly funded, they are private enterprises whose aim is to commercialize public research. Generally, this implies bringing an innovative idea or concept (e.g., a patent) to the market of companies that would then use them to transfer the ideas into marketable products. Currently, there are around "15 SATT and it is planned that they will replace the industrial liaison entities attached to higher education institutions and previous forms of licensing" (Erawatch, 2014).

IRT/ITE are a technological research laboratories that bring together private, public and academic research entities. The goal of those projects is to enhance public-private partnerships over a ten year period. IRT/ITE are co-funded by both the public and private sector.

Other such policies include "Pôles de compétitivité" (competitiveness clusters) and Carnot Institutes (research laboratories).

²⁵The section rests on Erawatch(2014) France: Interaction between knowledge triangle policies. Accessed on: 10 October, 2014. Available at: http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/fr/country?section=PolicyMix&subsection=InteractionBetweenKnowledgeTrianglePolicies

12.7 Assessment

The scope of incentives for R&D is very wide. Crédit Impôt Recherche, generic R&D tax credit, and Jeune entreprise innovante, scheme targeted at young R&D-intensive SMEs, are applied to firm- R&D expenditure. R&D is defined according to OECD Frascati Manual. The novelty requirement is "new to the world", which is considered best practice. For downstream activities, e.g., prototyping, an Innovation tax credit is available. Such tax incentive supports those activities that may not be considered as R&D under the definition in Frascati Manual but that, nevertheless, can support the innovative activity or faster adaptation to market tendencies in a firm.

France also offers a "patent box" that provides a reduced corporate tax rate on income from IP. Such scheme is not considered advisable practice.

With respect to targeting, the R&D tax incentive schemes in France largely follow advisable practice. R&D tax incentives are not particularly targeted to any type of sector, region or legal entity. However, France offers a very generous R&D tax incentive for young R&D-intensive SMEs, which is considered best practice. Also, Innovation Tax credit is only available to SMEs.

Immediate refunds for unutilized credits is available, firms can receive a tax benefit even if they are not profitable. Such practice is also considered recommendable.

On the implementation side, the French system benefits from maturity which is also reflected in a relatively high awareness and application rate among French firms. The application procedure could be improved, e.g., by allowing firms to fully apply to the tax incentives online and providing a one-stop agency. Such reforms would decrease the compliance costs for firms, which is especially important in the case of young firms.

On evaluation practice, France performs very well. The tax incentives have been regularly evaluated, both by the government and academia.

12.8 References

Afigec (accounting and consulting). Accessed on: 20th April 2014. Available at: <http://afigec.com/>.

Association Nationale Recherche Technologie (ANRT), n.d., Accessed 20 April 2014. Available at: <http://www.anrt.asso.fr/>.

Cahu P. et al., *L'impact macroéconomique de la réforme 2008 du crédit d'impôt recherche*, *Revue économique*, 2010/2, vol. 61 : 313-39.

Duguet, E., 2012, The effect of the incremental R&D tax credit on the private funding of R&D, *Revue D'économie Politique*, 2012/3, vol. 122.

Erawatch, *Support – Measure, Research Tax Credit, Crédit d'Impôt Recherche*. Accessed on: 10 March 2014. Available on: <http://erawatch.jrc.ec.europa.eu/erawatch/>.

E&Y, 2013, *Worldwide R&D incentives reference guide 2013-2014*. Accessed on: 18 March 2014. Available on: <http://www.ey.com/Publication/>.

Fraichard, J. and H. Delcamp, n.d., *Exchange of good practices on R&D and innovation tax incentives*. DGCIS / DG Trésor.

France, ministère de l'économie, de l'industrie et de l'emploi and ministère du budget, des comptes publics, et de la réforme de l'état, 2010, *Annexe E, Mission d'évaluation*

approfondie no. 5, Mission d'évaluation sur le credit d'impôt recherche. Accessed on 20 March 2014. Available at: <http://www.economie.gouv.fr/>.

France, ministère de l'Économie, de l'industrie et de l'emploi and ministère du budget, des comptes publics, et de la réforme de l'état, 2010, *Mission d'évaluation sur le credit d'impôt recherche.* Accessed on : 20 March 2014. Available on : <http://www.ladocumentationfrancaise.fr/>

France, ministère de l'Éducation Nationale, de l'enseignement supérieur et la recherche. Accessed on: 22 March 2014. Available on : <http://www.enseignementsup-recherche.gouv.fr/cid5738/le-statut-de-la-jeune-entreprise-innovante-jei.html>.

France, ministère de l'Éducation Nationale, de l'enseignement supérieur et la recherche, département de la Communication, 2014, Guide du Crédit d'impôt recherché. Accessed on : 4 April 2014. Available at: <http://media.enseignementsup-recherche.gouv.fr/>.

Hallépée, S. and A.H. Gacia, 2012, *Évaluation du dispositif JEI.* Ministère du redressement productif. Accessed on : 4 April 2014. Available on: http://www.dgcis.gouv.fr/files/files/directions_services/etudes-et-statistiques/evaluation/evaluation-du-dispositif-JEI.pdf.

Invest in France Agency. Accessed on: 5 April 2014. Available at: <http://www.invest-in-france.org/us>.

Invest in France Agency, 2013, *France's research tax credit.* Accessed on: 5 April 2014. Available on: <http://www.invest-in-france.org/Medias/Publications/153/France-research-tax-credit-2013.pdf>.

Le crédit d'impôt recherche en 2011, Chiffres du CIR 2011, MESR, juillet 2013; http://cache.media.enseignementsup-recherche.gouv.fr/file/2011/35/0/bilanCIR2011_262350.pdf

Mulkay, B. and J. Mairesse, 2011, *Évaluation de l'impact du crédit impôt recherche,* Rapport pour le Ministère l'Enseignement supérieur et de la Recherche, nov. 2011

Service-public, 2014, *Crédit d'impôt recherche.* Accessed on: 18 April 2014. Available from: <http://vosdroits.service-public.fr/professionnels-entreprises/F23533.xhtml#N10128>.

THE OFFICIAL WEBSITE OF FRANCE. *Research tax credit.* Accessed on: 22 March 2014. Available on: <http://www.france.fr/en/working-and-succeeding-france/research-tax-credit>.

Tresor-Economics, 2009, *The economic impact of the 2008 research tax credit reform (Crédit d'Impôt Recherche).* Accessed on: 22 March 2014. Available at: <https://www.tresor.economie.gouv.fr/>.

LegiFrance.gouv.fr., 2014, *Article 39 terdecies: Modifié par Ordonnance n 2013-676 du 25 juillet 2013 - art. 42"* Available at: <http://www.legifrance.gouv.fr/affichCodeArticle.do?cidTexte=LEGITEXT000006069577&idArticle=LEGIARTI000006307690&dateTexte=&categorieLien=cid>

13 Germany

13.1 General characteristics

R&D expenditure (% GDP)	2.92
Corporate income tax rate	29.8
Public expenditure R&D tax incentives (%GDP)	0
Direct government funding of BERD (% GDP)	0.09

Currently, the government of Germany does offer any type of R&D tax incentives.

13.2 Other policy instruments

Non-repayable cash grants

R&D incentives are mostly in the form of non-repayable cash grants. They are awarded on a "per project" basis, especially for collaborative projects. The program focuses on various technology fields such as medical, environmental, information technology, climate protection, biotechnology, nano-technologies and production technologies. Those grants typically cover up to 50 percent of the costs of an R&D project. R&D grants are also available on regional levels. The selection criteria for eligibility include the level of innovation, as well as the technical and the economic risks attached to the project.

Technology open programs for small and medium sized enterprises (SMEs)

The "Central Innovation Program for SMEs" (ZIM) is the best known of these programs and provides grants for research projects within SMEs, covering 35 percent -50 percent of project costs. Up to 5.000 projects per year are supported.

Some Bundesstaaten (states) also hand out grants targeted at SMEs. These grants usually cover a maximum of 80 percent of project costs. They do not necessarily require collaboration between the research institute and the company.

R&D loans:

Other options are R&D loans or guarantees. The German government provides R&D loans which usually are applicable to all fields, without application deadlines and which can also support more costly projects. There are also state based R&D loan programs, designed to support SMEs (Taxand 2011/12). The German state governments provide the loans or guarantees through their business development banks. Germany's federal government-owned development bank (KfW) and the German state development banks are the most relevant banks for those activities.

Support for young technology-intensive companies also comes from public/private funds like the High-Tech Gründerfonds. It is an initiative of the German Federal Ministry of Economics and Technology (BMWi) and is supported by partners of the German industry. The initiative offers additional funding to innovative start-ups.²⁶

For all three types of instruments, the qualifying expenditures are connected to a specific project and all the costs associated with that project, but are not tied to a

²⁶ <http://www.gtai.de/GTAI/Navigation/EN/Invest/Business-location-germany/RD-framework/rd-incentives.html>

specific type of R&D expenditure per se (e.g. wages, machines, buildings, patent acquisition etc.).

13.3 Data availability

Currently, various data sources at the firm level are available for scientific use. Generally, these data sources can be accessed by remote data processing, guest science work places in a safe centre or via scientific programming files. Germany also participates in the CIS. R&D aggregate statistics are compiled uniformly according to Frascati Manual (OECD) and EU norms.

13.4 Assessment

It has long been debated whether Germany should introduce R&D tax incentives. Currently, the German government has decided not to introduce a preferential tax treatment for R&D. In Germany, R&D activities are financed via direct funding instruments on both federal and state government levels (grant, loan and participation programmes). Based on the evaluation results, existing large funding programmes are continuously adjusted to the changing needs of companies (in particular small and medium-sized enterprises) or changing market conditions.

There has been a discussion on the fiscal costs of possible tax policies. However, only few estimates have been made. ZEW estimates the fiscal costs of support in the form of a hypothetical tax credit on R&D expenses with a micro-simulation model. According to the simulations, the effects on fiscal revenue of differently designed incentives would be between EUR 464 million and EUR 5,701 million.

13.5 References

Deloitte, 2013, Global Survey of R&D Tax Incentives. Available at: http://www.deloitte.com/view/en_US/us/Services/tax/global-business-tax/r-and-d-and-government-incentives/Research-and-Development-Federal-Tax/dbedb490ae9dd310VgnVCM1000003256f70aRCRD.htm

EFI (2013) Research, Innovation and Technological Performance in Germany. Available at: http://www.e-fi.de/fileadmin/Gutachten/EFI_Report_2013.pdf

GWK (2013) Pakt für Forschung und Innovation Monitoring-Bericht 2013. Available at: <http://www.gwk-bonn.de/fileadmin/Papers/GWK-Heft-33-PFI-Monitoring-Bericht-2013.pdf>

OECD, 2012, Economic Surveys: Germany. February 2012.

Spengel, Christoph; Christina Elschner and Christof Ernst, 2009, Fiskalische Kosten einer steuerlichen Förderung von Forschung und Entwicklung in Deutschland – Eine empirische Analyse verschiedener Gestaltungsoptionen. ZEW Discussion Paper 10-019.

14 Greece

14.1 General characteristics

R&D expenditure (% GDP)	0.69
Corporate income tax rate	26
Public expenditure R&D tax incentives (%GDP)	n/a
Expenditure other innovation policy: R&D expenditure in public sector as % GDP	0.45
<i>Please refer to Chapter 1 for data sources</i>	

14.2 Instrument 1. Enhanced allowance for R&D

As from February 2011, the investment law 3908/11 provides that various types of costs, including R&D and innovation projects qualify for a tax allowance. In order to qualify, the projects must be carried together with a Higher Education Institution from Greece or the EU. Young companies can use the tax allowance for ten years, while all other companies for eight (Erawatch, 2014).

The maximum level of total state aid that a firm can attract to any one project depends on the prefecture and the size of the company (small, medium and large firms are distinguished). It varies between 15 to 50 percent. The highest percentage of aid (50 percent) is offered for small firms in less developed regions. The lowest rate (15 percent) is available for large enterprises in more advantageous regions (Enterprise Greece, n.d.).

Application should be carried online or sent to the competent Investor Service Office (available across Greece). Pre-evaluation is available: authorities at the Investor Service Office review the application and issue accordingly approval or disapproval. The decision-time (evaluation of the application) should be carried within 40 days. This progress of the process can be monitored online. Overall, the entire application and evaluation process should take up to six months (Enterprise Greece, n.d.).

14.3 Instrument 2. Outcome incentive

According to the patent law (L. 3842/10, art.71), profits obtained from commercialization of patented products are exempt from corporate tax for three consecutive fiscal years (first year being the year when first profits were gained). The benefit is applicable also to those patented products that were created by third parties (Erawatch, 2014).

14.4 Instrument 3. Tax exemption for R&D

As from December 2013, R&D expenses are excluded from the gross proceeds during the year in which they were incurred. Expenditure on R&D assets are allocated within a 3 year period (Erawatch, 2014).

14.5 Other policy instruments

Under the TEMPME programme which works in synergy with EU structural funds, companies are offered a wide range of tax exemptions and grants. Fiscal support is offered generally for investments in companies, among them – R&D.

14.6 Data availability

The Greek government does not release firm-level data for scientific studies. The national statistical office in Greece also does not collect and report data on R&D activities on a regular basis.

14.7 Assessment

Greece offers an enhanced allowance for R&D, as well as facility to exclude R&D expenses from the gross proceeds in the year they were incurred. Furthermore, income from internationally recognised patents is exempt from tax. Such incentive is, however, not advisable practice. Detailed information about the qualifying R&D and expenditures covered was not available.

In terms of targeting, R&D tax allowance has a strong regional focus and targeting to firm size. Such heterogeneity translates into higher administrative and compliance costs for firms, overall making the R&D tax incentives less efficient.

In terms of organization, online application is available and whole application process takes up to six months, which is considered advisable practice.

14.8 References

Avgerinos, Y.V., 2012, *Investment Incentives Law*. Accessed on: 23 February 2014. Available at:

<http://www.greeklawdigest.gr/topics/banking-system-finance-investment/item/41-investment-incentives-law%20a>

General Secretariat for Research and Technology, n.d. Accessed on: 10 April 2014. Available at: <http://www.gsrt.gr/central.aspx?sId=119I428I1089I323I488743>.

Enterprise Greece, n.d., *Doing Business in Greece*. Accessed on: 14 October 2014. Available from:

<http://www.investingreece.gov.gr/default.asp?pid=180&la=1>

VK, Premium Business consultants, n.d., *New Investment LAW 3908/2011*. Accessed on: 23 June 2014. Available at:

<http://www.vkpremium.gr/new-investment-law-39082011/>

Deloitte, 2013, *International Tax – Greece, Highlights*. [Online] Accessed on: 27 February 2014. Available at:

<http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-greecehighlights-2014.pdf>.

Tsipouri L. and S. Athanassopoulou, 2014, *Erawatch, Country Reports 2013: Greece*, JRC Science and Policy reports, European Commission.

15 Hungary

15.1 General characteristics

R&D expenditure (% GDP)	1.3
Corporate income tax rate	20.6
Public expenditure R&D tax incentives (%GDP)	0.08
Direct government funding of BERD (% GDP)	0.11
<i>Please refer to Chapter 1 for data sources</i>	

15.2 Instrument 1. Enhanced allowance

An enhanced allowance of 100 percent for fundamental research and R&D is available, i.e., for every EUR 100 spent, firm can deduction another EUR 100 for tax purposes. In order to qualify, the research or R&D must be contracted by universities, the Hungarian Academy of Sciences or by joint ventures with these institutions.

Eligible expenditure include personnel costs, expenditure on equipment and certain materials, products. Scheme is not specially targeted to size of company, legal form or region.

15.3 Instrument 2. Payroll withholding tax incentive for research personnel with academic titles

Wage bill for researchers with a PhD within a firm are exempt from social security tax and training fund contributions.

15.4 Instrument 3. Accelerated depreciation

R&D capital costs can be deducted at a 100 percent rate within a year.

15.5 Instrument 4. Patent Box

The gross royalty received from exploitation of IP, can be reduced by 50 percent. The IP must be a result of R&D activities. Under certain conditions, capital gains incurred from sale or in-kind contribution of qualifying IP are also free from corporate tax. The following must hold: "(1) the company makes an election with the tax authorities within 60 days following the date of the IP acquisition; (2) the company holds the assets for at least one year before any subsequent sale" (Deloitte 2014). Any capital loss realized in the same way cannot be accounted for corporate tax purposes.

15.6 Instrument 5. Wages Tax Allowance

Tax allowance of 10 percent (15 percent for SME) of the R&D personnel costs applies. Tax allowance applies to those activities that qualify as basic, applied research and experimental development, as well as software development. Tax incentive can be claimed during the tax year and the following three tax years in equal instalments (INCL, 1996).

15.7 Other policy instruments²⁷

Hungary offers various policy instruments that promote the interaction between the knowledge triangle. This include policies that provide funding to joint research projects, as well as the creation of research centres, e.g. the programme *Development and strengthening of research and development centres* (combines different previous measures of university knowledge centres, private-public research initiatives).

Several policy instruments motivate research mobility from academia and public sector to business. Example include the "Öveges József" and "Kozma László" programme that promoted mobility of researchers technical, business and scientific qualifications.

Furthermore, Hungary has several initiatives for business incubation, e.g. Support to innovation and technology parks.

15.8 Data availability

Firm-level data on R&D tax incentives is generally not available. However, the National Tax and Customs Administration of Hungary (NTCA) provide aggregated data on taxes. The data are publicly available on NTCA website. Hungary also participates in the Community Innovation Survey since (CIS) that covers firm-level information on innovative performance and activity.

15.9 Assessment

Hungary offers a limited range of R&D tax incentives that are input related. The scheme is volume based and may combine with other incentive schemes with a regional target such as subsidized land prices. As for targeting, there is little differentiation and no special schemes offered to SMEs in Hungary. On the implementation side the Hungarian case is at an early stage and is still lags behind best practices in Western Europe. The investment agency website suggests that Hungary also adopts a case-by-case approach to negotiating in particular with individual and larger investors. Generally the emphasis is more on attracting foreign direct investors to the country using regionally differentiated schemes and incentives.

15.10 References

Deloitte, 2014, *Global Survey of R&D Tax Incentives*. Available at: <http://www2.deloitte.com/ie/en/pages/deloitte-leyton/articles/2014-global-survey-research-development-tax-incentives.html>

Erawatch, 2013, *Hungary, Research Performers, Business enterprise sector*. Accessed on: 14 October 2014. Available at: http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/hu/country

Eugo Hungary. Point of single contact, n.d., *Investment Incentives*. Accessed on: 22 aPRIL 2014. Available on: <http://eugo.gov.hu/doing-business-hungary/investment-incentives>

Goldberg, I, 2014, *R&D Tax Incentives Hungary*. [E-mail]. Message to: Laki, G., Ministry of National Economy (Tax and Financial department).

²⁷ Paragraph fully rests on Erawatch (2013), Hungary: Interaction between the knoweldge triangle policies. Accessed on October 14, 2014. Available at: http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/hu/country?section=PolicyMix&subsection=InteractionBetweenKnowledgeTrianglePolicies

International center for not-for-profit law, 1996, *Act LXXXI of 1996 on Corporate Tax and Dividend Tax. Section 22: Regional and Other Tax Incentives*. Accessed on: 17 April; 2014. Available on:
<http://www.icnl.org/research/library/>

The Hungarian Investment and Trade Agency, n.d. accessed on: 17 April 2014.
Available at:
www.hita.hu.

16 Ireland

16.1 General characteristics

R&D expenditure (% GDP)	1.72 ^(e)
Corporate income tax rate	12.5
Public expenditure R&D tax incentives (%GDP)	0.14 (2010)
Direct government funding of BERD (% GDP)	0.05 (2010)
<i>Please refer to Chapter 1 for data sources</i>	

16.2 Instrument 1. R&D tax credit

A 25 percent tax credit that applies on R&D expenditure is offered. The design is mixed volume/incremental, with the volume component recently being raised to EUR 200,000. The base year was set to be 2003, making it effectively volume based for new entrants. No ceiling is set to the level of eligible expenditure over the base year of 2003. Thus the scheme effectively requires a minimum amount of expenditure for companies who performed R&D in the in 2003 and provides a single, general rate for all other companies. The definition of qualifying R&D is based on the Frascati Manual and includes basic, applied and experimental research. Hence the novelty requirement is "new to the world".

The tax credit can be carried back one year and carried forward indefinitely. Where there is no corporation tax liability to be relieved, the tax credit is refundable from the year claimed. These refunds are payable in instalments over three years and are limited by reference to corporation tax liability over the previous ten years, or two years worth of payroll taxes.

The tax credit is not targeted to any particular sector or size of firm. Qualifying expenditure is broad and includes direct and indirect costs as long as they are incurred in R&D activities.

Outsourcing may take place anywhere in the world, but it is limited to 15 percent of the overall eligible expenditure allowed with an additional 5 percent allowable for third level institutions. There is no restriction on the location of any IP generated from the R&D carried out. The taxpayer must apply for the credit within 9 months of the year end (with the annual corporation tax return).

Econometric evaluation was deemed not feasible due to data limitations. However, the government carried a throughout assessment of the R&D tax credit and concluded of its positive impact.²⁸

16.3 Other policy instruments

Enterprise Ireland (EI) provides direct R&D supports to companies and also promotes the collaboration between the industry and higher education institutes. EI provides a variety of grants including innovation partnerships, R&D fund grants, technical

²⁸ See: Review of An Roinn Airgeadais *Department of finance (2013) Review of R&D Tax Credit*

feasibility grants, and innovation vouchers. EI also highlight the availability of the R&D Tax Credit by providing a guide to client companies on the R&D Tax Credit.

Science Foundation Ireland's (SFI) focus is primarily on supporting HERD. SFI also provides grants to both international and local researchers. Furthermore it provides grants for collaboration with industry, thereby also providing incentives to BERD.

There are a number of other government agencies that assist in motivating R&D in Ireland. The Higher Education Authority (HEA) administers the Programme for Research in Third Level Institutions (PRTLTI) and which has the largest R&D agency budget: in 2011 HEA allocated an estimated EUR 309.2 million to R&D activities; 34 percent of the total state spending on R&D.

16.4 Data availability

Firm-level data is available. The access is controlled by the premises of the Central Statistics Office in accordance with Statistics Act 1993. Ireland also participates in CIS and provides data that is in line with EU and OECD rules. However, data has certain limitations that restricted government to carry an econometric assessment on the effectiveness of R&D tax incentives.

16.5 Assessment

Ireland offers a comparatively generous R&D tax credit scheme that covers direct and indirect R&D and IP costs (also for certain buildings) and expenditures. With each passing year since 2003 the scheme becomes more volume based and favouring start-ups, bringing it in line with best practice. R&D is defined according to OECD Frascati Manual, the novelty requirement being "new to the world", which is also considered best practice.

As regards targeting, there are no sectoral or regional differentiations, which along with lack of minimum expenditures for new firms accords with best practice. Application procedure is relatively simple, it can be carried online and a one-stop agency is available. The scheme has also been evaluated.

This is reflected in the take-up rates that have increased substantially over the years. The number of companies benefiting from the credit increased from less than 75 in 2004 to almost 1,500 in 2011. The annual cost of the scheme is estimated to have risen from EUR 71 million to approximately EUR 261 million over the same period. This represents nearly 70 percent of all state support (including direct grants) given to private firms for R&D in 2011.

Altogether Ireland is considered to exhibit many best practice features in terms of targeting, as well as scope and implementation, which includes public consultation.

16.6 References

Ireland. An Roinn Airgeadais, Department of Finance, 2013, Review of Ireland's Research and Development (R&D) Tax Credit 2013.

Ireland. Statute Book, Finance Act (2013). Available at:
<http://www.irishstatutebook.ie/2013/en/act/pub/0008/print.html>

Ireland. Statute Book, Taxes Consolidation Act (1997). Available at:
<http://www.irishstatutebook.ie/1997/en/act/pub/0039/print.html#part6>

17 Israel

17.1 General characteristics

R&D expenditure (% GDP)	n/a
Corporate income tax rate	20
Public expenditure R&D tax incentives (%GDP)	n/a
Direct government funding of BERD (% GDP)	0.17 (2010)
<i>Please refer to Chapter 1 for data sources</i>	

17.2 Instrument 1. Accelerated depreciation

Provided certain conditions, an enterprise conducting R&D either in-house or by a contractor is allowed to deduct 100 percent of R&D expenses in the year incurred.

In order to qualify, R&D must be carried in manufacturing, agriculture, transportation or energy sectors. R&D must be approved by the competent ministry in which the R&D takes place. According to Article 20A(a)(2) of the Tax Ordinance, an enterprise whose R&D does not meet one of the conditions, is allowed to deduct the capital cost in three equal annual instalments (OCS, 2014, Caspy & Caspy CPA, 2014).

17.3 Instrument 2. The Law for the Encouragement of Capital Investments

The Law for the Encouragement of Capital Investments provides benefits for companies which meet the requirements of Article 18A of this Law. This article defines companies in biotechnology and nanotechnology as eligible for benefits, provided they have been approved by The Office of the Chief Scientist (OCS). The benefits consist of reduced corporate income tax.

Recently, a characteristic of venture capital scheme has been added to the Law for the Encouragement of Capital Investments. Private investors (angels) in seed-stage companies can write off their investment as an expense (OCS Tax Benefits, 2014).

To date there exists no government or academically administered evaluations of R&D tax incentives (see below for evaluation of direct support).

17.4 Other policy instruments

OCS of the Ministry of the Economy is in charge of policies to support R&D and new technologies in Israel (OCS, 2011). Some of the other OCS direct-support tools are:

Technological Incubators

The incubator program supports new entrepreneurs with innovative concepts to establish their own companies.

TNUFA

The program supports individual inventors at the pre-seed stage and start-up companies during the earliest stages of their projects.

HEZNEK

The HEZNEK program support Seed Companies in mobilizing investments in start-up companies by jointly investing with outside investors - venture capital funds or investment companies.

The MAGNET program

The program supports collaboration among academic institutions, industry and technological user associations.

MATIMOP

The program promotes advanced technologies and supports international collaboration through joint ventures.

In 2008, a study of the effects of government support (matching grants) to industrial R&D on the Israeli economy was undertaken at the request of Israel's Ministry of Finance and the Office of Chief Scientist at the Ministry of Economy. By using data from industry and R&D surveys in 1996–2003, it was found that the scale of the new R&D is two to three times the amount of the (marginal) government support and that this effect is stable and significant across R&D sectors both in industry and in the software (Lach, Parizat & Wasserteil, 2008).

17.5 Data availability

Generally, Central Bureau of Statistics (CBS) does not publish data on a firm level. Nevertheless, there is a possibility for university researchers to buy a file with firm level data that is not identifiable. Israel has made significant improvements in data availability since joining the OECD in 2012, but there is still space for improvement.

17.6 Assessment

Despite offering a general accelerated depreciation on R&D expense, Israel's policy on R&D incentives is amongst the most conservative and limited in scope and targeting. It is particularly in the view to the high level of development and the advanced stage of S&T in Israel. There is some tendency in Israel to prioritise or target particular sectors or R&D activities over other.

The private sector is the main player in R&D, providing more than 2/3 of all funding in 2011. In general, fiscal policies do not play a major part in the policy mix, which aims to stimulate commercial R&D through direct grants to companies.

Currently, there are three simultaneous and independent investigations of the new tax benefits: (i) the Neaman Institute at the Technion conducts an academic study of advantages and disadvantages of tax benefits to encourage business R&D in Israel, for the National Council of R&D in the Ministry of Science; (ii) the Ministry of Finance has contracted E&Y-Israel to study supportive measures for R&D and Innovation in Israel; and (iii) The Ministry of Economy has contracted an evaluation of the tax benefits included in the Law for the Encouragement of Capital Investments.

In terms of implementation the Israeli system is relatively efficient, offering a short turnover time on applications of only two months. A one-stop shop is available, which is also facilitated by the application procedure online.

17.7 References

Caspy, E. and C.P.A. Caspy, 2014, *Income Tax Ordinance, Article 20 A (in Hebrew)*. Jerusalem: 3rd February 2014. Accessed 17 April 2014. Available at www.caspy.co.il.

Deloitte, 2013, *Global Survey of R&D Tax Incentives*. Accessed on: 17 April 2014. Available at: <http://www.deloitte.com/>

Goldberg, I, 2014, *Israel Tax Incentives*. [E-mail]. Message to: Caspy, E., CPA, Caspy&Caspy C.P.A. (Jerusalem), 10 April 2014.

Goldberg, I, 2014, *Israel Tax Incentives*. [E-mail]. Message to: Peled, D., Head of Economics Department, University of Haifa, 10 April 2014.

Goldberg, I., 2014, *Israel Tax Incentives*. [E-mail]. Message to: Brenner, N., Israeli Central Bureau of Statistics, 10 April 2014.

Israel, Ministry of Finance, n.d. *Income Tax Ordinance [New Version] 5721-1961*. Accessed on: 25 April 2014. Available at: <http://www.financeisrael.mof.gov.il/FinanceIsrael/>.

Lach, S., S. PARIZAT and D.WASSERTEIL, 2008, *The Impact of government support to industrial R&D on the Israeli Economy*. Tel Aviv: EGP Applied Economic Ltd. Available at: <http://www.economy.gov.il/NR/rdonlyres/04D3E45C-A94D-408D-8813-5C65869162C4/0/RDGovSupportEnglish2011821.pdf>.

Ministry of Economic, n.d. *Research and Development – Chief Scientist*. Accessed on 25 April 2014. Available at: www.moital.gov.il/madan.

Ministry of Economic, n.d., *Tax Benefits from the Office of the Chief Scientist*. Accessed on: 5 February 2014. Available at: www.moital.gov.il/madan (in Hebrew)

Office fo the Chief Scientist (OCS). *Government Supported Incentive Programs*. Accessed on: 5 February 2014. Available at: <http://www.moital.gov.il/NR/rdonlyres/83C79A59-DCCE-4950-8257-DE48B9D0B9DC/0/IncentivePrograms.pdf>.

18 Italy

18.1 General characteristics

R&D expenditure (% GDP)	1.27
Corporate income tax rate	31.4
Public expenditure R&D tax incentives (%GDP)	0.003
Direct government funding of BERD (% GDP)	0.04
<i>Please refer to Chapter 1 for data sources</i>	

18.2 Instrument 1. R&D tax credit "Decreto Destinazione Italia"²⁹

On December 2013 an executive order (law decree) of the government was approved. It includes measures to promote investment in R&D through tax incentives. These measures include a tax credit for the period 2014 – 2016 on R&D expenses incurred by Italian resident companies, as well as subsidiaries of foreign groups and Italian branches of foreign companies.

It is planned that the new tax credit will offer a 50 percent rate. The expense base is incremental, defined as "*the annual increase of expenses in each fiscal year*". The benefit is capped at EUR 2.5 million per year. In order to qualify, firms must invest at least EUR 50,000 in R&D activities.

R&D is defined similar as definitions laid out in the OECD Frascati Manual; it applies to experimental, industrial and basic research. Eligible expenditure includes R&D personnel costs, research costs incurred in collaboration with research centres and universities, outsourced research, technical activities and patents (internally developed or whose exploitation been approved by the creator).

Firms can apply online, a professional assistance is needed to verify the costs claimed. In case of false statements, penalties apply.

18.3 Instrument 2. Tax credit for hiring researchers

A 35 percent tax credit applies to total personnel costs for firms that hire qualifying researchers. In order to qualify, employees must hold a PhD degree or the personnel without such a degree must be engaged only in R&D activities. Additionally, for SMEs the researchers must be employed for at least two years, while for all other companies- three years. The annual maximum level of benefit per companies is set at EUR 200,000 (Deloitte, 2014).

18.4 Instrument 3. Accelerated depreciation

As from 1988, an accelerated depreciation is applied to instrument and laboratory equipment. The minimum level of such costs must be EUR 2,000.

²⁹As proposed in the Article 3 of the Decree Law no. 145/2013. The section rests on descriptions found in private sector institutions' online articles: Bird&Bird (2014) and International Tax Review(2014)

18.5 Data availability

Firm-level data is available and have been used in econometric studies. Italy also participates in the CIS. R&D aggregate statistics are compiled according to OECD Frascati Manual and EU norms.

18.6 Assessment

Italy offers R&D tax incentives that cover a very wide base of eligible expenditures: personnel costs, costs incurred from collaboration, outsourcing and patenting. R&D is defined similar to international standards, and generally, the novelty requirement is "new to the world", considered advisable practice. While R&D tax credit for researchers is volume based, and considered best practice, the proposed R&D tax incentive under "Decreto Destinazione Italia" is incremental, which is not considered advisable practice.

The proposed R&D tax incentive under "Decreto Destinazione Italia" does not differentiated across regions or legal entities or firm size, in line with best practice. However, it does not offer a 'negative tax' option in case firms do not have taxable income- this may disproportionately harm young firms. Furthermore, the minimum requirement for R&D related expenses in order to qualify for a tax credit, may be an additional barrier for young and small firms and is not recommended practice.

Tax credits for hiring researchers offers the same rate for all types of firm sizes but the eligibility requirement differs slightly between SMEs and other enterprises. Embedded in its design itself, profit position itself does not affect the benefit, considered advisable practice.

Regarding implementation, no public consultation or evaluations are planned; however the application procedures are electronic and one-stop, which is best practice.

18.7 References

Deloitte, 2014, Global Survey of R&D Tax Incentives:2014. Available at: <http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-global-rd-survey-aug-2014.pdf>

International Tax Review, 2014, *Italian design projects set to become fashionable under new R&D credit regime*. Accessed on: 16 October, 2014. Available at: <http://www.internationaltaxreview.com/Article/3307800/Italian-design-projects-set-to-become-fashionable-under-new-R-D-credit-regime.html>

Bird and Bird, 2014, *Italy: Tax credit for research and development investments*. Accessed on: 16 October 2014. Available at: <http://www.twobirds.com/en/news/articles/2014/global/tax-july-2014/tax-credit-for-research-and-development-investments>

19 Japan

19.1 General characteristics

R&D expenditure (% GDP)	3.25 (2010)
Corporate income tax rate	35.64
Public expenditure R&D tax incentives (%GDP)	0.07
Direct government funding of BERD (% GDP)	0.03
<i>Please refer to Chapter 1 for data sources</i>	

19.2 Instrument 1. General tax credit system

Japan has one of the oldest (since 1967) and most extensive R&D tax credit systems in the world. The main element of the incentive system is a base tax credit in three layers that all blue book companies can apply for. The system has undergone revisions several times. Recently (early 2010s) there have been alterations in the system that aim in particular to scale up the intensity of R&D with existing large scale innovative firms in Japan.

A major reform of the system took place in 2003 when the system went from being incremental to volume based with the introduction of the Total Tax Credit System. This system remains in force today. It is complemented by incentives targeted specifically at SMEs (see 'Instrument 2' below) and very recently Special Economic Zones that target R&D intensive foreign investments have also been introduced (see 'Other policy instruments' below).

There exist several evaluations of the total Tax Credit System. Most of them are available in Japanese language only. The main study available in English is by Kasahara, Shimotsu & Suzuki (2011). The study analyzes the effects of R&D tax incentive scheme in year 2003 when it moved from an incremental to a volume based system. (Later there has been the attempt to combine features of both into the total system.) Here one could argue that a major effect of the reform would be in fact to target more the extensive margin of innovation, whereas the previous system was focused mostly on existing innovators (the intensive margin). The study finds that the reform had a positive impact on firms' R&D spending in Japan. However, a major limitation of the study is that it does not analyze whether the reform induced firms to start investing in R&D (the extensive margin). Motohashi (2010) studied the impact of Japanese R&D tax incentive scheme in the period of 1983-2005. Once firm-specific characteristics were accounted for (e.g., managerial quality, human resources, unique resource base) the analysis showed that tax incentives had very marginal effect on R&D expenditure.

19.3 Instrument 2. R&D tax incentives for SMEs

R&D tax incentives for SMEs in Japan allow SMEs to receive a preferential tax rate. It also consists of three layers aiming to provide incentives to R&D at the extensive and intensive margin at the same time. A very recent study by Kobayashi (2014) documents that tax credits targeting SMEs in Japan had a positive effect on the level of R&D spending. Though the study uses a methodologically robust approach, it is purely cross sectional, looking only at the effects in 2009. Hence, important firm- and year-specific information can be missed. The evaluation studies for Japan also

generally show that on the intensive margin credit constrained firms are more responsive to R&D tax credits.

19.4 Other policy instruments

Recently Japan introduced a Special Economic Zones policy among other giving special incentives to foreign investors setting up R&D facilities in the specific areas designated for zones development. It is not certain whether investors into the zones can apply for the general investment incentives available here and combine it with the Total Tax Credit System. The latter would make it somewhat more generous in particular to foreign investors. Combined with the SEZs, Japan is developing an aggressive strategy to attract in particular regional headquarters or regional R&D centres of foreign investors, as summarized in the communication paper by summarised by METI.

19.5 Data availability

It is generally possible via the national statistical office to obtain firm-level data for the purpose of scientific study. The national statistical office in Japan collects data on R&D activities on a regular basis and it is consistent with OECD norms.

19.6 Assessment

The R&D tax incentive system in Japan is mature, moderately generous and multi-faceted. The system aims to provide incentives to both the intensive and extensive margin of innovation. This is the most interesting aspect of the Japanese system which has not been investigated in depth by available evaluation studies. e.g. available evaluation studies typically focus alone on existing R&D performing firms (the intensive margin).

Firms are targeted in terms of size, geographical location, as well as whether the firm is local or foreign. The targeting of R&D programs with foreign investors is a new feature of the Japanese system which may be a consequence of the increase in competition among Asian locations for the high end of foreign investment. Such detailed targeting is not considered advisable practice, as it increases the compliance costs for firms and administrative costs for the government. This can, in turn, results in overall lower policy efficiency.

19.7 References

Ernst & Young, 2013, *2013 Asia-Pacific R&D Incentives*. Accessed on: 3 March 2014.] Available at:

[http://www.ey.com/Publication/vwLUAssets/2013_Asia-Pacific_R_and_D_incentives/\\$FILE/2013_Asia-Pac RD Incentives Guide.pdf](http://www.ey.com/Publication/vwLUAssets/2013_Asia-Pacific_R_and_D_incentives/$FILE/2013_Asia-Pac_RD_Incentives_Guide.pdf).

Hitoshi, T., J. Stuart-Smith and L. Ng, 2011, Japan Sets up Special Zones to Lure R&D and HQs, *International Tax Review*, vol. 14: 22.

Jensen, C., 2014, *Data Request*. [email]. Message to: Kyosei Urabe, cultural attaches at the Japanese Embassy in Copenhagen, 12th February 2014.

Kasahara, H., K. SHIMOTSU and M. SUZUKI, 2011, *How much do R&D tax credits affect R&D expenditures? Japanese tax credit reform in 2003*. Research Institute of Economy, Trade and Industry. *Discussion Paper* 11072.

Kobayashi, Y., 2014, Effect of R&D tax credits for SMEs in Japan: a microeconomic analysis focused on liquidity constraints, *Small Business Economics*, vol. 42:311-27.

Ministry of Economy, Trade and Industry, 2012, *Investment Incentives for Global Enterprises – Act for Promotion of Japan as an Asian Business Center*. Accessed on: 3 March 2014. Available at: http://www.meti.go.jp/english/policy/external_economy/investment/pdf/130612_01a.pdf.

Ministry of Economy, Trade and Industry, 2013, *Key Points of FY2014 Tax Reform: Related to Economy and Industry*. Accessed on: 10 April 2014. Available at: <http://www.meti.go.jp/english/aboutmeti/policy/fy2014/pdf/fy2014tax.pdf>.]

NTA, 2013, *National Tax Agency Report*. [Online] Accessed on: 10 April 2014. Available from: http://www.nta.go.jp/foreign_language/Report_pdf/2013e.pdf.

20 Latvia

20.1 General characteristics

R&D expenditure (% GDP)	0.66 ^(p)
Corporate income tax rate	15
Public expenditure R&D tax incentives (%GDP)	n/a
Expenditure other innovation policy: R&D expenditure in public sector as % GDP	0.51
<i>Please refer to Chapter 1 for data sources</i>	

20.2 Instrument 1. Enhanced allowance

Since 2009 a corporate income tax (CIT) allowance for research and development (R&D) is available in Latvia.³⁰ Under this measure the expenditures of creation or acquisition of registered trademarks or patents can be increased by 50 percent, t.i., the expenditure can be multiplied by a coefficient of 1.5.

However, as of January, 2015 this tax incentive scheme will be abolished. Starting from July 1, 2014 a new enhanced allowance scheme will be introduced. The new enhanced allowance scheme will offer a 200 percent super deduction; for every EUR 100 spent, a firm can deduct another EUR 200.

Following R&D expenditures are included:

- Remuneration of the scientific staff or scientific technical staff;
- Remuneration of the research services provided by the specialised scientific institutions (member state residents of EU or EEA);
- Remuneration of the accredited certification, test and calibration institutions (member state residents of EU or EEA) for the test, certification and calibration services.

This instrument will include R&D expenditure that is directed to industrial research and experimental developments. Latvia has loss carry forward rules for unlimited period.

Tax relief is provided for any corporate income tax payer who wants to explore and implement new technology in the company or to launch a product for which a industrial research is necessary.

20.3 Instrument 2. Intellectual property acquisitions by non-residents

Another type of R&D incentives is offered to investors in the Latvian free ports or special economic zones. There are four special economic zones in Latvia. Investors here are offered a wide range of incentives including tax-based incentives. Among the tax-based incentives mentioned by the Latvian Investment Agency, are tax rebates for payments incurred when non-residents use intellectual property. Only foreign investors can enjoy tax-related R&D incentives in the Latvian free ports.

³⁰According to information received from the Corporate and International Taxation Unit at the Direct Tax Department, Ministry of Finance in Latvia,

Payments for use of the intellectual property made by residents of the SEZ to the non-residents of Latvia in offshore zones or in low tax countries are taxed by 15% according to the Law on Corporate Income Tax, article 3 (8), with the aim to avoid tax evasion. The list of those offshore and low tax zones is approved by the Government. Article 3 (9) allows SRS to cancel this tax at all for a particular company - resident of Latvia, if it proves that payments are done not to avoid taxes. Tax regime of SEZ reduces this tax on payments for use of intellectual property by eighty percent (rebate on withholding tax for dividends, management fees and payments for usage of intellectual property for non-residents).

The exact size of the rebates is not mentioned on the web-page of the Latvian Investment Agency. This type of incentive is expected to be phased out during 2014 due to the introduction of the more general scheme of enhanced allowance as mentioned above.

20.4 Other policy instruments

Latvia offers cash grants to investors in general, some of which are targeted in particular at fostering innovation or more R&D spending in the country. Most of the cash grants that target innovation in particular will typically be co-sponsored via the EU structural funds. The government also provides guarantees, loans, seed and venture capital, and other financial instruments to promote access to finance for innovative firms.

20.5 Data availability

Firm-level data for studying issues related with tax is available, obtainable through a special application. The Latvian statistical office collects data on R&D activities on a regular basis. It also participated in CIS 2010. However, there are no studies assessing the effects of the R&D tax allowance introduced in 2009.

20.6 Assessment

Until recently Latvia has been a selective and marginal user of R&D tax type of incentives, mainly targeting the acquisition of technology from outside the country and via foreign investors and entrepreneurs. However, in terms of good practise and in particular with respect to targeting is Latvia in a transition towards a more transparent, easy to administer and non-selective regime for R&D tax incentives.

Together with the reforms there is a large upscaling in the scope and also in the generosity of the incentives. The definition of R&D activities does not follow good practise, e.g. the novelty requirement concerns products and processes that are new to the firm.

The scheme has a generic approach, it is not targeted towards any particular sector, size or age of firm. A "negative tax" measure is not available, which is not considered advisable practice, as this may disproportionately harm young firms. Carry forward is available for an unlimited period, which might be too much of a good thing.

Application is carried together with yearly tax returns, and can be done online; considered advisable practice. Pre-assessment of the eligibility is, however, not offered. However, taking into account the limited novelty requirement, the uncertainty for firms is relatively low.

Currently, no evaluations were available for the R&D tax measure introduced in 2009. There are also no planned evaluations to the R&D tax allowance to be introduced in January, 2015, which is not considered advisable practice. Ministry of Economics is planning evaluation for new R&D tax allowance after two to three years of implementation.

20.7 References

Arhipova, I., 2013, Latvia research funding and quality of research activities. *Economic Science for Rural Development Conference Proceedings*. 31.

Deloitte, 2013, Taxation and Investment in Latvia 2013 – Reach, Relevance and Reliability. Accessed on: 10th April 2014. Available from: <http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-latviaguide-2013.pdf>.

Investment and Development Agency of Latvia. Accessed on: 10th April 2014. Available from: <http://www.liaa.gov.lv/>.

Jensen, C., 2014, *Information*. [E-mail]. Message to: Kodolina-Miglane, I., Kalane, A. & Krivisa, E. Corporate and International Taxation Unit at the Direct Tax Department, Ministry of Finance (Latvia). 31st March 2014

Mezeniece, M., & Rivza, B. (2012). Influential Factors on the EU Structural Funds Financing Efficiency in the R&D Field in Latvia. *European Integration Studies*. (5). p.57-62. Accessed: 10th April 2014. Available from: <http://www.eis.ktu.lt/index.php/EIS/article/view/1076>.

Authors would like to gratefully thank Ieva Kodolina-Miglane, Astra Kalane and Edite Krivisa from the Ministry of Finance of Latvia for the review and clarifications made on information provided in the report.

21 Lithuania

21.1 General characteristics

R&D expenditure (% GDP)	0.9 ^(p)
Corporate income tax rate	15
Public expenditure R&D tax incentives (%GDP)	n/a
Expenditure other innovation policy: R&D expenditure in public sector as % GDP	0.66
Please refer to Chapter 1 for data sources	

21.2 Instrument 1. Super deduction

Since 2008 Lithuania offers R&D investors a 200 percent enhanced allowance, i.e., for every EUR 100 spent a firm can deduct another EUR 200 for tax purposes.

According to the local legislation, research and experimental development means “a systematic creative activity of the study of the nature, human being, culture and society, and the use of the results of such activity”³¹.

Research and experimental development include three activity spheres: “1) *basic research* (experimental and/or theoretical operations which are carried out primarily to acquire new knowledge about the essence of phenomena and/or observed reality without aiming, at the time of research, to use the obtained results for a specific purpose); 2) *applied research* (the experimental and/or theoretical operations carried out for acquiring knowledge and primarily aimed at attaining specific practical objectives or at solving tasks); 3) *experimental development* (a systematic activity based on the knowledge acquired through research and practical experience, the aim of which is to create new materials, products and equipment, develop new process, systems and services or to essentially improve those already created or developed; also to create, develop or to essentially improve solutions to problems faced by human beings, culture and society, based on the knowledge acquired through research and practical experience)”³².

Where scientific research and experimental development works are acquired from another entity or a natural person, the costs incurred due to such acquisition shall be deducted from income only if the acquired scientific research and experimental development works have been carried out in a country of the European Economic Area. Alternatively, it can be a state outside the European Economic Area which has concluded and brought into effect a treaty for the avoidance of double taxation with Lithuania.

Maximum ceiling does not apply. Firms with no taxable income cannot receive the tax benefit. Carry over provision is not available.

Eligible expenditure include:

³¹See: Republic of Lithuania Law on higher education and research (30 April 2009 No XI-242). Available at: http://planipolis.iiep.unesco.org/upload/Lithuania/Lithuania_Law_on_HE_and_Research_2009.pdf

³² *Ibid.*

- wages of employees who directly involved in scientific research and experimental development works;
- business trips directly related to scientific research and experimental development works;
- costs of stock, materials and other short term assets;
- costs for acquisition of services directly related to scientific research and experimental development works (consulting, leasing, repair, warehousing, telecommunication, etc.);
- costs for acquisition of scientific research and experimental development works from other natural persons or legal entities;
- import and input VAT from the above costs that was not deducted.

No review or consent of the tax authorities is required to benefit from R&D tax incentives.

21.3 Instrument 2. Accelerated depreciation scheme

Since 2008 an accelerated depreciation scheme for R&D capital is also in place. These capital assets may be written-off over two years or more.

21.4 Other policy instruments

Lithuania along with a number of other neighbouring countries make ample usage of more general investment incentives that may strongly interact with R&D tax incentives. Lithuania in particular has adopted investment incentives with a spatial target (special economic zones or valleys). The investment valleys are typically concentrated around the most highly developed metropolitan areas in Lithuania. These incentives are financed through the EU structural funds. In total benefits can make up to 50 percent of project costs. The Lithuanian government is currently setting up a system for monitoring the investment valleys.

Withholding tax rate applicable to a payment for the license of patents: exempt from the withholding tax credit, if 25 percent of shares are hold by EU registered company for not less than two years (otherwise 10 percent).

Withholding tax applicable to payments/royalties for know-how (i.e., under a licensing arrangement): 0 percent or 10 percent withholding tax.

21.5 Data availability

The Lithuanian Statistical Office collects data on R&D activities on a regular basis. Aggregated data is generally available. Micro-data can be obtained via a special application. Lithuania also participated in CIS 2010.

21.6 Assessment

Lithuania offers R&D enhanced allowance and an accelerated depreciation. The definition of R&D is somewhere similar to OECD Frascati Manual. The novelty requirement is "new to the world", in line with best practice.

The incentive has a generic approach, it is not targeted to any specific type of field, firm size or age. In order to qualify, firms do not need to have any minimum amount of R&D expenditure, considered advisable practice. However, firms carry forward is not available and "negative tax" option is not available; both considered not advisable practice.

One-stop agency is not available. It was not clear if firms can apply to the benefit online. Currently, no evaluations were available for the super deduction. All together, this indicates of the scope for improvement in terms of organization.

21.7 References

Invest Lithuania, 2013, *R&D in Lithuania: Beautiful minds at work*. Accessed: 15th March 2014. Available from:
www.investlithuania.com

Jensen, C., 2014, *Another dataset*. [E-mail]. Message to: RASTENIENĖ, A. 10th April 2014

Legal and tax framework for doing business in Lithuania. *Research and Development Initiatives*. Accessed: 10th April 2014. Available from:
<http://taxguide.lt/research-development-incentives/>

Lithuania. Research and higher education monitoring centre. (2012) *Monitoring Guide for the implementation of the Valleys projects and JRPs (D.1.4)*. Accessed: 15th March 2014. Available from:
www.mosta.lt.

Ministry of Finance of the Republic of Lithuania. Accessed: 17th March 2014. Available from:
<http://www.finmin.lt/>

22 Luxembourg

22.1 General characteristics

R&D expenditure (% GDP)	1.46
Corporate income tax rate	29.2
Public expenditure on R&D tax incentives (% GDP)	0 (2009)
Direct government funding of BERD (% GDP)	0.04 (2009)
<i>Please refer to Chapter 1 for data sources</i>	

22.2 Instrument 1. Partial tax exemption of income derived from qualifying IP

In the context of EU 2020 goals, Luxembourg has introduced a favorable tax regime to income derived from the exploitation of intellectual property (IP).

The outcome-related tax incentive provides:

- 80 percent exemption of the net income derived from the use or the right to use qualifying IP rights;
- 80 percent exemption of net capital gains realized upon disposal of qualifying IP rights;
- Notional deduction corresponding to 80 percent of a deemed royalty income for taxpayers who created a patent and use it in their own activity;
- 100 percent exemption of the value of qualifying IP rights from net wealth tax.

Eligible entities include all entities or individual subjects exercising a commercial activity in Luxembourg and liable with this income to Luxembourg income tax. Eligible assets include software copyrights, patents, trademarks, designs, models and domain names.

Income and capital gains from qualifying IP rights can benefit from an effective tax rate of 5.7 percent. Various types of IP qualify for the regime and include: patents, trademarks, designs and models, copyright related to software and domain names.

22.3 Instrument 2. Accelerated depreciation

The rate of the accelerated depreciation applicable to materials and equipment used exclusively in scientific or technical research activities may not exceed four times the rate that would be applied for straight-line depreciation, and it may not be greater than 40 percent.

The accelerated depreciation on the R&D assets is applicable to current investments. In order to utilize the accelerated depreciation on the R&D assets, a specific appendix must be included in the annual income tax return with the following information:

- Acquisition or production date
- Acquisition or production price
- Ordinary useful life
- Amount of annual depreciation

22.4 Other policy instruments

Luxembourg does not offer extensive direct programs aimed at innovation. However, there are several initiatives that aim to support the links between the knowledge triangle. Furthermore, there are several business incubators that support innovative start-ups and spin-offs are in place

22.5 Assessment

In terms of scope Luxembourg does not reflect best practise; the focus on the output related instrument ('Partial tax exemption of income derived from qualifying IP') is not considered advisable practice.

With respect to implementation, an online application is available but there is not a one-stop agency, which is not considered best practice. Furthermore, the instruments have not been evaluation and the government does not plan to undertake such assessment.

22.6 References

Alexander, S. & Bloomberg, R. ERAWATCH. (2014) *Country Reports 2012: Luxembourg*. [Online] Accessed: 15th April 2014. Available from: <http://erawatch.jrc.ec.europa.eu/erawatch/>.

Ministry of Economy and thE Foreign trade. (n.d.) Accessed: 17th April 2014. Available from: <http://www.eco.public.lu/>.

Luxinnovation - National agency for research and innovation. (n.d.) *Support for innovative start-ups*. Accessed: 03rd March 2014. Available from: <http://en.luxinnovation.lu/>

Ernst & Young. (n.d.) *Luxembourg Intellectual Property Tax Regime*. Accessed: 1st March 2014. Available from: <http://www.ey.com/Publication/vwLUAssets/>.

23 Malta³³

23.1 General characteristics

R&D expenditure (% GDP)	0.84 ^(p)
Corporate income tax rate	35
Public expenditure on R&D tax incentives (% GDP)	n/a
Expenditure other innovation policy: R&D expenditure in public sector as % GDP	0.33
<i>Please refer to Chapter 1 for data sources</i>	

23.2 Instrument 1. R&D tax credits

The R&D tax credits are part of the new R&I Strategy 2020. The tax credits are applied to expenditure incurred on industrial research and experimental development projects aimed to develop innovative products and solutions. Eligible expenditure include, among other things, personnel costs, costs of instruments and equipment and costs of building.

Depending on the size of the project and type of research carried out, costs on which to apply the preferential tax treatment can range from 25 to 75 percent. The tax credits which are not utilized during a particular year are carried forward to subsequent years.

The scheme is administered by Malta Enterprise, which also functions as a 'one-stop' agency for the companies.

At the moment, apart from the level of aid provided in 2009 and 2011, there are no indicators available that are sufficient for an appraisal of the success of the impact of R&D tax credits measure. However, the high level of aid intensity provided through this tax credit scheme in comparison to other national schemes shows that both application procedure and form of aid provided are in line with the target group needs. In addition to that, Malta Enterprise has so far received no applications for the similar R&D tax credits scheme. Malta Enterprise believes that those companies that are eligible for the 'Research and Development – Tax Credits' scheme are considering their R&D costs as investments, and hence apply for Investment Aid Tax Credits. The reason may be as that the Investment Aid Tax Credit is a simpler route when compared to the R&D tax credit.

The Investment Aid Tax Credits scheme is planned to run until 2013. Information about the further development beyond this stipulated end date is currently not available.

23.3 Instrument 2. Expenditure on scientific research

Expenditure incurred on scientific research may be entitled to a deduction from their chargeable income of more than 100 percent of such expenditure, limited to a percentage of the company's annual turnover for that particular year. Where the deduction cannot be fully set off against the income of the qualifying company for the

³³Note that the described tax policy instruments were in place in 2013 but are currently under review

year during which the expenditure was incurred, the excess deduction is carried forward and set off against income generated in subsequent years.

23.4 Instrument 3. Exemption of Royalty Income from Patents

The incentive gives fiscal benefits to individuals and enterprises owning the rights to patented intellectual property and receiving income in the form of royalties.

The Income Tax Act exempts from tax royalties, advances and similar income derived from patents in respect of certain qualifying inventions, subject to certain criteria and conditions. Distributions of the exempt profits remain free from tax in Malta for each level of distribution up the shareholding chain.

23.5 Other policy instruments

Tax incentives for research foundations

In April 2011, the government of Malta in collaboration with the University of Malta set up the University of Malta Research, Innovation and Development Trust. Individuals and organizations which donate money to this fund benefit from a tax credit equivalent to the amount donated.

Although there are several private research foundations in Malta, these are all very small organizations and they do not have any significant output.

23.6 Assessment

Up until 2013, Malta offered a vast array of different R&D tax policy measures, including input-related tax credits and enhanced allowances, and output-related tax benefits, like an exemption from royalty income from patents. While input-related volume based R&D tax credits can be considered a recommendable practice, output-related tax incentives are not. R&D is defined according to international standards, considered advisable practice.

On the implementation side the policy instruments rank relatively well, as there is an internet site for applications and a one-stop shop which makes it fairly easy for firms to apply for the tax credit. However, the country is lacking more on the public consultation and evaluation side of the incentive scheme.

Furthermore, the large amount of different instruments also means that there may be overlap between the different instruments and it can be difficult for firms to realize which scheme fits for their activities. Such aspects decrease the efficiency of the policy, and are not advisable.

23.7 References

ERAWATCH – Country page: Malta. Accessed: 5th March 2014. Available from: http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/mt/country

Eureka- Country page: Malta. Accessed: 20th February 2014. Available from: <http://www.eurekanetwork.org>.

Fusion, The R+I programme. Accessed: 22nd February 2014. Available from: www.mcst.gov.mt.

Ernst & Young and Malta Business Bureau, 2013, *Market gaps in access to finance and the feasibility of new financing instruments in the EU addressing the credit needs of*

Maltese business. Accessed: 11th March 2014. Available from:

http://issuu.com/malta_business_bureau/

Malta Enterprise, 2008, *Incentives under the Malta Enterprise Act. Overview*.

Accessed: 10th March 2014. Available from:

<http://maltaenterprise.com/>

Malta Enterprise, 2009, *Malta's Incentives Package for R&D and Innovation*. Accessed: 9th March 2014. Available from:

http://www.sesec.org/pdf/8/SESEC8_Azzopardi.pdf.

Malta Enterprise, 2009, *R&D tax credit - incentive guideline*. Accessed: 12th April 2014. Available from:

<http://www.maltaenterprise.com/>

Malta. Ministry for Education and Employment and the Malta council for Science & Technology, 2014, *National Research and Innovation Strategy 2020*. Accessed: 3rd March 2014. Available from:

<http://www.mcst.gov.mt/>

Malta. Ministry of Finance, 2012, *Malta's National Reform Programme under the Europe 2020 Strategy*. Accessed: 18th April 2014. Available from:

<http://ec.europa.eu/europe2020/>

Malta, 2007, *Malta Enterprise Act, Chapter 463 of the Laws of Malta*. Accessed: 15th April 2014. Available from:

<http://www.maltaenterprise.com/>

24 Netherlands

24.1 General characteristics

R&D expenditure (% GDP)	2.16 ^(p)
Corporate income tax rate	25
Public expenditure on R&D tax incentives (% GDP)	0.15
Direct government funding of BERD (% GDP)	0.04
<i>Please refer to Chapter 1 for data sources</i>	

24.2 Instrument 1. Research and Development Promotion Act (WBSO)

WBSO is a payroll withholding tax credit for R&D wages. The WBSO makes a distinction between entrepreneurs liable to withhold payroll tax and entrepreneurs liable to pay personal income tax. The former group is offered a deduction from the payroll tax they are required to pay (35 percent of the first EUR 250,000 and 14 percent of remaining R&D wages in 2014). The latter group of entrepreneurs is offered a fixed R&D tax allowance when carrying out at least 500 hours of R&D work in a calendar year. In addition, for start-up companies the rate of tax credit is 50 percent in the first bracket.

The official WBSO evaluations were carried out in 2002, 2007, and 2012. All evaluation studies find the R&D tax incentives had a positive impact on R&D expenditure.

Cornet and Vroomen (2005) is the only evaluation of the WBSO that used a quasi-experimental design. They find that the WBSO provides large positive benefits for start-ups. The extension of the first tax bracket in 2001 is found to have a smaller, but still positive effect.

Mohnen and Lokshin (2008) look at the impact of the WBSO on R&D wages. They find the tax credit lead to increase of wages for R&D personnel. However, although the effect is sizeable, the effect on real R&D investment still outweighed the wage increase.

24.3 Instrument 2. Research and Development Allowance (RDA)

The RDA is a supplement to the WBSO and offers a tax benefit for costs and expenditures other than wages incurred for R&D projects. The RDA takes the form of a deductible item for taxable profits. The RDA rate is 60 percent, meaning that for every euro of spent on R&D, 60 eurocent extra may be deducted from taxable income. This percentage holds both for firms liable to corporate income tax and for self-employed entrepreneurs liable to personal income tax.

The RDA was implemented in 2012 and has not been evaluated yet.

24.4 Instrument 3. Innovation box (Innovatiebox)

The Innovatiebox is an instrument that reduces the tax burden on income generated from innovative activities. Firms can opt for the Innovatiebox if they develop intangible assets themselves. Moreover, these assets should either be patented or

qualified as R&D activities. Qualified R&D activities are not necessarily performed in the Netherlands, but the financial risk and management of these activities should be based in the Netherlands. The incentive allows for a deduction of taxable income by eighty percent of income from innovation, amounting to an effective corporate income tax rate of five percent for income from innovation by firms that make use of the Innovatiebox. Innovative firms may opt for an alternative scheme which has standard deduction of 25 percent of taxable income with income capped at EUR 100,000 (which amounts to a maximum tax benefit of EUR 4,000).

The Innovatiebox will be evaluated in 2015.

24.5 Other policy instruments

In terms of government support private R&D, R&D tax incentives are more important than direct government funding. According to the OECD R&D tax incentives comprise about 80 percent of total government R&D support in 2011³⁴. This number will have increased with the introduction of the RDA in 2012.

Although tax incentives are important, there are several other major direct policy instruments. The government provides subsidies to nine knowledge-based sectors that are important for the Dutch economy. These subsidies are matched by businesses and semi-public research institutions (the so-called *topsectorenbeleid*).

Via the SME Innovation fund (Innovatiefonds MKB+) the government provides loans under favourable conditions to innovative firms. Venture capital funds are also part of the policy.

24.6 Data availability

Firm-level data from Statistics Netherlands is available to researchers. However, the most important data for WBSO evaluation is not from Statistics Netherlands, but from Netherlands Enterprise Agency. They assess WBSO applications and collect data from firms that make use of WBSO. This data is only made available to researchers who perform the official evaluations. Data collection is in accordance with EU and OECD norms. Netherlands also participated in CIS 2010.

24.7 Assessment

In terms of scope, the Netherlands offers a combination of tax-credit and tax allowance, which is in line with the good practices. The outcome related incentive-Innovatiebox- is not considered advisable practice.

The instruments do not distinguish between regions and industries. There are additional benefits for start up companies. This is in line with the good practices.

With respect to the implementation, the Netherlands performs very well. Firms can apply online, a one-stop agency is available (Netherlands Enterprise Agency) and decisions are made within three months. Evaluations of the instruments are planned and the studies showed that the input-related schemes did induce more R&D expenditure. Study by Griffith et al. (2014) that simulated the impact of Patent Box in Benelux countries and UK, however, indicated that the policy generally might result in a substantial tax loss in all of countries analyzed, and is not an advisable policy.

³⁴ OECD STI Scoreboard 2013.

24.8 References

Belastingdienst, 2014, Innovatiebox. Accessed: 12th January 2014. Available from: <http://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/winst/vennootschapsbelasting/innovatiebox>

Cornet, M. and B. Vroomen, 2005, Hoe effectief is extra fiscale stimulering van spur- en ontwikkelingswerk? Effectmeting op basis van de natuurlijke-experimentmethode, CPB document No.103

Lokshin, B. and P. Mohnen, 2013, Do R&D tax incentives lead to higher wages for R&D workers? Evidence from the Netherlands, *Research Policy*, vol. 42, no. 3, pp. 823-830

Lokshin, B. and P. Mohnen, 2012, How effective are level-based R&D tax credits? Evidence from the Netherlands, *Applied Economics*, vol. 44, no. 12, pp. 1527-1538

Verhoeven W.H.J. ,van Stel, A.J. and Timmermans, N.G.L., 2012, Evaluatie WBSO 2006-2010, EIM onderdeel van Panteia

Netherlands Enterprise Agency, WBSO: Research and Development (R&D) tax credit. Accessed on: August, 2014. Available at: <http://english.rvo.nl/subsidies-programmes/wbso-research-and-development-rd-tax-credit>

Netherlands Enterprise Agency, WBSO: Changes to Research and Development (R&D) tax credit. Accessed on: August, 2014. Available at: <http://www.rvo.nl/actueel/nieuws/wijzigingen-de-wbso-en-rda-voor-2014>

Tweede Kamer der Staten-Generaal. (2013) Kamerstuk 33402 Nr. 60. Available from: <https://zoek.officielebekendmakingen.nl/kst-33402-60.html> [Accessed: 12th January 2014]

Tweede Kamer der Staten-Generaal. (2013) Kamerstuk 33402 Nr. 62. Accessed: 12th January 2014. Available from: <https://zoek.officielebekendmakingen.nl/kst-33402-62.html>

Authors would also like to thank Paul Silvertant from Ministry of Economic Affairs, for the review and clarifications of the information provided in the report.

25 Norway

25.1 General characteristics

R&D expenditure (% GDP)	1.65
Corporate income tax rate	27
Public expenditure on R&D tax incentives (% GDP)	0.05
Direct government funding of BERD (% GDP)	0.08
<i>Please refer to Chapter 1 for data sources</i>	

25.2 Instrument 1. SkatteFUNN

The tax deduction of costs related to research and development, SkatteFUNN, was introduced for small and medium sized firms from January 2002 and made available also for large firms from January 2003. While the tax credit system is permanent, specific details of the system were changed in 2009 and 2014.

Currently, small and medium enterprises may deduct 20 percent of expenses related to an approved R&D project from taxes owed. A SME enterprise is defined as having: (a) fewer than 250 employees; (b) an annual turnover not exceeding EUR 50 million or an annual balance sheet smaller than EUR 43 million³⁵. Large enterprises may deduct 18 percent. Otherwise, SkatteFUNN is technology-, industry- and region-neutral instrument.

Maximum accepted project costs are as follows:

8 mill NOK per year for own R&D (all projects in the firm). For this item maximum deduction is 1.6 million NOK.

22 mill NOK per year together for own R&D and R&D bought from approved R&D institutions. For this item maximum deduction is 4.4 million NOK.

There is also limit for hourly wage that can be paid to own R&D personnel. In 2014 it is 600 NOK per hour. The aim is to prevent spill-over of the subsidy to wages.

A firm can carry R&D project alone, together with other firms or together with approved R&D institutions. In case of cooperation, every firm must submit its own application.

The projects are divided into projects related to industrial research and projects related to development. There is no requirement that a firm must have taxable income, but it has to be registered as tax-liable in Norway.

The SkatteFUNN R&D tax deduction system lies administratively under the Ministry of Trade. The decision is made in cooperation between The Research Council of Norway, Innovation Norway and The Directorate of Taxes. Innovasjon Norge (Innovation Norway) makes a first assessment of whether the project qualifies for support or not. Forskningsrådet (The Research Council of Norway) approves or disapproves the

³⁵ LOVDATA, Skattefradrag for kostnader til forskning og utvikling (FoU-fradrag). Accessed on: September, 2014. Available at: http://lovdata.no/dokument/SF/forskrift/1999-11-19-1158/KAPITTEL_16-5

application. Skatteetaten (Skattedirektoratet, Directorate of taxes) is making the decision about the amount of the tax deduction.

The content of the project has to be approved in advance by the Research Council of Norway. There is also a requirement that the costs that are included in the calculations for the R&D tax credit application has to be verified by an auditor. The Tax Authorities control the reported costs and calculates the size of the tax deduction. If the tax deduction is higher than the taxes which have to be paid, the difference will be paid out to the firm as a subsidy. A corresponding subsidy is provided also to firms that do not have taxable income.

An evaluation of SkatteFUNN was carried by Hægeland and Møen (2007). They analyzed the impact of the SkatteFUNN during 2002-2006. On average, they found that one krone spent as foregone tax revenue, induced more than two krone of additional R&D. Nonetheless, they noted that the effect seems to be driven by firms that did very little R&D before the implementation of the tax scheme. The additional effect on R&D expenditure tended to be larger in small, low-tech and relatively low-skilled firms.

Cappelen et al.(2012) showed that SkatteFUNN tax credit induced firms to implement new production processes and products that were new to the firm. However, it did not result in more radical innovation in a form of new patents or products that would be new to the market.

25.3 Other policy instruments

The R&D intensity of the Norwegian business sector is relatively low, but this is mainly due to the large role of resource-based industries, which are knowledge intensive, but not R&D intensive. Norway has several policy measures that are aimed at stimulating business sector R&D. The main actors are Research Council of Norway (RCN), Innovation Norway (IN) and The Industrial Development Corporation of Norway (SIVA) (Bulanova & Madsen, 2012). RCN acts as a funding agency for independent research programmes and projects, strategic programmes at research institutes, and Norwegian participation in international research programmes. IN focuses on small and medium sized companies and underdeveloped regions. Its mandate is to support companies in developing their competitive advantage, enhance innovation and be a partner in internationalization. SIVA aims to develop strong regional and local industrial clusters through ownership in infrastructure, investment and knowledge networks as well as innovation centres.

25.4 Data availability

Due to the decision to undertake evaluations on SkatteFUNN, a database with time-series data on firm level was created. The database includes data from The Research Council of Norway (SkatteFUNN), the Directorate of taxes, and Statistics Norway (R&D statistics, structural statistics and the accounts statistics). There are more than 18 000 firms in the database and it comprises firms that have applied for SkatteFUNN-money or are included in the R&D statistics of the Statistics Norway during the time-period 1993-2005. This database can be seen as a complement to the separate use of the sources. Norway also reports data to Eurostat and OECD, participates in CIS.

25.5 Assessment

The SkatteFUNN scheme is a volume-based R&D tax credit, according to best practice. The novelty requirement is that R&D shall be new to the firm, which is not considered best practice.

SkatteFUNN is not differentiated across regions, type of activities or legal entities, but the firms have to be registered in Norway. The tax credit scheme favours small and medium-sized enterprises, as they are offered a higher rate of tax credit. Furthermore, a maximum ceiling of eligible expenditure applies, which may especially impact large firms with typically larger R&D budgets.

According to best practice, there is no minimum basis for deduction. Also, if the tax credit exceeds the tax payable by the firm, the difference is paid to the firm in the form of a negative tax or a grant. This has turned out to be an important feature of the scheme. There is no carry over provision; costs should be deducted in the same income year as a project has been approved, which is not considered advisable practice.

The electronic application system is a one-stop system. The payment of a negative tax or a grant is made when the tax authorities have completed their tax assessment, and takes place the year after the actual R&D expenses have occurred.

Almost all the features listed above can be assessed as best practices. However, for young companies the long lag between the time when the expenditure was incurred and compensation received may have a negative impact on their activities, as they are typically more liquidity constrained.

25.6 References

Bulanova, O. and Madsen, E.L., 2012, ERAWATCH COUNTRY REPORTS 2012: Norway. erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/file_0380.pf

Cappelen A., Raknerud A. and Rybalka M., 2012, The effects of R&D tax credits on patenting and innovations, *Research Policy* 41, p.334-345

Cappelen, Å. , Fjaerli, E., Foyn, F., Hægeland, T., Møen, J., Raknerud, A. and Rybalka, M. ,2007,Skattefunn-evalueringen – Årsrapport 2006, Rapport 2007/17, Statistisk sentralbyrå, Oslo.

Cappelen, Å. , Raknerud, A. and Rybalka, M.,2007, Effekter av SkatteFUNN på foretakenes produktivitet og lønnsomhet, Rapport 2007/22, Statistisk sentralbyrå, Oslo.

Cappelen, Å. , Raknerud, A. and Rybalka, M.,2007,Resultater av SkatteFUNN – patentering og innovasjoner, Rapport 2007/36, Statistisk sentralbyrå, Oslo.

Cappelen, Å. , Fjaerli, E., Foyn, F., Hægeland, T., Moen, J., Raknerud, A. and Rybalka, M. ,2008,Evaluering av SkatteFUNN – Sluttrapport, Rapport 2008/2, Statistisk sentralbyrå, Oslo-Kongsvinger.

Cappelen, Å. , Fjaerli, E., Foyn, F., Hægeland, T., Moen, J., Raknerud, A. and Rybalka, M. ,2010, Evaluation of the Norwegian R&D Tax Credit Scheme, *Journal of Technology Management & Innovation* 2010, Volume 5, Issue 3, pp. 97-109.

Cappelen, Å. , Fjaerli, E., Foyn, F., Hægeland, T., Moen, J., Raknerud, A. and Rybalka, M. ,2010, Evaluation of the Norwegian R&D Tax Credit Scheme, Discussion Papers No. 640, December 2010, Statistics Norway, Research Department, Oslo.

Finansdepartementet ,1999, LOV-1999-03-26-14, sist endret LOV-2013-12-13-127 fra 01.01.2014, Lov om skatt av formue og inntekt (skatteloven). Kapittel 16: Fradrag i skatt og refusjon / Fradrag i skatt for kostnader til forskning og utvikling, § 16-40

Skattefradrag for kostnader til forskning og utvikling (FoU-fradrag). (The Norwegian Taxation Act, Chapter 16, § 16-40). Oslo.

FORSKNINGSRÅDET: SkatteFUNN. Available at:

<http://www.forskningsradet.no/servlet/Satellite?c=Page&pagename=skattefunn%2FHovedsidemal&cid=1222340152188>

Hægeland, T. and Møen, J., 2007a, Input additionality in the Norwegian R&D tax credit scheme, Reports 2007/47 Statistics Norway

Hægeland, T. and Møen, J. 2007b, The relationship between the Norwegian R&D tax credit scheme and other innovation policy instruments, *Statistics Norway*.

Hægeland, T., Kjesbu, K.A. and Moen, J. ,2006, Forer SkatteFUNN-ordningen til økt FoU-innsats? Forelopig rapport om innsatsaddisjonlitet, Rapport 2006/12, Statistisk sentralbyrå, Oslo-Kongsvinger.

Fjærli, E.,2007,Skattemotivert tilpasning til SkatteFUNN-ordningen, Rapport 2007/50, Statistisk sentralbyrå, Oslo.

Kjesbu, K.A. ,2006, Dokumentasjon av tidsseriebase for fou-data, seksjon for energi- og Industristatistik, notater 2006/14, statistisk sentralbyrå, oslo.

Norges forskningsråd, 2014, Årsrapport 2011 skattefunn. Oslo

Norges forskningsråd, 2013, Årsrapport 2011 skattefunn. Oslo

The Research Council of Norway: SkatteFUNN

<http://www.forskningsradet.no/en/SkatteFUNN/1252498540812>

The Research Council of Norway: SkatteFUNN – incentivising companies to invest in research, development and innovation. Available at:

http://www.forskningsradet.no/prognett-skattefunn/Home_page/1222340152176

26 Poland

26.1 General characteristics

R&D expenditure (% GDP)	0.9
Corporate income tax rate	19
Public expenditure on R&D tax incentives (% GDP)	0 (2011)
Direct government funding of BERD (% GDP)	0.03 (2011)
<i>Please refer to Chapter 1 for data sources</i>	

26.2 Instrument 1. New Technology Tax Relief

A company can deduct from its tax base up to 50 percent of expenditures incurred for acquisition of new technology in form of intangible assets. Purchase of new technology in form of proprietary right, licenses, know-how, rights under patents or of R&D service (CPA 72) which is in use for less than five years worldwide. Costs of internal R&D activities do not qualify. This enhanced allowance instrument is available for SMEs and large enterprises carrying out business activity outside special economic zones (SEZ) and it allows carry forward.

The novelty of technology must be confirmed by an opinion issued by an independent scientific body such as university or R&D institute (according to a definition from Law on Financing Science).

Since its beginning in 2006 until 2010 the 'New technology Tax Relief' had negligible practical importance with less than 30 firms annually benefiting from it (Ministry of Finance, 2011). Since 2011 the popularity of this instrument has increased. Mainly, this is due to promotion activities by the Ministry of Economy and also because the availability of grants for entrepreneurship funded from EU structural funds has been decreasing.

According to Ministry of Finance (2012) in 2012 97 firms were granted the 'New Technology Tax Relief' for a total allowance amounting to almost 440 million (in 2011 and 2010 it was respectively 270 million and 33 million). Although the number of firms tripled over one year, the usage of the instrument still appears to be limited.

Such tendency might possibly raise from three reasons: (1) Firms still appear not to be fully informed about the policy; (2) direct policy instruments are widely used and popular; (3) financial risk involved. The opinion issued by independent scientific body is not binding for tax authorities who can consider expenses as non-eligible. Experts point also to the fact that the 'New Technology Tax Relief' encourages mainly purchase of innovations while does not incentivize carrying out in-house R&D activities (Deloitte, 2013a). This is the most significant negative difference in the design of this instrument compared to R&D tax exemptions in other European countries which support innovations (Klincewicz, 2014).

26.3 Instrument 2. Tax Deduction for firms with R&D Centre status

Enterprises can deduct up to 20 percent of R&D revenues from tax base. Use of savings is restricted to financing costs of R&D and invention patenting. This is an income incentive that has been introduced in 2005 by Law on selected forms of

support for innovation activities. To use this instrument, entity must have R&D Centre status.

RDC status is granted upon application to the Ministry of Economy and the following conditions apply: (i) net revenues of EUR 1.2 million; (ii) at least 20 percent of revenues generated from the sales of R&D services, or industrial property rights (CPA 72). The latter condition holds since 2008 (before the revenues share was set at much more restrictive level of 50 percent).

Entities having RDC status can be exempted also from the property tax, agriculture tax and forestry tax up to EUR 200,000.

If R&D Center is located in special economic zone (SEZ) the enterprise can benefit from corporate tax exemption in the range of 30 percent-70 percent of investment costs (purchase of land, fixed assets, intangibles) or two-year costs of new jobs, depending on the location of SEZ and size of enterprise (Taxand, 2012; Ernst&Young 2011).

The aim of those tax deduction was to increase business R&D. However, this tax incentive appears to be considered as unattractive which is confirmed by extremely low take-up rate. According to communications from the Ministry of Economy, in 2011 there were altogether only 18 R&D Centres in Poland. In June 2014 the number has increased to 31.

Low take-up rates might be stem from several reasons. Firstly, the use of savings is restricted only to R&D costs and requires a separate financial management (innovation fund). Secondly, a separate application procedure to obtain R&D centre status is mandatory and also additional reporting to the Ministry of Economy on annual basis is required. Most importantly, however, the eligibility criteria, in terms of revenues, are considered too restrictive, especially for young firms. Furthermore, legal design of R&D Centre status does not fit well to the needs of bigger firms. R&D Centres must constitute a separate organizational, financial and legal entity, which, in the case of large firms having R&D departments, implies bearing additional costs of introducing artificial separation.

26.4 Other policy instruments

In Poland, R&D tax incentives play a less important role than direct policy instruments aimed at supporting innovation. According to (Kapil, et al. 2012), R&D tax incentives comprise only about 20 percent percent of total government R&D support.

Major non-tax policy instruments are available in the form of grants, mostly from EU structural funds distributed by different agencies. Some of grant schemes are directed to specific sectors which are potentially important for the polish economy, such as engineering, IT, or shale gas extraction (Taxand, 2012).

26.5 Assessment

Current system of tax incentives in Poland is based on two instruments: New Technology Tax Relief and Tax Deduction for R&D centres. Although both instruments have been designed and implemented already around 2005/2006, the take-up rates have been low. Moreover, current system is more targeted to support implementation of technology and not in-house development. These observations point to the need to redesigning tax incentive system.

Particularly, Tax Deduction for R&D centres seems to be not advisable tax instrument. It has several not recommended elements in the design: it is an output-related, enhanced allowances instrument without strict novelty requirement, which is not recommended practice. Moreover Tax Deduction for R&D centres it not fitted to small

firms because of minimal revenue threshold and restricts the spending of deducted R&D revenues which is not best practice for implementation design. Also the generosity of support seems to be insufficient to induce widespread adoption. Finally, implementation is burdensome and requires special status which is granted in the separate application process without electronic system.

Tax Deduction for R&D is input related and volume-based instrument with a novelty requirement which is a recommended composition for the scope of instrument. It fits well both young and large firms with carry forward. However, it is limited only to external purchases of R&D services which is not recommended practice for targeting. Another not recommended practice is that novelty of technology confirmation although mandatory for enterprise, is not binding for the fiscal authorities. This creates financial risk for using this instrument.

Final remarks

There are no other instruments in force at the moment but important changes to tax incentives system have been discussed since 2012 and are expected to enter into force in 2014 or 2015. The government realizes that with the current instruments, which are in force for almost ten years, Poland is lagging behind other countries in the region. This is also demonstrated in the 2013 edition of Innovation Union Scoreboard published which ranks Poland on the low 24th place (EC, 2013).

According to consultation document by the Ministry of Economy (2013), the new tax relief will be a combination of tax credit (26 percent) with regular tax allowance (100 percent) to account for specificity of both established businesses and start-ups. The new tax instrument will be equivalent to (extra) 131 percent of enhanced tax allowance (Deloitte, 2013b). Kapil et al. (2012) indicate that the new scheme will increase long-term incentives for innovation and, thus, will induce larger business R&D expenditures. However Klineciewicz (2014) raises concerns that under current restrictive course of fiscal policy, introduction of this new measure, although desirable, might be further delayed.

26.6 References

Deloitte, 2013a, Global Survey of R&D Tax Incentives 2013. Accessed: 10th April 2014. Available from:
<http://www.deloitte.com/>

Deloitte Poland, 2013b, Inwestycje w B+R. Jak to robią najlepsi? (Investment in R&D. Poland and best practices from other countries). Accessed: 17th March 2014. Available from:
http://www.deloitte.com/view/pl_PL/.

Ernst AND Young. (2011) Specjalne Strefy_Ekonomiczne po 2020 roku Analiza dotychczasowej działalności oraz perspektywy funkcjonowania (Special Economic Zones beyond 2020. Analysis of current activities and an outlook for their existence). Accessed: 17th March 2014. Available from:
<http://www.ey.com/PL/pl/Services/Tax/SSE-po-2020-roku>

European Commission, 2013, Innovation Union Scoreboard. Accessed: 10th April 2014. Available from:
http://ec.europa.eu/enterprise/policies/innovation/files/ius-2013_en.pdf

Kapil, N., Piatkowski, M., Radwan, I. & Gutierrez, J.J., 2012, Poland enterprise innovation support review: from catching up to moving ahead. The World Bank. Accessed: 20th April 2014. Available from:

<http://www.mg.gov.pl/>

Kliniewicz, K., 2014, ERAWATCH country Reports 2012: Poland. Accessed: 04th April 2014. Available from:

<http://www.kooperation-international.de/>

KPMG, 2012, Specjalne Strefy Ekonomiczne (Special Economic Zones). Accessed: 15th March 2014. Available from:

<http://www.kpmg.com/PL/>

Ministry of Economy, 2013, Program rozwoju przedsiębiorstw - projekt do konsultacji (Enterprise Development Program - consultation document). Accessed: 10th March 2014. Available from:

<http://www.mg.gov.pl/Wspieranie+przedsiębiorczosci/>

Ministry of Economy, 2011, Informacja dotycząca rozliczenia podatku dochodowego od osób prawnych za 2010 rok (information on CIT exemptions in 2010). Accessed: 10th March 2014. Available from:

<http://www.finanse.mf.gov.pl/>

Ministry of Finance, 2012, Informacja dotycząca rozliczenia podatku dochodowego od osób prawnych za 2010 rok (information on CIT exemptions in 2011). Accessed: 10th March 2014. Available at:

<http://www.mf.gov.pl/documents/766655/1189566/Informacja.>

Taxand, 2012, R&D Market in Poland – Support for Research and Development Activity of Enterprises. Accessed: 25th March 2014

Available from:

<http://pl.scribd.com/doc/128463148/Accreo-Taxand-R-D-Market-in-Poland2012>

Poland, 2008, Ustawa z dnia 30 maja 2008 r. o niektórych formach wspierania działalności innowacyjnej (Act on selected forms of support for innovation activities). Accessed: 30th March 2014. Available from:

<http://isap.sejm.gov.pl/DetailsServlet?id=WDU20081160730.>

Poland, 2008, Ustawa z dnia 30 kwietnia 2010 r. o zasadach finansowania nauki (Law on Financing Science). Accessed: 12th April 2014. Available from:

<http://isap.sejm.gov.pl/Download?id=WDU20100960615&type=3.>

Ministry of Economy, 2014, Communication from the Minister of Economy of 04 June 2014, on granting the status R&D centers. Accessed: 14th April 2014. Available from:

<http://bip.mg.gov.pl/O+ministerstwie/Jednostki+organizacyjne+nadzorowane+lub+podlegle/Informacje+o+instytutach+badawczych.>

27 Portugal

27.1 General characteristics

R&D expenditure (% GDP)	1.5 ^(p)
Corporate income tax rate	31.5
Public expenditure on R&D tax incentives (% GDP)	0.09
Direct government funding of BERD (% GDP)	0.03
<i>Please refer to Chapter 1 for data sources</i>	

The last reform of the Tax Code – Income and Gains of Collective Persons (Código do Imposto sobre o Rendimento das Pessoas Colectivas, or CIRC) was established by Law n.º 2/2014, of January 16.

27.2 Instrument 1. Tax Incentives System in Research and Business Development (SIFIDE)

SIFIDE I: SIFIDE I consisted of a tax credit granted for companies which perform or contract R&D activities. There was also an element of stimulus for companies which were already undertaking R&D activities in order to increase their commitment.³⁶

The evaluation of SIFIDE I showed that the average time to contract was more than six months; the average size (budget) of funded projects was less than EUR 100,000; the average duration of projects was less than one year; and funding rates to SMEs were 30 percent.³⁷

SIFIDE II: Based on the 2005 legislation, SIFIDE I was reformed in 2010 and 2011 and introduced for the 2011–2015 period.³⁸

SIFIDE II R&D tax credits are set against the IRC (business revenue tax)³⁹. It is both volume and incremental, with the following rates and limits:

- Base Rate: 32.5 percent tax credit on the R&D expenditure during the tax year. Under certain circumstances, for young small and medium enterprises the rate is increased to 42.5 percent.
- Incremental Rate: 50 percent tax credit to that qualifying R&D expenditure that exceeds the average amount spent in the prior two tax periods. The incremental part of the benefit is capped at EUR 1.5 million.

Research expenditure is defined as that incurred for acquiring new scientific or technological knowledge. Development expenditure is defined as that related to the exploitation of research results with a view to get new or significantly improved raw materials, products, services or manufacturing processes (Erawatch, 2014).

³⁶ <http://mapeer-sme.eu/en/programmes-for-smes/search-in-the-online-database/tax-incentives-system-in-research-and-business-development-PT2>

³⁷ <http://mapeer-sme.eu/en/programmes-for-smes/search-in-the-online-database/tax-incentives-system-in-research-and-business-development-PT2>

³⁸ http://www4.seg-social.pt/documents/10152/593072/DL+167_E_2013

³⁹ http://www.biolegis.com/uploads/tx_articles/State_Aid__CRA_Law_2011.pdf

A full deduction of wages of researchers and auxiliary personnel related to research and development is possible and there is also a deduction of operating expenses related to R&D, but the deduction ceiling is 55 percent of wages of researchers and auxiliary personnel related to R&D projects (Erawatch, 2014).

Expenses for recruiting PhD's are eligible for an additional 20 percent tax credit – with an overall limit of EUR 1.8 million. Any unused deduction may be carried forward for six years.

Expenditures in the SIFIDE II regime include “the acquisition cost of new fixed assets which are connected with R&D activities (except buildings and land); the wages of personnel directly involved in R&D activities (limited to 90 percent for non-SMEs); allocated costs of directors and professionals participating in the management of R&D institutions; operating expenses, such as overhead and contracted R&D expenses from anyone other than public entities and/or entities not officially recognized as possessing R&D capabilities, of up to 55 percent of wages of personnel directly involved in R&D activities; costs of contracting R&D activities from public entities and/or from entities recognized as possessing R&D capabilities; expenditures incurred to raise capital for institutions that perform R&D and contributions to funds aimed to finance R&D; costs of registration and maintenance of patents (applicable only for SMEs); patent acquisition costs related to R&D activities (applicable only for SMEs); costs of R&D audits (applicable only for SMEs) and expenses related to demonstration activities of approved R&D projects” (Deloitte 2013: 26).

If there are financial contributions carried out with public grants, the revised deductions do not cover R&D expenditures. Companies with fiscal debts or debts to the Social Security cannot claim these tax deductions (Erawatch, 2014)

The Budget Law for 2013 introduced few changes in SIFIDE II. The most relevant concern was the revision of incentives in order to ensure that those will be proportional to the assets assigned to R&D activities. Second, new rules regarding the eligibility of personnel expenditures were introduced; Third, an introduction of a more preferential rate of incentives for micro, small and medium-sized companies. Fourth, the definition of rules was adjusted in order to avoid the abuse of SIFIDE II. Finally control was assigned to an entity designated by the Ministry of Economy and Employment (Ministério da Economia e Emprego) (Erawatch, 2014).

Budget Law for 2014 (article 211 of the Law n.º 83-C/2013, of December 31) extended SIFIDE II till 2020. Several adjustments to the R&D tax credit were made: (1) The additional 20 percent tax credit, with the overall limit of EUR 1.8 million in expenses for recruiting PhD holders was removed from SIFIDE II; (2) personnel costs, not considered an operating expense, incurred with PhD holders are eligible in 120 percent; (3) Unused deductions from SIFIDE II can be carried forward eight years. (4) limitation of 90 percent for expenses related to wages of personnel directly involved in R&D activities, in case of SME, were removed from the SIFIDE II.

There was an evaluation of the programme in 2005/2006 by a commission nominated by the Minister for Science, Technology and Higher Education. It was concluded that SIFIDE had positive impact on inducing business firms to carry out R&D activities. Still, concerns were raised that the commission was not fully independent (Erawatch, 2013). Moreira and Sesena (2010) concluded: From all the measures taken by the government related to R&D stimulation, one of the most significant is the SIFIDE programme because of its positive effect on the increase in business enterprise R&D expenditures. In fact, the take up of SIFIDE by firms was very high due to the advantages offered by the system as a lawful tax evasion device for firms in a year of high profits (Moreira and Sesena, 2010: 4).

27.3 Instrument 2. Patent Box⁴⁰

The Portuguese patent box, which is effective since January 2014, is part of a comprehensive reform of Portugal's Corporate Income Tax (CIT) system⁴¹. The tax incentive applies for intellectual property rights and intangible assets. It offers a 50 percent exemption from CIT for companies exploiting patents, industrial designs or models protected by intellectual property rights, which leaves the effective tax rate at 11,5 percent in 2014 (CIT was reduced from 25 percent to 23 percent in 2014.) Depending on macroeconomic developments, further proposed CIT reductions will possibly lower this rate to 10,5 percent in 2015 and 8,5 percent in 2016.

The partial tax exemption applies to a proportion of the profits derived from both the licensing and sale of the qualifying intellectual property rights. Costs of the development of the qualifying intellectual property still remain fully deductible (Garrigues, 2014). This holds for self-developed patents in countries which are not on a black-listed jurisdiction, and intellectual property which is effectively used for business activities.

The Law also provides that the acquisition costs incurred with certain intangible assets (with no time limit on their use) may be tax deductible at a 5 percent rate over 20 years. This includes industrial property rights (such as brands) or goodwill acquired in a business combination that is registered or purchased as of January 2014 (with some exceptions).⁴²

The impact of the Patent Box that was introduced in 2014 still needs to be assessed. As indicated by the evaluation of Patent Box in Benelux countries and UK, such instruments lead to large losses in government revenue (Griffith et al., 2013).

Costs of the CIT reform: The European Commission estimates that after the reform CIT-related tax expenditure will go down to 0.2 percent of GDP, though a large share of the reduction (from 0.8 percent of GDP in 2013) is due to definitional issues related to the SGPS regime (EC, 2014).

27.4 Other policy instruments

There are other policy instruments which do not provide R&D incentives in the classical sense. However, they affect R&D spending indirectly.

Scientific Patronage

Another system of tax incentives for R&D in Portugal is the scientific patronage. This regime offers tax incentives to individuals and organizations that provide funding to R&D activities (foundations, R&D units and research centres associations, institutes, higher education institutions). The contributions can be increased, as based on taxable profit, up to a 140 percent maximum (Taxand, Erawatch).

The take-up of this system has been extremely limited.

⁴⁰ http://info.portaldasfinancas.gov.pt/NR/rdonlyres/DB0D5898-6686-41CA-A750-3498D9BCB579/0/CIRC_03_2014.pdf Article 50A

⁴¹ "The reform stands on three pillars: 1) the redesign of the corporate income tax structure, which includes a gradual decrease in the tax rate, restructuring of the tax base, revamping of tax expenditures and special provisions for SMEs; 2) the simplification of tax compliance and other tax administration procedures, which should enhance legal stability, lower compliance costs and reduce litigation; 3) and new tax rules on cross-border business activities, aimed at promoting Portugal's inbound and outbound investment." (EC 2014: 24)

⁴² <http://www.taxandworld.com/portugal-new-tax-measures-relating-to-estates-investments-introduced-on-the-basis-of-budget-2014/>

Non-habitual tax residency

A change to the residency statute in the Portuguese Personal Income Tax Code was established in September 2009. It made non-habitual tax residency more inclusive, with the intention of attracting foreign personnel in scientific, artistic or technical activities considered of high added value.

A Ministerial Order (12/2010) lists qualifying activities related to R&D, scientific and technological activities. The incentive offers a 20 percent tax rate applicable to that net income, which is derived from activities that qualify as "high added value" of a scientific, artistic or technical nature. Provided certain requirements are met, exemptions for income from foreign references also qualify. Employment income derived from high added-value activities earned abroad may benefit from an exemption if they are subject to effective taxation abroad. Dividends, interest, rental income and capital gains may also benefit from an exemption, provided SMEs are partnered (Ministerial Order 12/2010; Taxand).

Contractual incentives

A new Investment Tax Code (Código Fiscal do Investimento) Decree-Law 249/2009⁴³ brought some relevant amendments to the Tax Incentives Statute (Estatuto dos Benefícios Fiscais), which also included R&D measures. The new amendment establishes tax incentives in an up to ten-year contractual basis for investment projects from January 2009 to December 2020. The investment must be greater than EUR 5 million, be considered as relevant for technological innovation and national scientific research, aimed at reducing regional economic imbalances, it must create jobs and stimulate technological innovation and scientific research. The incentives may comprise a tax credit of 10 percent to 20 percent of the eligible investments made, that are deducted against the taxable profit of the project.

Contractual incentives include a wide range of different tax benefits: corporate income tax credits; exemptions or reductions of municipal real estate tax; municipal real estate transfer tax; and stamp tax. Within one project, those tax incentives cannot be combined with other tax policy instruments.

Additionally, Decree-Law 250 / 2009⁴⁴ introduced tax benefits for investments in foreign countries. It contains a group of measures that aim to benefit international science and technological activities. It offers tax benefits for costs related to facilities, services and logistics (Law 249/2009 and Law 250/2009; Taxand).

Companies can also apply for support for vocational training.

27.5 Data availability

Firm-level data is collected. Portugal also participates in the CIS. R&D aggregate statistics are compiled uniformly according to Frascati and Oslo manuals.

27.6 Assessment

Portugal offers an R&D tax credit that is a hybrid form between volume and incremental base. While volume- base R&D tax credits are considered best practice, the incremental part of the scheme complicates the system. This results in higher compliance costs for firms and administrative cost for the government. As such, it is not considered best practice. The outcome related R&D tax incentive- the patent box- is not considered advisable practice.

⁴³ <http://dre.pt/pdf1s/2009/09/18500/0677406783.pdf>

⁴⁴ <http://dre.pt/pdf1sdip/2009/09/18500/0678406786.pdf>

While generally SIFIDE II is relatively generic instrument, it targets young SMEs, which is considered advisable practice.

Final remarks

The comprehensive reform of the corporate income tax effective in 2014 was introduced with a large (85%) parliament majority and aims to promote sustainable economic growth based on private investment and internationalisation of the economy. It focuses especially on the decreasing private investment in order to improve competitiveness in an increasingly globalized world. Portugal had increased tax incentives in the last years but has still fallen back in international comparisons of generosity. Between 2005 and 2009, R&D intensity and the number of researchers more than doubled, representing the highest growth in EU. However, the number has decreased ever since. Portugal is still ranked as a moderate innovator in the 2014 Innovation Union Scoreboard.

27.7 References

Carvalho, Adão, 2006, *Investigação e Desenvolvimento Empresarial: investir no futuro*. Available at:

<http://dspace.uevora.pt/rdpc/bitstream/10174/3031/1/Investiga%C3%A7%C3%A3o%20e%20desenvolvimento%20empresarial%20investir%20no%20futuro.pdf>

Carvalho, Adão; Martínez-Azúa, Beatriz Corchuelo, 2013a, *Business R&D Policy In Spain And Portugal: Objectives, Incentives And Outcomes*. Available at:

<http://dspace.uevora.pt/rdpc/bitstream/10174/8779/1/2013%20%5BCarvalho%20Corchuelo%20Business%20R%26D%20Policy%20in%20Spain%20and%20Portugal%20Objectives%20Incentives%20and%20Outcomes.pdf>

Carvalho, Adão; Martínez-Azúa, Beatriz Corchuelo, 2013, *A comparative analysis of business R&D policy in Spain and Portugal*. In: *Economics and Business Letters* 2(3), 116-127, 2013.

Deloitte, 2013, *Global Survey of R&D Tax Incentives 2013*. Available at:

http://www.deloitte.com/view/en_US/us/Services/tax/global-business-tax/r-and-d-and-government-incentives/Research-and-Development-Federal-Tax/dbedb490ae9dd310VgnVCM1000003256f70aRCRD.htm

European Commission: *Private Sector Interaction in the Decision Making Processes of Public Research Policies. Country Profile: Portugal*. Available at:

http://ec.europa.eu/invest-in-research/pdf/download_en/psi_countryprofile_portugal.pdf

European Commission, 2014, *The Economic Adjustment Programme for Portugal Tenth Review*. Available at:

http://ec.europa.eu/economy_finance/publications/occasional_paper/2014/pdf/ocp171_en.pdf

European Commission, 2014a, *Enterprise and Industry Innovation Union Scoreboard* http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf

European Commission, 2013, *Mapping the population, careers, mobilities and impacts of advanced research degree graduates in the social sciences and humanities (POCARIM)*. Available at:

http://www.liv.ac.uk/media/livacuk/law-and-social-justice/pocarim/Policy,analysis,WP2_Final,formatted.pdf

Erawatch: Portugal: SIFIDE 2012 - Tax Incentives To R&D Activities. Available at: http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/pt/highlights/highlight_0004

EuropaBio, n.d., Portugal. Available at: <http://www.europabio.org/sites/default/files/portugal.pdf>

Garrigues, 2014, Enhancing Portuguese Corporate Tax Regime. <http://www.garrigues.com/pt/orcamento2014/Documents/Garrigues%20Highlights%20of%20the%20Portuguese%20CIT%20Reform.pdf>

Governo de Portugal: Portugal Investor's Guide <http://www.portugalglobal.pt/EN/InvestInPortugal/investorsguide2/investmentincentives/Paginas/TheInvestmentTaxCode.aspx>

ITIF: Stewart, Luke A.; Warda, Jacek; Atkinson, Robert D., 2012, We're #27!: The United States Lags Far Behind in R&D Tax Incentive Generosity, <http://www2.itif.org/2012-were-27-b-index-tax.pdf>

Mamede, Ricardo Paes; Feio, Paulo Areosa, 2012, Institutional conditions for effective and legitimate industrial policies: the case of Portugal. WP n.º 2012/13. http://home.iscte-iul.pt/~rpme/Documentos/RPM-PAF_2012_Dinamia.pdf

Moreira, Andreia; Sesena, Julian, 2010, Comprehensive analysis of programs and initiatives in Portugal that assist the collaboration between science and SME. http://mapeer-sme.eu/en/~media/MaPEer-SME/DocumentLibrary/RTD%20programmes/Portugal_programm_report

OECD, 2011, The International Experience with R&D Tax Incentives. <http://www.finance.senate.gov/imo/media/doc/OECD%20SFC%20Hearing%20testimony%209%2020%2011.pdf>

OECD, 2013, Science, Technology and Industry Scoreboard 2013. Innovation for Growth. Available at: http://dx.doi.org/10.1787/sti_scoreboard-2013-en

Papanikos, Gregory, 2012, Why are Tax Incentives Increasingly Used to Promote Private R&D? Available at: http://dspace.uevora.pt/rdpc/bitstream/10174/5311/1/Economic%20Essays_Why%20are%20Tax%20Incentives%20Increasingly%20Used%20to%20Promote%20Private%20R%26D.pdf

PwC, 2013, Main Features of the 2013 State Budget. Available at: http://www.pwc.pt/pt/pwcinformisco/orcamento-estado/2013/imagens/pwc-2013statebudget_newsalert-changes11-12-2012.pdf

PwC, 2014, 2014 State Budget proposal. Available at: http://www.pwc.pt/pt_PT/pt/pwcinformisco/orcamento-estado/2014/docs/pwc_2014statebudget.pdf

Santos, Lilian; Teixeira, Aurora A.C., 2013, Determinants of innovation performance of Portuguese companies: an econometric analysis by type of innovation and sector with a particular focus on Services. Available at: wps.fep.up.pt/wps/wp494.pdf

Taxand Alvarez & Marsal, 2011/12, global guide to R&D tax incentives.
<http://www.taxand.com/taxands-take/thought-leadership/taxand-global-guide-rd-tax-incentives-20112012>

28 Romania

28.1 General characteristics

R&D expenditure (% GDP)	0.42
Corporate income tax rate	16
Public expenditure on R&D tax incentives (% GDP)	n/a
R&D expenditure in public sector as % GDP	0.3
<i>Please refer to Chapter 1 for data sources</i>	

28.2 Instrument 1. Super deduction

Romania offers a super deduction on qualifying R&D expenses. The incentive was first introduced in 2003 but was only made widely available to all firms as late as 2010. In During this time, the government considerably improved the application procedure.

In February 2013, the rate of incentives was increased from 20 percent enhanced allowance to a 50 percent enhanced allowance.

Currently, there are no evaluations available of the impact and effectiveness of R&D tax incentives in Romania. However, the plan is to introduce yearly evaluations.

28.3 Instrument 2. Accelerated depreciation

Romania also offers a scheme for accelerated depreciation of R&D capital assets. A maximum of 50 percent of the R&D capital assets value may be written-off during the first year of usage. The rest would typically be depreciated over the remaining useful life of the asset. In the extreme case the asset would be written off over a two year period.

28.4 Other policy instruments

Combined with the above instruments, Romania offers co-funding in the area of R&D investments under the EU structural funds.

28.5 Data availability

The National Institute of Statistics (NIS) allows access to micro-level data only based on a contract signed with a university, research institute or domestic/EU public institution. Individual researchers are not able to sign such contracts. Firm-level data is also provided by the Romanian Ministry of Finance. Romania also participates in CIS and provides data according to EU norms.

28.6 Assessment

Romania, as a relatively new EU member country, has gradually adjusted its R&D regime to that of the rest of the EU. R&D tax incentives were introduced as early as 2003. Significant reforms were made in 2010, when the eligibility criteria and application process became more transparent. Recent reforms in Romania have sought to scale up the deductions, thereby placing itself now on the generous end of the scale of R&D tax incentives in the EU.

As such, the scope of these incentives is still relatively limited and does not generally reflect best practise.

Romania has not adopted any significant type of targeting. In terms of organization, the programme appears to still be under development. The government has expressed commitment to improve the practice and align with best practise over time.

There is little knowledge about the cost of the incentives, as well as impact and efficiency of the instruments.

28.7 References

Deloitte, 2013, International Tax – Romania Highlights 2013. Accessed: 12th April 2014. Available from: <http://www.tohmatsu.com/assets/Dcom-Global/>

Jensen, C., 2014, R&D Tax Incentives in Romania. [E-mail]. Message to: Scarlet, E. 19th February 2014

The National Agency for Fiscal administration, n.d., Accessed: 12th April 2014. Available from: <https://www.anaf.ro/>

29 Slovakia

29.1 General characteristics

R&D expenditure (% GDP)	0.82
Corporate income tax rate	22
Public expenditure on R&D tax incentives (% GDP)	0.0002
Direct government funding of BERD (% GDP)	0.03
<i>Please refer to Chapter 1 for data sources</i>	

29.2 Instrument 1. R&D Tax credit

Tax relief in the Slovak Republic is embedded in the Act No. 595/2003 Coll. on Income Tax. It was introduced in January 2010.

A taxpayer shall meet both of the following conditions:

- during tax periods for which the tax relief is claimed, the taxpayer will apply all provisions of the Income Tax Act with respect to reducing tax base, (e. g. depreciation, deduction of tax loss);
- the taxpayer is obliged to adhere to the arm's length principle when calculating the tax base in a mutual business transaction with a related party.

In order to qualify, a minimum amount of total eligible costs for fundamental research projects is set:

- EUR one million per 1 project – large enterprises
- EUR 0.5 million per 1 project – medium enterprises
- EUR 0.25 million per 1 project – micro and small enterprises

The minimum amount of total eligible costs for applied or experimental development projects:

- EUR 3.5 million per 1 project – large enterprises
- EUR 2.5 million per 1 project – medium enterprises
- EUR 1.5 million per 1 project – micro and small enterprises

Furthermore, there is also a maximum amount that a taxpayer can receive through both subsidies and R&D tax incentives.

- fundamental research: EUR 20 million per 1 project
- applied research: EUR 10 million per 1 project
- other projects: EUR 7.5 million per 1 project

A taxpayer can claim the tax credit up to three consecutive fiscal years. The amount cannot exceed the expenditure paid from its own funds, reported in the taxpayer's financial statements (OECD, 2014).

The usage of R&D tax incentives has been evaluated in terms of usage by the Slovak government and the figures suggest that usage is very limited and with a minimal impact on the Slovak governments budget.

29.3 Other policy instruments

Investment grants:

Slovakia offers various R&D subsidies. There is a general subsidy. Depending on the specific scheme and objectives, the range of eligible costs can be between 25 percent-100 percent. The aim of the grants is to support basic research, develop studies of feasibility, ensure protection of IP and temporarily assign high quality staff to R&D activities. The R&D subsidy is applicable to future investments. Maximal duration of basic/applied research and experimental development is three years.

The amounts vary according to the project type. The maximum amount of a grant is restricted by the European Commission Regulation (EC) No 800/2008 (Articles 31, 32, 33). In order to obtain the R&D development subsidy, companies are required to seek approval from the Ministry of Education.

29.4 Data availability

Slovakia participated in CIS 2010 and provides aggregate statistics to EUROSTAT on regular basis, following the EU norms.⁴⁵ Firm-level data is not generally available from Slovak authorities for research purposes.

29.5 Assessment

There is a wide range of general incentives for R&D available in Slovakia, including volume-base R&D tax credits.

Unfortunately the available information on these schemes is quite limited and the official web pages that govern the programmes and online application have not been updated for a considerable period (2012). This places in doubt whether the incentives are still in effect or not. For example, recent publications from SARIO suggest that it is mainly the investment grant schemes that are still in effect.

The approach adopted by the Slovakian government seems very much to be case-by-case negotiations with individual investors in the country.

There is too limited information available in this case to assess the targeting and implementation of the instruments. There has been a facilitation of application online, however, the lacking timeliness of the web pages places in question whether this practise is now continued. All this in itself is a reflection of poor practise except with respect to scope and intended instruments adopted by the Slovak government.

29.6 References

Ernst & Young, n.d., *Worldwide R&D incentives reference guide 2013–2014*. Accessed: 25th April 2014. Available from:

[http://www.ey.com/Publication/vwLUAssets/EY-Worldwide R and D incentives reference guide/\\$FILE/EY-Worldwide-R&D-incentives-reference-guide.pdf](http://www.ey.com/Publication/vwLUAssets/EY-Worldwide_R_and_D_incentives_reference_guide/$FILE/EY-Worldwide-R&D-incentives-reference-guide.pdf)

Jensen, C., 2014, *Questions about tradition to collect and use firm-level data in Slovakia*. [E-mail]. Message to: Pekarovic, J. 19th May 2014

Slovak Research and Development Agency., n.d., *Statute of the Slovak Research and Development Agency*. Accessed: 25th March 2014. Available from:

<http://www.apvv.sk/buxus/docs/agentura/predpisy-externe/statute-srda.pdf>.

⁴⁵ According to S&T responsible Mrs. Edita Novotna

OECD, 2014, Summary description of R&D tax incentive schemes for OECD countries and selected economies, 2013. Accessed on: 15 October, 2014. Available at: www.oecd.org/sti/rd-tax-stats.htm

30 Slovenia

30.1 General characteristics

R&D expenditure (% GDP)	2.8 ^(p)
Corporate income tax rate	17
Public expenditure on R&D tax incentives (% GDP)	0.06
Direct government funding of BERD (% GDP)	0.28
<i>Please refer to Chapter 1 for data sources</i>	

30.2 Instrument 1. R&D tax relief

As from 2012, Slovenia offers a volume-based R&D super deduction at a 100 percent rate. The tax allowance applies to investments in R&D. Qualifying R&D is according to the Frascati Manual. Eligible expenditure include material, service and personnel costs, as well of purchase of R&D equipment. Furthermore, costs of contracts from external parties (researchers or experts working on the specific project) and other outsourced R&D activities also qualify.

R&D deductions are claimed by the company in its annual Tax Return. There is no need for a pre-approval (Ministrstvo za finance, 2014, Ministry Of Finance, 2012).

In contrast to current R&D expenses, tax relief for investment in tangible assets, such as equipment and machinery, can be deducted in amount of 40 percent of the investment. Both incentives the unused part of the incentives can be carried forward for five years. (ibid. 2012, 2014)

30.3 Instrument 2. Depreciation allowance

Slovenia offers a depreciation allowance for equipment used for R&D purposes. Maximum annual depreciation rates are set at 33.3 percent.

30.4 Instrument 3. Allowance for investment

For self-employed entrepreneurs, Slovenia offers a tax allowance for investments in R&D.

30.5 Instrument 4. Deduction for royalties

The taxable base for royalties is reduced by 10 percent.

Up to date, there are no government or academically administered evaluations of these incentives.

30.6 Other policy instruments

Direct support to R&D plays a more important role as of total government expenditure than R&D tax incentives. Various grants are offered for R&D investment.

In the past 20 years Slovenian government has also developed the approach of business incubators⁴⁶.

The European Commission's Operational Programme "Fostering regional development potentials 2007–2013" offers direct support for joint development investment projects (European Commission, Operational Programme Research And Development For Innovation).

30.7 Data availability

Statistical office of the Slovenia conducts surveys on R&D and innovation activity in manufacturing and selected service sectors on aggregate level. Slovenia also participated in CIS. It covered, however, a different reference period than other countries (2001-2002).

30.8 Assessment

Slovenia follows a minimalist, yet very efficient and good practise approach to R&D incentives both when it comes to scope and targeting. There is a 100 percent tax allowance on R&D expenses. Eligible expenses follow international standards and norms. The novelty requirement of R&D is "new to the world", considered best practice. In addition, Slovenia also offers extra allowance on capital expenditures in terms of accelerated depreciation.

There is no particular targeting or differentiation of incentives in Slovenia, according to best practise standards. However, firms with no taxable income cannot receive the tax incentive, which may especially harm young firms.

Slovenia offers an efficient organization system using a one-stop shop and an online application system. The turnover time on applications is often very short. All of this makes the organization fitting into advisable standards. The drawback is that there are not econometrical evaluations of the policy instruments, which could be used as a learning tool for further improvements.

30.9 References

Goldberg, I., 2014, *Slovenia R&D tax incentives*. [E-mail]. Message to: Cvelbar, A., Secretary, Industry And Technology Division, Enterprise, Competitiveness And Technology Directorate, Ministry Of Economic Development And Technology. 10th April 2014

Ministry of Economy and Energy. (n.d.) *Entrepreneurship, Competitiveness and Technology*. [Online] Available from: <http://www.mgrt.gov.si/>. [Accessed: 20 April 2014]

Ministrstvo za Finance., n.d., *Direktorat za sistem davčnih, carinskih in drugih javnih prihodkov, sektor za sistem obdavčitve dohodkov in premoženja*. Accessed: 20 April 2014. Available from: http://www.mf.gov.si/si/o_ministrstvu/direktorati/

Slovenian Ministry of Finance, 2012, *Taxation In Slovenia*. Accessed: 20 April 2014. Available from: <http://www.mf.gov.si/>

Ernst & Young ,n.d., *Worldwide R&D incentives reference guide 2013–2014*. Accessed: 20 April 2014. Available from:

⁴⁶ See: <http://www.vlada.si/>.

<http://www.ey.com/Publication/>

Udovič, B. and Bučar, M., 2013, ERAWATCH *Country Reports 2012: Slovenia*.

Available from:

<http://erawatch.jrc.ec.europa.eu/erawatch/>

31 Spain

31.1 General characteristics

R&D expenditure (% GDP)	1.3
Corporate income tax rate ⁴⁷	30
Public expenditure on R&D tax incentives (% GDP)	0.03
Direct government funding of BERD (% GDP)	0.12
<i>Please refer to Chapter 1 for data sources</i>	

31.2 Instrument 1. Volume credit

Since the introduction of the current design of R&D tax incentives in 2004, the measure has been reviewed various times. The last changes were made in 2013.

Currently, Spain offers a 25 percent tax credit on current total qualifying R&D expenditure. Qualifying research (applicable for all R&D tax credits) is defined as "original planned investigation that seeks to discover new knowledge and greater understanding in the science and technology", while development as "application of the results of investigation activities aimed to produce new materials, products or design new production processes or methods, as well as substantial technological improvement of materials, products, processes and previously existing systems" (Article 35.1.a in *Texto refundido de la Ley del Impuestos sobre Sociedades*).

The tax credit is not targeted to any specific region, legal form, size of firm or activity. However, in order to support companies with liquidity constraints, an immediate deduction and a cash-refund in case a firm does not have taxable income is possible.

31.3 Instrument 2. Incremental credit

The incremental tax credit is available if current R&D costs exceed the average R&D expenses of the previous two years. In this case, a credit of 25 percent of the average R&D expenses plus 42 percent of the excess over the average is applied.

Cap/Limitations (applies to all Spanish R&D tax credits)

If R&D tax credit exceeds 10 percent of tax due before applying tax credits, credits may not exceed more than 60 percent of the mentioned tax liability⁴⁸. If the amount does not exceed 10 percent of the tax due before applying tax credits, credits may offset 25 percent of the mentioned tax due⁴⁹. Alternatively, under the Entrepreneur Law, entities may opt not to apply the mentioned limits to the tax credit for R&D&I activities generated in tax periods commencing from January 2013 onwards. The additional amount of qualifying expenditure is reduced by 20 percent and it may not exceed EUR 1 million in case of technological innovation activities, and EUR 3 million for joint R&D and technological innovation activities (Ministerio de Economía y Competitividad (2014)

⁴⁷The corporate income tax rate is applied in all of Spain, except for the The Autonomous Communities of the Basque country and Navarra

⁴⁸for tax periods commencing in 2012, 2013, 2014 and 2015; otherwise 60 percent

⁴⁹for tax periods commencing in 2012, 2013, 2014 and 2015; otherwise 35 percent

The impact of the recently introduced measures has not been evaluated yet, as they are relatively new. However, various academic evaluations have been carried to assess the effects of the previous designs of the Spain's R&D tax credit schemes. Corchuelo and Martínez-Ros (2009) found that the R&D tax credits had a positive impact in large, medium and hi-tech firms. They also noted that SMEs enterprises were less likely to know about the tax incentives, which substantially lowers the take up-rates, as SMEs are predominant in Spain's economy.

Busom et al. (2012) additionally found that small and financially constrained firms were more likely to use R&D subsidies than tax incentives. However, SMEs with IPR-protected innovative products were more likely to use R&D tax incentives than subsidies.

31.4 Instrument 3. Patent box

Provided that certain requirements are met, 60 percent of the net earnings from the intellectual property sale of the intangible asset are exempt from taxable income. The tax incentive is available to the creator of know-how, patents, designs, formulas or secret proceedings.

31.5 Instrument 4. Innovation tax credit

A 12 percent *Innovation tax credit* applies for costs that are incurred from research activities that resulted in technological innovation of new products or productions processes, as well as substantial improvements in the existing ones.

Since 2013, it is also possible for taxpayers to cash in on the R&D tax credits in case of insufficient corporate income.

31.6 Instrument 5. Credit for R&D personnel

Spain offers a 17 percent tax credit on wage tax for researchers dedicated exclusively to R&D activities. Additionally, a reduction of 40 percent is available for the social security contributions of personnel employed in R&D or technological innovation activities.

31.7 Other policy instruments

R&D Equipment Credit

An 8 percent credit is available for investment in tangible and intangible fixed assets that were solely for qualified R&D (real estate is excluded). The base for this credit is reduced by 65 percent of any applicable grant funding (Alvarez and Marsal Taxand, 2011).

Grants

Both the Spanish federal government and many regional governments provide grants for the performance of R&D activities. If both grants and R&D tax reductions apply, the base for the calculation of tax credits is reduced by 65 percent of any government subsidies granted for those activities and considered as income for the year (Alvarez and Marsal Taxand, 2011, KPMG, 2012).

Regional tax incentives

Regional R&D tax incentives in the Basque Country and Navarra have been different to the federal ones (KPMG, 2012)⁵⁰. In 2010 the Basque Corporate Income Tax (CIT)

⁵⁰ Even after thorough research it has been hard to find recent literature on this aspect

system for example was more generous to taxpayers than in the rest of Spain in several aspects:

- The standard Basque CIT rate was 28 percent (Spain: 30 percent);
- Basque CIT regulations also contemplated tax credits for 10 percent of the expenditure in new fixed assets that did not exist under Spanish CIT law;
- R&D tax credits under Basque CIT regulations were higher than in Spain in general (50 percent-30 percent in the Basque CIT and 42 percent-25 percent in the Spanish CIT);
- The Basque R&D tax credit could reduce the tax liability to zero, while the Spanish one could offset a maximum of 35 percent of the yearly tax liability (50 percent in some special cases).
- The Basque Country also introduced a patent box regime. General features are equal to the regime found in all of Spain (Taxand, 2010).

31.8 Data availability

Firm-level data is available in the 'Survey on Business Strategies' that provides firm-R&D expenditures. The dataset has already been used by various econometric studies (e.g., Corchuelo and Martínez-Ros, 2009). Spain also participates in CIS and Amadeus database. Data collection is in line with EU and OECD norms.

31.9 Assessment

Spain's current R&D tax incentive scheme is a combination between a hybrid approach of both a volume-based and incremental tax credit, a patent box scheme, an innovation tax credit, as well as a credit for R&D personnel. Tax credits, especially when volume-based, are a desirable practice. However, incremental-based incentives as well as output-related tax incentives such as patent-boxes are not recommended. Further, due to historical reasons certain Spanish regions (e.g. the Basque Community) have a significant legislative autonomy in tax matters which they have, in the past, used to also encourage R&D through specific tax measures such as patent box regimes (Nardiz 2010).

Despite having one of the most generous R&D tax incentive programs in Europe, the bureaucratic procedure was until recently very complex and uncertain, which led to only a share of eligible firms (mostly large companies) actually using the tax incentives (EU Erwatch 2013, MINECO 2011).

Carry forward up to 18 years is possible. Also, firms can receive the tax credit in cash, in case a firm does not have taxable income, which is considered advisable practice. Ceilings apply, but they are only restrictive for large firms.

The encouragement of R&D has become a priority for Spanish public authorities, who have implemented several changes in recent years⁵¹. Application procedure can be carried online, and firms may apply for a pre-validation of the application, which are binding for tax authorities at the moment of actual application. Guides and a one-stop agency that can assist in the application processes are also available. The current online application system is used by basically all Spanish firms who conduct R&D, and a recent survey indicated that the latter is seen as a strong improvement, though long decision times and a missing binding report for the patent box regime are criticised (CEOE 2013).

⁵¹ Alvarez & Marsal Taxand 2011

31.10 References

Alvarez and Marsal Taxand, 2011, Global Guide to R&D Tax Incentives 2011-2012. Available at:

<http://www.williamfry.ie/Libraries/test/Taxand-Global-Guide-to-R-D-Tax-Incentives-2011-2012.sflb.ashx>

Busom, I., B. Corchuelo and E. Martínez-Ros, 2012, Tax incentives or subsidies for R&D?, UNU-MERIT, Maastricht University School of Business and Economics.

CEOE – Confederación española de organizaciones empresariales ,2013, Eficiencia de las ayudas públicas a las actividades de I+D+I. Noviembre 2013.

Corchuelo, M. B.; Martínez-Ros, E.,2009, The effects of fiscal incentives for R&D in Spain. Working Paper 09-23, Business Economic Series 02, Universidad Carlos III de Madrid.

Clarke, Modet & Cº ,2013, Spain moves ahead in Patent Box. In: Newsletter November 2013. Link:

http://www.clarkemodet.com.br/boletin/technology_transfer/spain_moves_ahead_in_patent_box.aspx

Deloitte, 2014, 2014 Global Survey of R&D Tax Incentives. Available at:

<http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-global-rd-survey-aug-2014.pdf>

Erawatch, 2012,Erawatch country reports 2012: Spain. Available at:

http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/file_0404.pdf

Ernst & Young,2013, Spain introduces measures to support small and medium sized companies. Tax Alert October 2013. Accessed on: 5 September 2014. Available at:

http://tmagazine.ey.com/wp-content/uploads/2013/10/2013G_CM3851_Spain-introduces-measures-to-promote-RD-activities-and-to-support-small-and-medium-size-companies.pdf

KPMG, 2013, New tax measures introduced by law 14/2013 of 27 September 2013, on support for and the internationalisation of entrepreneurs. Accessed on: February 2014. Available at:

<http://www.kpmg.com/global/en/issuesandinsights/articlespublications/taxnewsflash/pages/spain-rd-and-investment-tax-credits-patent-box-regime.aspx>

KPMG ,2012, R&D incentives and services. Adding value across Europe, Middle East and Africa. Accessed on: February, 2014. Available at:

https://www.kpmg.com/IE/en/IssuesAndInsights/ArticlesPublications/Documents/Research-Development/EMEA_Brochure7Nov12.pdf

MINECO – Ministerio de Ciencia e Innovación (2011): Análisis comparativo sobre el diseño, configuración y aplicabilidad de Incentivos Fiscales a la Innovación empresarial. Mayo 2011. Available at:

http://www.idi.mineco.gob.es/stfls/MICINN/Innovacion/FICHEROS/Estudio_comparativo_deducciones_I+D+i_MICINN.pdf

Nardiz, Antonio M.,2010, Spain - Basque patent box regime. Garrigues Tax Advisory. Available at:
http://www.garrigues.com/en/Publicaciones/Articulos/Paginas/articulos_13300.aspx

Taxand ,2010, Getting the most out of tax benefits for R&D and royalty income. Taxand's Take Article, 26 March 2010. Available at:
<http://www.taxand.com/taxands-take/news/getting-most-out-tax-benefits-rd-and-royalty-income>

Authors would also like to thank Alfonso Rosillo González de Aguilar and Luis Peragon from Ministry of Finance and Public Administration of Spain for the review and clarifications of the information provided in the report.

32 Sweden

32.1 General characteristics

R&D expenditure (% GDP)	3.41 ^(e)
Corporate income tax rate ⁵²	26.3
Public expenditure on R&D tax incentives (% GDP)	n/a
Public expenditure on other innovation policy (% GDP)	0.12
<i>Please refer to Chapter 1 for data sources</i>	

32.2 Instrument 1. Reduction of social security contributions for commercial R&D activity

At the beginning of 2014 Sweden introduced an R&D tax incentive instrument to companies who are engaged in R&D activities. The incentive base is employer's social security contributions. The background of new incentive was that this kind of support have become common in other countries.

Until last year, research and development costs were simply deductible (including purchased information services). During the period 1973-1983 Sweden adopted a special tax support instrument for R&D expenditures, but it was abandoned because of multiple problems (firms converted their spending on R&D and administrative costs to firms and tax administration were large).

The new instrument allows that a firm can reduce the paid social security contributions with an amount that corresponds 10 percent of wages of the R&D personnel.

In order to qualify, at least 75 percent of employee's working hours must be spent on R&D activities. In addition, an employee has to work in this task at least 15 hours.

Reduced contribution per company can rise at maximum to SEK 230 000 per month (around EUR 25,000).

Only limited companies in private sector are entitled to the reduction. Private entrepreneurs, limited partnerships and publicly owned companies are not eligible.

Payment will be credited to the employer on a monthly basis on the company's tax account. The time between when the actual work is carried and the compensation is on average of just over one month.

The new instrument was approved in parliament last November. The legislature didn't require an impact assessment. Nor Ministry of Finance, not Swedish tax authorities have plans for a follow-up report or special evaluation.

The financial cost to the state has been estimated to be SEK 540 million per year (around EUR 59 million). Contribution deduction expands the corporate income tax base and increases tax revenues taxation by some SEK 120 million per year (around EUR 13 million). So the net cost to Swedish government is estimated to be about SEK 420 million per year (around EUR 45.6 million).

⁵² In 2013 the rate was decreased to 22 percent

32.3 Other policy instruments

The policy challenge identified in several studies is that even if R&D intensity is high in Sweden, it does not promote innovation-driven growth as much as expected (this is often called "Swedish Paradox"). There is lack of connections between the academic and business sector R&D. Moreover, a few multinational companies dominate in the private sector R&D). The Swedish government has in recent years increased R&D funding and promoted interaction between academia and private firms to overcome these problems (ERAWATCH, 2013).

The tasks in innovation policies are divided between two ministries. Policy responsibility for innovation support lies with the Ministry of Enterprise, Energy and Communication whereas research policy lies with the Ministry of Education. The former finances the Swedish Research Council, the main agency supporting R&D. The latter finances the Swedish Agency for Innovation Systems (VINNOVA), which supports innovation and application-oriented research. There seems to be some problems with coordination in the actions of these operators.

32.4 Data availability

Statistics Sweden permits access for researchers to firm-level data. The data is anonymized and the researchers need to apply for access to the microdata. The population, variables and reference period need to be described in the application. The data is collected by the tax authorities sending firm-level data to Statistics Sweden. R&D agency in Swedish Statistics report R&D data according to Eurostat regulations. Normally R&D data and figures can be found in domestic publication/databases before Eurostat.

32.5 Assessment

Swedish R&D incentive scheme is a payroll withholding tax credit, which is according to best practice. Precondition for reduced contribution rate is that company's R&D employees carry out systematic and highly skilled research or development. In addition, R&D employees have to practice research and development activities which create new knowledge, products or production processes. The mentioned characteristics are according to advisable practice standards.

The new tax incentive scheme offers equal opportunity for all the private limited companies and in all branches. The deduction has a company-specific monthly ceiling and is targeted mainly to start-ups and small and medium-sized enterprises. A firm cannot carry forward the expenditure.

Swedish new tax credit is complementary to the R&D subsidy scheme, because the company can, at same time, utilize direct R&D schemes (but not related to wages). In this regard, the new demand driven scheme seems to be quite generous especially for small and medium-sized private-sector corporations. However, the small percentage of benefit offered reduces its importance. The incentive scheme is not related to the Knowledge Triangle principles, because the scheme is company specific (the supply driven and politically coordinated R&D direct subsidy schemes have been challenged by this new demand-driven instrument).

The application for rebate is sent electronically every month. If the tax authorities accept the company's application, the contribution rate is lowered next month. In the drafting phase in 2012 and 2013, the number of stakeholders and interested parties were heard. Regarding the implementation, preconditions for best practice are fulfilled.

32.6 **References**

Hallonsten O.,2013, Erawatch Country Reports 2012: Sweden, ERAWATCH

33 United Kingdom

33.1 General characteristics

R&D expenditure (% GDP)	1.72 ^(ep)
Corporate income tax rate	21
Public expenditure on R&D tax incentives (% GDP)	0.08
Direct government funding of BERD (% GDP)	0.09
<i>Please refer to Chapter 1 for data sources</i>	

33.2 Instrument 1. Research and Development Relief

Small or Medium Sized Enterprise (SME) Scheme:

The R&D relief for SMEs offers a deduction from corporation tax liability for R&D expenditure. As from August 2008, SME is defined as a "company or organization with fewer than 500 employees and either having an annual turnover that does not exceed EUR 100 million or a balance sheet that does not exceed EUR 86 million" (HM Revenue and Customs [HMRC], 'Research and Development (R&D) Relief for Corporation Tax' n.d.).

The deduction rate has been increased frequently over the period 2008-2012. Currently, it offers SMEs a 125 percent deduction; for every EUR 100 spent on R&D, a firm can deduct another EUR 125 from its pre-tax corporate income. The scheme includes an indefinite carry forward facility and the maximum amount of the government support that any one R&D project can receive is EUR 7.5 million.

A payable credit is also available to loss making SMEs. The rate of the cash refund was recently increased. With 2014 budget, the government announced that from April 2014, the payable credit will be raised from 11 percent to 14.5 percent.

Large company Scheme:

Currently two schemes coexist for large companies investing in R&D: the optional *Above the line (ATL)* scheme and *R&D relief for large companies*. The design of the latter one that will cease out in April 2016, is essentially very similar to the scheme for SMEs. The main difference is that it offers a lower tax allowance rate of 30 percent, and companies cannot receive a payable tax credit in case they have negative gross profits.

The ATL, that will become mandatory for all large companies after April 2016, offers a 10 percent taxable credit on the amount of firm's R&D activity set against corporation tax liabilities. For firms without corporation tax liabilities, the credit is fully paid out net of tax with a cap equal to the total sum of *Pay-as-you-earn (PAYE)/National Insurance Contributions (NIC)*⁵³ liabilities. No minimum amount of investment in R&D is required and firms can carry forward losses indefinitely.

⁵³UK government system to gather National Insurance contributions (NICs) and Income tax from employees. It is based on the employees' earning and collected around the financial year

An evaluation done by HMRC (2010) for the period between 2000 and 2007 and another study that analyzed R&D effects in Northern Ireland between 1998 and 2003 by Harris et al. (2009) concluded that the R&D tax relieves had a positive impact on R&D expenditure. However, Harris et al. (2009) found that the productivity of firms could only be increased with very generous benefits. As noted by Harris et al. (2009), these effects can be lower in practise due to relatively inelastic labour supply curve in the region.

A survey carried by HMRC among companies undertaking R&D activities showed that companies believe R&D tax benefits induced them to spend more on R&D. However, in large companies R&D activities appeared not to be sensitive to R&D tax incentives as they were part of a long term strategic plan (HMRC, 2000). Generally, in the presence of the tax allowance, firms were more inclined to invest in more risky projects.

33.3 Instrument 2. Research and Development capital allowances

For capital R&D expenditure an accelerated depreciation is offered to all companies at a 100 percent rate. The allowance must be claimed in the accounting period in which the R&D costs are incurred. No limit of maximal costs that can be claimed is set.

33.4 Instrument 3. The Patent Box

The recently introduced Patent Box is an outcome related incentive providing a 10 percent reduction in the corporate income tax rate for profits made on patents and specific medicinal or botanic innovation rights.

A four year phase-in period is set for the policy. In the first year of the scheme only 60 percent of the qualifying profits apply for the benefit. This rate increases by 10 percent per year, and will reach a 100 percent in April 2017.

33.5 Other policy instruments

Direct government support in the form of R&D grants and subsidies is only slightly larger than the amount spent on R&D tax incentives (OECD, 2013). Direct support offers support for knowledge transfers between the Knowledge triangle and general advice for companies that plant to invest in innovation. Direct policy instruments tend to have regional characteristics.

Whether a company can use the mix of tax and non-tax R&D incentives is conditional on the type of the grant or subsidy it receives. If subsidies are considered "State Aid", the company is not eligible for SME R&D tax relief. If any other type of support is received, the SME can still apply for the tax relief. In this case, however, the SME must deduct the amount received through grants or subsidies from the expenditure eligible for R&D tax relief. Such limitations are not set for the large enterprise scheme.

33.6 Data availability

Firm level data is available from Office of National Statistics (ONS) 'virtual microdata laboratory' (created in 2004). UK also carries "UK Innovation Survey" that is part of CIS. ONS provides data to researchers, provided a specific application is made.⁵⁴ Information on innovation outputs (e.g., patents) are also available at 'The Oxford firm-level Intellectual Property Database'.⁵⁵

⁵⁴See: <http://www.statistics.gov.uk/hub/business-energy/businesses/research-and-development/index.html>

⁵⁵ See: http://www.economics.ox.ac.uk/materials/working_papers/paper546.pdf

33.7 Assessment

UK offers the whole range of R&D tax incentives, both input and output related. It offers enhanced allowances and tax credits for current costs, as well as accelerated depreciation for capital costs; Patent box for IP-income. All R&D tax incentive schemes are volume-based and the novelty requirement of qualifying R&D is "new to the world", both being good practice. However, the UK's output-related R&D tax scheme- the patent box- is not a recommendable policy.

The schemes are not differentiated across regions or legal entities. There are various instances of targeting on firm size. Preferential rates are offered to SMEs. Ceilings apply, but they may only be restrictive for large firms. Young firms are implicitly targeted through availability of cash refunds and the carry-over provisions, which is a recommendable practise.

UK's schemes have undergone several changes in the past years to make R&D tax incentives simpler to use. Now, UK performs well with regard to organization. The policy changes were induced by public Consultation documents, an evaluation was also carried. The application procedure can be settled online together with the tax return application. This has reportedly induced the popularity of the schemes with a particularly strong rise during the Great Recession. The eligible amount of R&D expenditure followed the trend, even though this was driven by large companies that in 2011/12 made 81 percent of the total eligible R&D spending (ONS 2013).

33.8 References

HM Revenue and Customs, Manual for R&D tax relief. Accessed: 22nd January 2014. Available at:

<http://www.hmrc.gov.uk/manuals/cirdmanual/cird80000.htm>

HM Revenue and Customs, 2010, An Evaluation of Research and Development Tax Credits

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

HMRC, 2013, Research and Development Tax Credits reform: Above the Line.

Available at:

www.gov.uk/government/uploads/system/uploads/attachment_data/file/179234/research_and_development_credit.pdf.pdf

HM Revenue and Customs, Manual for R&D Capital allowances. Accessed: 22nd January 2014. Available at:

<http://www.hmrc.gov.uk/capital-allowances/basics.htm#2>

Harris R., Li Q. C. and Trainor M., 2009, Is a higher rate of R&D tax credit a panacea for low levels of R&D in disadvantaged regions?, *Research Policy* 38,p. 192-205

Office of National Statistics, 2013, Topic guide to Research and Development

<http://webarchive.nationalarchives.gov.uk/20140721132900/http://ons.gov.uk/ons/reldit1/bus-ent-res-and-dev/2012/index.html>

Helmers, C., Rogers, M., Schautschick P., 2011, Intellectual Property at the Firm-Level in the UK: The Oxford Firm-Level Intellectual Property Database, Department of Economics Discussion paper series, University of Oxford

34 United States of America

34.1 General characteristics

R&D expenditure (% GDP)	2.67 ^(p) (2011)
Corporate income tax rate	39.1
Public expenditure on R&D tax incentives (% GDP)	0.06
Direct government funding of BERD (% GDP)	0.26
<i>Please refer to Chapter 1 for data sources</i>	

Tax credit incentives form a modest part of total government funding for business expenditures on R&D.

34.2 Instrument 1. Credit for Increasing Research Activities (Internal Revenue Code, Section 41)

This tax-credit scheme rewards firms that increase their domestic R&D spending above the level that they had in the past. The Credit for Increasing Research activities has been around since its enactment in 1981, but the scheme has a 'permanently temporary' character. It has been changed and extended sixteen times, sometimes retroactively, with frequent implementation changes. The most recent tax credit schedule expired in December 2013. In 1995/96 the scheme has been out of operation because of failed extension negotiations in Congress, and at the moment of writing (early 2014) the expired tax credit system again has no follow up.

The non-refundable tax credit is available for qualified research expenses (QRE) incurred in the USA. Firms are eligible for the tax credit if their current QRE-over-sales ratio is higher than that in the past. For the calculation of the reference ratio, firms may elect one of two methods. A firm's choice for either of both methods is binding for the years after, unless revoked with IRS consent.

The first method ('Traditional Calculation') is based on the firm's average annual QRE-over-sales ratio in the fixed period 1984-1988. For qualified R&D expenditure in excess of this reference ratio, a 20 percent nominal tax credit is available.

The second method is the Alternative Simplified Credit (ASC) calculation of the base level: 50 percent of the average QRE-over-sales ratio in the preceding 3 years. For the R&D in excess of this reference ratio, a 14 percent nominal tax credit is available.

Young firms that did not exist in the fixed reference period, can only choose the ASC method, which is less generous. Those firms whose sales since 1988 expanded faster than QRE, tend to choose for the ASC method. There are specific, more generous tax credit schedules for cooperation with qualified basic research institutes (universities), orphan drug research and research in energy consortia. Unused tax credit may be carried forward for 15 years and carried backwards for 3 years.

The frequent revisions in the scheme between 1981 and 2013 several times resulted in adding complicated adjustments in the calculation of the base rate. The 'permanently temporary' character of the federal tax credit system fails to create a stable policy environment for R&D decisions that naturally have a medium-term or even long-term character. Since 2011, the Obama government has been requesting

Congress to make the scheme permanent, so far without success. Several evaluation studies since the early 1990s have found that the incremental federal tax credit system had a significant positive impact on qualified and total R&D expenditure. Strongest was the incremental impact on R&D wage sums and R&D supplies. Several studies use relatively small samples and have short evaluation periods, despite the 15 year carry-forward period. Only the firm-level study by Rao (2013) covers the full operation period of the first decade, with coverage of the entire carry forward period. Research by size class of the firms shows that the impact of the schedule on small firms was not substantially stronger than on large firms. Rao (2013) concludes that rather the opposite is true: the estimated elasticities show that large firms are more responsive, suggesting that targeting on small firms may not be the most efficient way to boost total corporate research spending.

34.3 Instrument 2. Federal tax facility for accelerated depreciation of R&D expenses

The tax code (I.R.C. §174) allows firms to take a 100 percent deduction for research and experimentation expenditures in the tax year they are paid. They may deduct 100 percent of R&D costs (other than costs associated with the acquisition of fixed depreciable property) from federal income taxes. Alternatively, firms may defer these expenditures and amortize them, but most firms write off in just one year. While section §174 of IRC does not define what qualifies as research and experimentation expenditures, Treasury regulations have generally interpreted them as "R&D costs in the experimental and laboratory sense". Carry forward is possible over 20 years.

Using the accelerated depreciation facility interacts in two ways with the incremental tax credit facility (instrument 1). Due to a rule introduced in 1989, the current use of the §174 R&D expense reduction effectively lowers the incremental tax credit rate from 20 percent to about 13 percent. Moreover, the firm's R&D tax deduction this year still adds to the base level of the QRE-to-sales ratio in the subsequent years, therefore reducing the firm's future eligibility for incremental tax credit.

34.4 Instrument 3. State-level R&D tax incentives

Many US states have some type of tax-based incentives for local R&D activities in their state. States like Virginia, Arizona, South Carolina and Michigan use volume-based tax credit systems, but most other states use incremental tax credit systems. State schemes differ widely in their definition of what qualifies as 'qualified research expenditure', in the tax credit rates (from 1.9 to 24 percent), in standard state-level corporate tax rates (from 0 to 12 percent), in the calculation of the reference base for the tax credit, and in the carry-forward facilities (between 5 and 20 years). Paff and Watkins (2009) find considerable variation in after-tax R&D prices across US states, with prices on a marginal dollar of R&D ranging between USD 0.18 (Virginia) to USD 0.52 in Virginia and (Washington State).

The state-level tax-incentive systems in the USA seem hardly or only weakly coordinated. Several of these incentive schemes are in some way connected and coordinated with the federal tax credit policy, either by the definitions of 'qualified research expenditure' or by linking state-level tax-credit eligibility to eligibility at the federal level. But this is not the case in all states. While one would expect state-level tax incentives to be targeted only at stimulating local R&D, some state schemes have elements that embody R&D tax credit tax competition.⁵⁶ In a US-wide study Wilson

⁵⁶ Two examples may clarify this. The incremental tax credit scheme of California is calculated not on the basis of the firm's QRE-over-sales ratio (gross receipts) in California, but on the basis of the firm's US-wide sales (gross receipts). This effectively lowers the base rate, and it increases a firm's eligibility for tax credit when moving its

(2009) finds that a 1 percent point increase in state-level R&D tax credit leads to a 3-4 percent long-run increase of in-state R&D spending and a 3-4 percent decrease in R&D spending in other states. The US-wide effect of state-level incentives on R&D spending is practically zero. These results show the existence of important state-level tax externalities, and also suggest high long-run geographic mobility of R&D activities.

34.5 Data availability

Firm-level data for econometric analysis can be accessed under certain application procedure and confidentiality agreements. In the latest evaluation of USA's R&D tax credits, Rao (2013) used confidential IRS data from corporate tax returns. Information from surveys can be very heterogeneous and scattered across different states, reflecting the regional (state) nature of the policies.

34.6 Assessment

There is little coordination between the federal and the state-level incentive systems for R&D activities. Most federal and state-level R&D tax-incentive schemes are oriented to supporting incremental R&D. This approach is not in conformity with international best practice, for reasons specified in the general part of this study. The federal schemes are mostly input-based and generic, though supplementary schemes are applicable to SME and specific manufacturing industries. Research co-operation with qualified universities and research institutes also receives an additional positive tax incentive.

The carry-forward provisions of the federal schemes extend to 15-20 years, which cannot be considered as international best practice. Especially in combination with frequent scheme revisions and the incremental character of the tax scheme, it leads to complicated administration for firms, and to high implementation costs for the tax authorities.

The federal research and experimentation tax credit has been extended almost yearly since 1981. This created uncertainty for firms that consider multi-annual, high-risk R&D investments. The almost annual bipartisan Congress negotiations about extension have also added more complexity to the tax credit scheme. The innovation-intensive business community is pleading for a permanent extension of this tax-credit scheme, and for increasing the claimable ASC tax credit from 14 percent to 20 percent. Several firm lobby groups campaign for a simplified, permanent and more generous Research and Experimentation (R&E) Tax Credit system.

34.7 References

Hall, B. & M. Wosinka, 1999, The effectiveness of the California R&D Tax Credit, Study prepared for the Californian Council on Science and Technology, Un. of Cal., Berkeley.

Paff, L. and T. Watkins, 2009, What is the after-tax price of R&D? An interstate comparison, *Fiscal Studies*, 30(1), 73-101.

R&D activity to California (Hall & Wosinka, 1999). North Dakota offers a 25 percent R&D tax credit on the first USD 100,000 R&D expenses, and up to 18 percent credit on increments above USD 100,000; this competes with the 13 percent rate that often effectively prevails for the federal tax credit scheme. The Angel Credit Fund of North Dakota even offers a generous 45 percent credit on a tax payer's investment in the funding of new start-ups' R&D.

Rao, N., 2013, Do tax credits stimulate R&D spending? The effect of the R&D tax credit in its first decade, Working Paper, The Wagner School, New York University.

Wilson, D., 2009, Beggar thy neighbor? The in-state, out-of-state, and aggregate effects of R&D tax credits, *The Review of Economics and Statistics*, 91(2), 431-436.