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CORPORATE TAXATION OF HEADQUARTER SERVICES IN EUROPE

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Content

Tables

Figures

Executive summary

Scope of the report

This report provides insights into the current tax treatment of group headquarter (HQ) services in the Netherlands, Ireland, the United Kingdom and Switzerland[1]. The study focuses on the taxation of holding companies, financing and treasury companies, research and development activities and the exploitation of intellectual property.

Countries not only take a great interest in attracting company headquarters as this usually comes along with an increase in corporation tax revenue. The relocation of company headquarters also has positive employment effects especially in the field of highly qualified manpower (Deschryvere, 2009). In the case of research and development activities, jurisdictions moreover expect positive spill over effects for domestic companies and research institutions.

In the past years, special tax regimes designed to attract foreign multinationals have appeared to be outdated, whereas new standards are being developed that are compliant within the framework of EU soft law and OECD policy guidelines. For instance, tax provisions that comprise the partial exemption of income derived from intellectual property such as the Dutch Innovation Box are currently on the rise.

The aim of this report is to provide insights into the effective tax burdens on group headquarter services in the Netherlands, Ireland, the United Kingdom and Switzerland. For this purpose we calculate effective tax burdens for different headquarter services by applying the renowned methodology of Devereux & Griffith which has already been employed extensively for cross-border tax burden comparison. In doing so, we focus on the taxation of holding companies, financing and treasury companies, research and development activities and the exploitation of intellectual property. To the extent that this is relevant

[1] In case of Switzerland we focus on the Canton of Zug in general but also on the Canton of Nidwalden as far as the taxation of intellectual property is concerned.

we address special tax regimes that aim at other kinds of group services such as auxiliary services.

In the report we calculate effective tax burdens for hypothetical investment projects. To provide a benchmark for the results with regard to these specific headquarter functions, we calculate effective tax rates for a "standard" manufacturing affiliate whose function is to produce manufacturing products. The results of the calculations are first analysed country by country pointing out the main tax drivers. In a second step, we focus on the different headquarter functions one by one and point out differences in the tax systems. Moreover, we explicitly point out the main advantages and disadvantages of the Netherlands as a location for HQ services.

A description of the four countries' tax systems is provided in the appendix of this report (appendices A and B). The appendix furthermore provides an overview of the model (appendix C) and a worked example for the case of the Netherlands (appendix D).

Results: Effective tax burdens of headquarter services

The effective tax burdens are expressed either as the costs of capital, the effective marginal tax rate (EMTR) or the effective average tax rate (EATR). For each location the analysis of effective tax burdens starts with a pre-defined benchmark case. This benchmark is a corporate investment in the manufacturing sector where we consider five assets with equal weights (i.e. each assets counts for 20% in the total investment mix): industrial buildings, an acquired patent, machinery, inventory and an interest bearing financial asset. The investment mix might be financed either by equity or debt. Afterwards, for each country the different headquarter functions are considered as different types of individual investments. The headquarter functions cover the holding and management of participations, group financing and treasury services, research and development (R&D), and the exploitation and management of intellectual property (IP). For reasons of simplicity, these functions are referred to as *holding function*, *financing function*, *R&D function,* and *IP function*.

In general, in all countries under consideration headquarter functions are taxed less heavily than ordinary investments considered as the benchmark case. From the headquarter functions, the R&D function receives the strongest

tax relief. Available relief is tied both to the input side of the innovation process and to its output and exploitation. While R&D super deductions in the Netherlands and the UK substantially reduce the effective investment costs, tax credits (Ireland) or reduced tax rates (so called Patent or Innovation Boxes in the Netherlands and the UK) provide for reduced taxation of the returns from innovation (in the case of the UK only from 2013 onwards). Innovation Box regimes exert a particularly favourable effect on the effective tax rates of highly profitable innovation projects because they reduce the tax levied on the economic rents earned from R&D. They should thus play an important role in the decision of firms on where to locate such investments. So far, tax incentives for research and development activities and the exploitation of intellectual property are generally of little importance in Switzerland. Yet, the introduction of a License box in the Canton of Nidwalden in 2010 has triggered a discussion on whether such a regime should be introduced in other cantons or even on the federal level.

Table 1 reveals that the effective tax burden on HQ functions is not always at the full discretion of the respective countries of residence. In contrast, source country taxation plays an essential role. This is particularly the case if holding functions receive tax exempt dividends or are in an excess credit position (Ireland). Here, local tax parameters of the holding country may however play a role when it comes to the value of the tax shield from interest expenses relating to the potential debt-financing of investments. The latter can be influenced by interest deduction restrictions and also the tax rate against which the interest expenses can effectively be deducted.

Moreover, financing functions are taxed equally across countries, if the investment is financed by debt. After all, Ireland is the country which displays the lowest tax burden for most headquarter functions (i.e. the financing function and the R&D function). Given the very low Irish statutory tax rate, debt-financing in Ireland however comes with a comparably low interest tax shield.

Table 1: Summary table of effective tax burdens, 2012

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands	Ireland	United Kingdom	General system	Special tax regime[1]
Benchmark case: Manufacturing affiliate						
Equity financing	CoC	6.9	6.2	7.7	5.9	-
	EMTR	27.6	19.4	35.4	15.2	-
	EATR	25.9	16.2	29.1	15.1	-
Debt financing	CoC	4.6	4.9	5.4	4.6	-
	EMTR	-9.0	-1.2	7.8	-9.1	-
	EATR	17.2	11.0	20.3	9.6	-
Specific headquarter function I: Holding function						
Equity financing	CoC	6.5	6.5	6.5	6.6	6.5
	EMTR	23.2	23.2	23.2	24.2	23.2
	EATR	23.2	23.2	23.2	23.5	23.2
Debt financing	CoC	4.2	5.4	4.3	6.5	6.5
	EMTR	-17.8	7.0	-15.3	23.2	23.2
	EATR	14.5	18.8	14.8	23.2	23.2
Specific headquarter function II: Group financing and treasury function						
Equity financing	CoC	6.7	5.5	6.6	5.9	5.4
	EMTR	25.1	9.8	24.0	14.7	7.1
	EATR	-	-	-	-	-
Debt financing	CoC	4.4	4.4	4.4	4.4	4.4
	EMTR	-13.4	-13.4	-13.4	-13.4	-13.4
	EATR	-	-	-	-	-
Specific headquarter function III: R&D function (self-developed IP)[2]						
Equity financing	CoC	2.8	-0.8	3.1	5.0	5.0
	EMTR	-77.0	n/a	-62.8	0.0	0.0
	EATR	-6.6	-16.1	10.7	11.3	7.3
Debt financing	CoC	2.6	-1.4	1.6	3.9	4.3
	EMTR	-96.1	n/a	-220.6	-26.6	-15.7
	EATR	-7.9	-18.8	4.9	6.9	4.3

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands	Ireland	United Kingdom	General system	Special tax regime[1]
Specific headquarter function IV: IP function (acquired IP)						
Equity financing	CoC	7.0	5.9	6.9	5.6	5.3
	EMTR	29.0	14.9	27.9	11.1	6.5
	EATR	26.4	13.2	25.3	14.0	8.9
Debt financing	CoC	4.7	4.9	4.7	4.3	4.6
	EMTR	-5.9	-2.5	-5.6	-16.1	-9.2
	EATR	17.7	8.9	17.0	8.4	5.4

Notes: [1] In the case of the holding function the cantonal holding company regime is taken into account. With respect to the financing function, the R&D function and the IP function, the mixed company regime is applied assuming that the number of Swiss-based employees exceeds 30 which implies that 25% of foreign source income is included in the cantonal income tax base.

[2] The following tax incentives are taken into account in the case of the R&D function: for the Netherlands the Innovation Box and the super deduction of 40%, for Ireland the 25% tax credit and for the United Kingdom only the 30% super deduction as the Patent Box regime will only be introduced in 2013 and will not fully become effective until 2017. Wage tax incentives for the employment of R&D personnel are not included in the calculations, such as the Dutch "WBSO". Accordingly the positive impact of these type of incentives is not measured in the report.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Switzerland is an attractive place also for the benchmark investment (manufacturing affiliate) and acquired IP (IP function) because it shows highly attractive general tax parameters (low statutory tax rates and attractive tax depreciation schemes). This is even more the case if the special cantonal tax regimes apply which are characterised by reduced cantonal income tax rates for foreign source income (other than income from qualifying participations). With respect to the financing function and the IP function Switzerland (Zug) even surpasses Ireland in case the mixed company regime is available. This, however, requires that the share of Swiss-source income does not exceed 20%.

The possible allocation of the activities of Swiss finance companies to a (deemed) foreign permanent establishment (so called "Swiss Finance Branch"), resulting in a corresponding low effective tax burden in Switzerland, is not included in the report, as the scope of the report is limited to domestic activities in each of the jurisdictions under consideration.

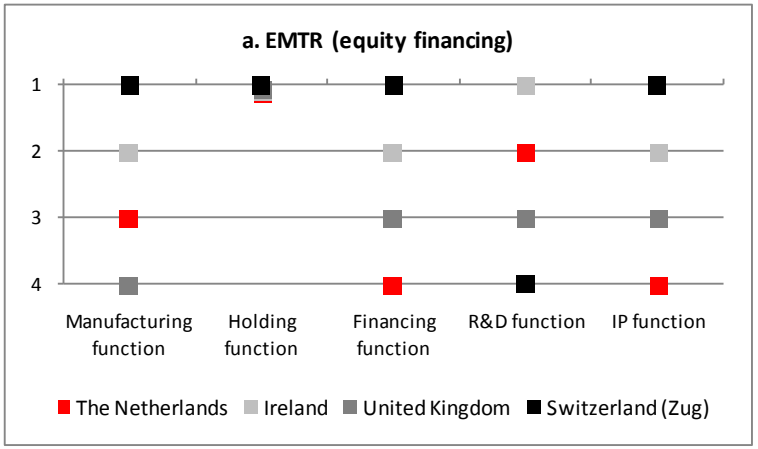
The Netherlands, the UK (as of 2013) and also the Swiss canton of Nidwalden clearly put a focus on the generous tax treatment of innovative activity by means of their Patent/Innovation Boxes. In the case of the Netherlands and the UK the comparably high ordinary tax rates furthermore provide for a high value of tax deductible interest, which is reflected in low costs of capital for debt-financing HQ functions.[2]

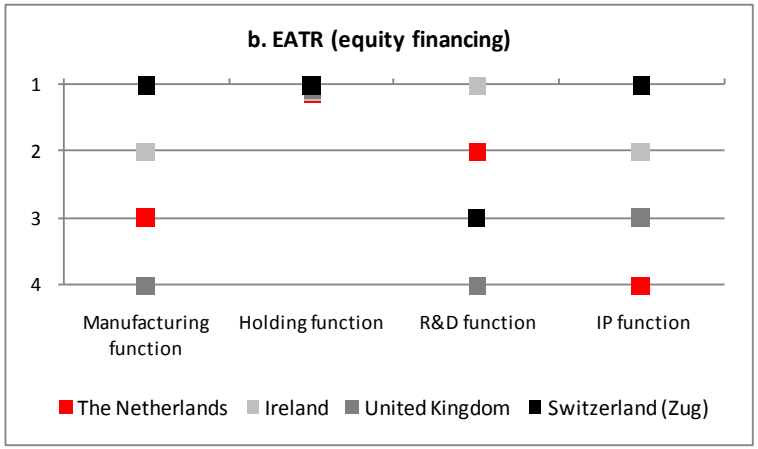
Comparative Analyses

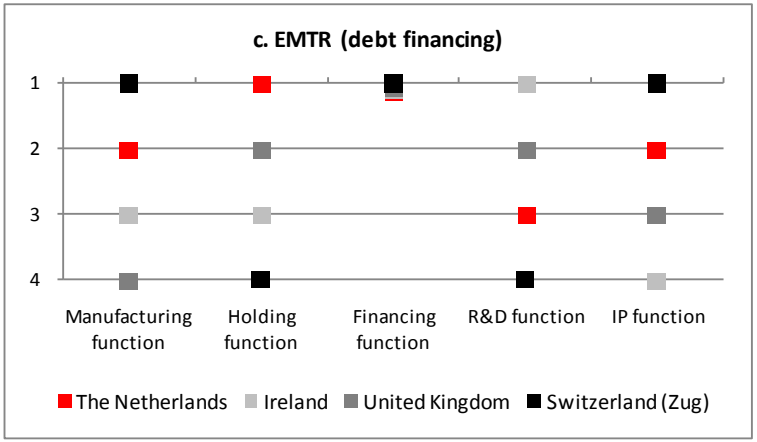
Figure I depicts the ranking of the four countries with regard to their tax attractiveness as locations for the HQ functions considered. Each country is marked by a coloured square, with the Netherlands in red, Ireland in light grey, the UK in dark grey and Switzerland (Canton of Zug) in black. There are four distinct graphs in Figure I, each referring to either the effective tax rate on investment just covering its costs of capital (EMTR) or to profitable investment earning excess profits (EATR). For both types of investment, financing with either equity or debt is considered. So, Figure I.a shows the rankings for the EMTRs of equity-financed investment. Figure I.b shows the rankings for the EATRs of equity-financed investment. Correspondingly, Figures I.c and I.d, respectively, refer to the EMTRs and EATRs of debt-financed investment. The y-axis of each graph shows the ranks numbered from 1 to 4, where 1 is the top rank with the lowest effective tax rate and 4 is the last rank with the highest tax level.

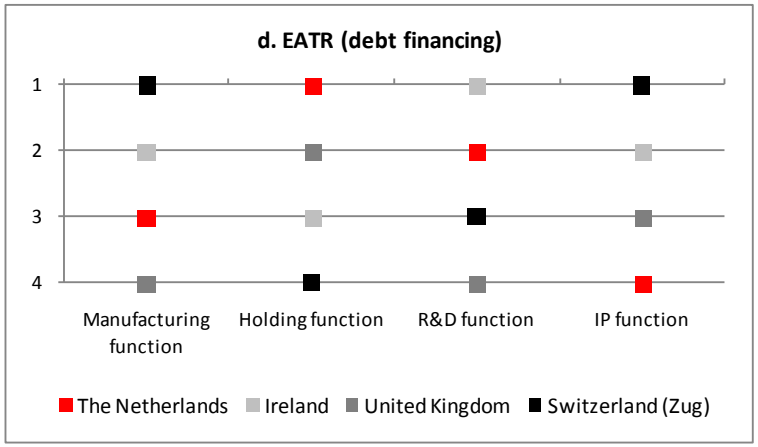
[2] Please note that for the United Kingdom and Switzerland the figures in Table 1 do reflect the effects of the Patent Box and the License Box whereas the Patent Box will only be introduced in 2013 and the License Box is only in place in the Canton of Nidwalden.

Figure I: Country ranking









Looking at Figure I, it becomes clear that among the four countries considered, the Netherlands rarely hold a top position in terms of tax attractiveness. Considering equity-financed investments, the relative advantage for the Netherlands is most pronounced for profitable R&D activity which results in self-developed intellectual property generating returns which by far exceed the costs of the invested capital (see Figure I.b, "R&D function"). In this particular case, the very low profit tax rate on proceeds from innovation under the Dutch Innovation Box regime takes full effect. Only Ireland, with its R&D tax credit regime, ranks top of the Netherlands for this type of profitable investment. Among the peer group considered, the Netherlands rank mostly third or fourth with respect to the other HQ functions under consideration. These lower ranks are due to a relatively high corporate income tax rate of 25% and a tax base definition which is somewhat broader than the ones found in other countries of the peer group. As a result, the Netherlands stays behind for those scenarios where either the tax base or the *ordinary* profit tax rate is particularly important, e.g. the financing function whose interest income is taxed at the ordinary profit tax rate.

Turning to debt-financed investment, the Netherlands show up more often among the top ranks of the four countries. The reason for this is that the Netherlands feature the highest statutory tax rate of all these countries. As a consequence, debt deductibility provides for a particularly valuable interest tax shield. So, if the HQ functions are supposed to be financed with debt, the Netherlands are a particularly attractive location. However, it should be borne in mind that interest expense is often not tax deductible in the Netherlands, and even further limitations, in particular for holding companies, have been announced taking effect from 2013. The interest tax shield has a heavy weight as determinant of the overall effective tax burden if the investment considered is of low profitability (see Figure I.c). If investment is highly profitable, it is again the taxation of the excess profits which is most decisive. Therefore, the Netherlands lose one rank, for example, in the ranking of the tax attractiveness for manufacturing functions when turning from economically marginal investment (Figure I.c) to profitable investment (Figure I.d). They can instead improve one rank from the 3rd to the 2nd rank in the ranking of effective tax levels on the R&D function (Figure I.c and 1.d, respectively) because

under the Innovation Box excess profits are taxed at rates far below the ordinary Dutch corporate income tax rate.

Overall conclusion and policy statements for the Netherlands

As an overall conclusion, it becomes clear that the Netherlands no longer has a competitive advantage as a holding company location, given similarly attractive regimes in the other jurisdictions under consideration. The Netherlands still seems to be relatively attractive in case of debt funded holding activities, but only to the extent that the related interest expense is tax deductible, which is not always the case and which will be subject to further limitations as of 2013. The impact of dividend withholding tax on dividends distributed by holding companies has not been taken into account in the model, which may be relevant when interpreting the outcome of the calculations, if we compare the Netherlands (15% WHT rate) for instance with the UK, which does not levy a WHT on outbound dividends. On the other hand, Controlled Foreign Company regimes, such as the regime in place in the UK, have not been included in the model either, which could also influence the outcome of decision makers upon choosing an appropriate jurisdiction for establishing holding company functions.

As for group finance and treasury functions, the EU code of conduct for business taxation and EU state aid rules seem to have resulted in a level playing field for both equity and debt funded group finance activities. It will be difficult for the Netherlands to distinguish itself from the other jurisdictions in this respect, other than by means of maintaining its vast network of tax treaties and maintaining its professional and easily accessible administrative practice of obtaining certainty in advance from the Dutch tax administration.

For the R&D and IP functions, the Netherlands seems to be on the right track in terms of attractiveness. The very positive outcome for the Netherlands due to the Innovation Box and super deduction (RDA), should be interpreted in light of the assumption that all the income from technical know-how can be taxed under the beneficial 5% effective tax rate of the Innovation Box. It should be borne in mind however that dependent on the facts and circumstances, not always the entire income can be allocated to the Innovation Box.

1 Introduction

Multinational companies increasingly decentralize group functions to different jurisdictions (Desai, 2009; Deschryvere, 2009). Decisions to relocate certain group functions are driven by tax as well as non-tax reasons. Group financing and treasury functions are often located close to important financial centres. In turn, research and development activities require highly qualified manpower and proximity to other public or private research institutes. With respect to the exploitation of intellectual property legal protection of property rights is decisive. Especially with respect to the location of financing and treasury functions as well as the location of intellectual property, tax considerations are of great importance as such activities may be used to shift profits from high tax to low tax jurisdictions (Desai, 2009).

Countries take great interest in attracting company headquarters. First, these specialised service functions of multinational firms promise to bring about additional tax revenue. Second, they are supposed to induce positive employment effects especially in the sector of highly qualified manpower (Deschryvere, 2009). In the case of research and development activity jurisdictions moreover expect positive spill over effects for domestic companies and research institutions.

In the past years, special tax regimes designed to attract foreign multinationals appeared to be outdated, whereas new standards are being developed that are compliant within the framework of EU soft law and OECD policy guidelines. For instance, tax provisions that, among other things, comprise the partial exemption of income derived from intellectual property (e.g. the Dutch “Innovation Box“) are currently on the rise.

The aim of this report is to provide insights into the taxation of group headquarter services in the Netherlands as well as three other countries, namely Ireland, the United Kingdom and Switzerland. For this purpose we calculate effective tax burdens for different headquarter services by applying the renowned methodology of Devereux & Griffith which has already been employed extensively for cross-border tax burden comparison. In doing so, we focus on the taxation of holding companies, financing and treasury companies, research and development activities and the exploitation of intellectual prop-

erty. To the extent that this is relevant we address special tax regimes that aim at other kinds of group services such as auxiliary services.

Stating the obvious, many elements that are very relevant to establish and maintain an attractive establishment climate cannot be measured, such as the positive role of a stable political climate. These elements, however, should be borne in mind as well when interpreting the results of this study

The report is structured as follows. In chapter two we calculate effective tax burdens for hypothetical investment projects. To provide a benchmark for the results with regard to these specific headquarter functions, we at a priori calculate effective tax rates for a "standard" manufacturing affiliate whose function is to produce manufacturing products. The results of the calculations are first analysed country by country pointing out the main tax drivers. In a second step, we focus on the different headquarter functions one by one and point out differences in the tax systems. Moreover, we explicitly point out the main advantages and disadvantages of the Netherlands as a location for HQ services. The report concludes with a summary of the main results of the cross-border comparison.

A description of the four countries' tax systems is provided in the appendix of this report (appendices A and B). The appendix furthermore provides an overview of the model (appendix C) and a worked example for the case of the Netherlands (appendix D).

2 Effective tax burdens of headquarter services

2.1. Introduction

The aim of this module is to analyse the effective tax burden of HQ services located in the Netherlands as well as three further European countries that constitute comparably popular European headquarter locations of multinationals. These are Ireland, the United Kingdom and Switzerland. The centralised functions analysed comprise the holding and management of participations, group financing and treasury services, research and development (R&D) activities, and the exploitation and management of intellectual property (IP).

For the purpose of this study we differentiate between R&D activities resulting in the creation of a **self**-developed intangible asset (a patent) generating royalty income and the exploitation of an **acquired** intangible asset (a patent) also generating royalty income.

In addition, specific tax regimes for group services are addressed as far as relevant. Such group services may comprise auxiliary services such as governance of group companies, reporting, organisational support, leasing, group captives, factoring and re-invoicing, human resources, procurement, distribution and sales, marketing, marketing research for the purpose of the whole group, IT services, and tax and legal advice.

2.1.1 Methodology

To measure the effective tax burdens on these functions, we apply a methodology which follows the approach put forward by Devereux and Griffith.[3] This approach assumes a forward-looking perspective in the sense that it models the effective tax burden as perceived by firms facing a hypothetical investment decision. It provides a possibility for modelling the most relevant provisions of tax regimes in a systematic way. Using this approach, the costs of

[3] See Devereux and Griffith (1999, 2003). The Devereux/Griffith approach is based on the commonly accepted framework developed by King and Fullerton (1984). For more detailed explanations we refer the interested reader to these papers. ZEW runs this model in numerous studies on behalf of the European Commission (Devereux et al. (2009, 2010, 2011)) and other institutions (Dressler et al. (2011)).

capital, the effective marginal tax rate (EMTR) and also the effective average tax rate (EATR) on a hypothetical investment can be computed.[4]

The model framework is based on the neoclassical investment theory. It starts out from the observation that, for a shareholder investing in a company, the respective rate of return earned must compete with the shareholder's alternative to corporate investment. This alternative is supposed to be a financial investment on the capital market. Consequently, when making investment decisions, the managers of a large multinational company, acting in the investor's interest and aiming to maximize shareholder value, are supposed to compare the attainable rates of return with the return the investor can earn on the capital market.[5] They will invest up to the point where an incremental investment, after all corporate taxes have been paid, yields just the real capital market interest rate and shows a net present value of zero. The *pre-tax rate of return* on this "marginal" investment which exactly meets the shareholder's minimum after-tax return requirements is called the **cost of capital** (Jorgenson 1963; Hall and Jorgensen 1967). Any investment which does not at least earn its cost of capital will not be undertaken. Via its effect on the cost of capital, taxation is thus supposed to exert an influence on the scale of investment activity. The higher the cost of capital, the larger is the disincentive to corporate investment. Furthermore, the cost of capital is an indicator for the competitiveness of a company.

At the company level, profit and capital taxes increase the cost of capital of equity-financed investments. If investments are instead financed with debt, the marginal return is shielded from profit taxation because interest payments are tax-deductible. Moreover, generous depreciation allowances and other types of tax base deductions have a decreasing effect on the cost of capital.

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[4] See Devereux and Griffith (1999, 2003) and Schreiber, Spengel and Lammersen (2002) for a more detailed explanation of the tax measures.

[5] Arguing from the perspective of large multinational companies, it seems plausible to assume that the management of the firm has no idea about where their relevant investors reside and where they pay (personal) taxes. Thus, from their point of view, the capital market interest rate without further adjustment for personal taxes is the relevant benchmark to decide whether an investment project adds value to the firm.

Beside the cost of capital, the **effective marginal tax rate** (EMTR) is as another measure of the effective tax burden on marginal investments. Considering taxes at the company level only, the EMTR is a simple monotonous transformation of the cost of capital. More specifically, it is defined as the difference in per cent between the cost of capital, denoted by $\tilde{p}$ and the real market interest rate, denoted by r.

$$EMTR = \frac{\tilde{p} - r}{\tilde{p}}$$

In less technical terms, the EMTR is an indicator for the tax-related share of the cost of capital. It thus conveys information on the tax wedge introduced in the costs of capital and the degree to which corporate investment is distorted by taxation. Moreover, expressing effective tax burdens in terms of the EMTR facilitates the comparison with other concepts of tax rates like statutory profit tax rates or average tax rates.

Both of the above indicators, the cost of capital and the EMTR, refer to an investment which is marginal in an economic sense, i.e. which earns the minimum required rate of return and generates a net present value of zero. The **effective average tax rate** (EATR) instead reflects the effective tax rate on a profitable "infra-marginal" investment which yields a pre-tax rate of return exceeding the costs of capital and thus has a positive net present value. More specifically, the EATR indicates the percentage reduction of the investment's net present value that is caused by taxation.

When choosing between two or more mutually exclusive profitable investments, a company will favour the alternative with the highest post-tax net present value, implying the highest increase in firm value. Given an equal pre-tax net present value, management will thus opt for the investment project with the lowest EATR because its net present value is least cut by taxes. Location decisions for subsidiaries of international corporations are the most relevant examples of this kind of decision. In this regard, the EATR is an important indicator for the attractiveness of a location.

The following equation describes a particular relationship between the cost of capital, the EMTR and the EATR:

$$EATR = \frac{\tilde{p}}{p} \cdot EMTR + \frac{p - \tilde{p}}{p} \cdot \tau$$

This relationship illustrates the properties of the EATR and helps to identify the impact of the different tax drivers on the effective tax burden. The EATR equals the weighted average of the EMTR and the combined statutory corporate income tax rate, denoted by τ. The weights are determined by the share of the pre-tax return p just covering the cost of capital $\tilde{p}$ (for the EMTR), and the excess return beyond the cost of capital.

With regard to the main drivers of the effective tax rates, the definition of the tax base has a greater influence on the costs of capital and EMTR than on EATR results. In contrast, for the EATR the statutory profit tax rates play an essential role. The more the rate of return exceeds the cost of capital, the more the EATR converges against the statutory corporate income tax rate. This becomes intuitively clear if we consider a profitable investment with the same level of initial expenses, but accompanied by an increasing level of return. The additional income is regularly taxed at the statutory tax rate without triggering additional allowances. Thus, the tax base definition, i.e. available tax deductions, becomes less relevant whereas the statutory income tax rate becomes the ever more dominant factor. Any applicable non-income taxes in the four countries considered can also be captured by the methodology outlined above. Non-income taxes have a particularly strong effect on the costs of capital and the EMTR, which assume that the underlying investment generates only small returns.

Please note that the taxation of personal shareholders is not part of this study. Throughout this whole study, we argue from the perspective of multinational companies. These firms normally tab the international capital market for financing purposes. For this reason, they do not know a priori where their shareholders and lenders reside and where they pay taxes. The relevant persons might reside anywhere in the world. As the decision-makers of the multinational firm therefore have no information on the personal tax parameters of their shareholders, they are plausibly assumed to ignore them altogether. As a consequence, the multinationals only take the taxation at the corporate level

into account when making decisions on where and on which scale to invest. Therefore, the personal shareholder taxation is plausibly assumed not to affect investment decisions of these large firms.

2.1.2 Economic assumptions

Several assumptions need to be made in order to define the hypothetical investment project analysed in this study and the economic conditions under which it is assumed to take place.

Given the analytical focus of the study, the kinds of income under consideration are dividend income, interest income, royalties, and, as far as relevant, service fees. The functions considered (re-)finance their activities with either equity or debt. In addition, we presume that the dividends, interest, royalties or service fees are paid by an associated company residing in a Member State of the European Union. Once we focus on the effective tax burden levied on holding functions, we assume that all its participations are held at 100%. Table 2 summarises the economic assumptions of our model.

Table 2: Economic assumptions (in %)

True economic depreciation rate	δ	
- intangibles		15.35
- industrial buildings		3.1
- machinery		17.5
real interest rate	r	5
inflation rate	π	2
pre-tax rate of return for EATR	p	20
Nominal interest rate	i	7.1

2.1.3 Tax parameters under consideration

This exercise is limited to parameters of the various tax regimes which can be captured in the context of the analysis of a hypothetical investment project. A full list of the tax parameters used in the report is given in Annex B.

The types of parameters incorporated into the model are as follows:

- statutory corporation tax rates, including surcharges and tax rates of typical local profit taxes, as well as various special rates which apply to specific forms of income or expenditure
- tax credits associated with dividend payments made from domestic and foreign source income
- corporate real estate taxes, net wealth taxes and other non-profit taxes on assets
- treatment of foreign source dividends and interest received by parent companies from EU subsidiaries
- capital allowances for industrial buildings, machinery, intangibles (the purchase of a patent)
- the tax treatment of financial assets and inventories
- restrictions to the deduction of financing expenses especially with respect to exempt income
- tax incentives for research & development (R&D allowances, super deductions, tax credits)

We do not take into account withholding taxes on dividends, interest or royalties paid by the associated companies which are resident in the European Union, as we assume that the prerequisites of the Parent-Subsidiary Directive and the Interest & Royalty Directive are fulfilled. For the case of Switzerland, we assume that Art. 15 of the Swiss-EU Savings Agreement is applied which is comparable to the respective provisions of the Parent-Subsidiary Directive and the Interest & Royalty Directive.

Our analysis starts for each country with a so-called benchmark case. This takes into account corporate investments in the manufacturing sector where we consider five assets with equal weights (i.e. each assets counts for 20% in the total investment mix): industrial buildings, an acquired patent, machinery, inventory and an interest bearing financial asset. The investment mix might be financed either by equity or debt.

Afterwards, for each country the different headquarter functions covered by this study are considered as different types of individual investments. The

headquarter function covers the holding and management of participations resulting in dividend income. The group financing and treasury function receives interest income from a financial asset, namely an intra-group loan. The research and development activity (R&D) is characterised by the creation of a patent which results in royalty income. In contrast to this, the exploitation and management of intellectual property (IP) comprises the generation of royalty income by exploiting an **acquired** patent. For reasons of simplifications, these functions are referred to as *holding function*, *financing function*, *R&D function,* and *IP function* in the following.

2.2. Analysis of effective tax burdens of Headquarter Services

2.2.1 The Netherlands

Table 3 shows the effective tax burdens on the headquarter functions under consideration in case they are located in the Netherlands, namely the *holding function*, the *financing function*, the *R&D function,* and the *IP function*. To provide a benchmark for the results with regard to these specific headquarter functions, we also calculate effective tax rates on a "standard" manufacturing affiliate whose function is to produce manufacturing products (*manufacturing function*).

The benchmark results for the manufacturing affiliate are displayed in Column (1) of table 3. Results for the holding function and the group financing function are, respectively, shown in columns (2) and (3). The results for the R&D function (self-developed patent) are presented in column (4). Column (5) of table 3 displays the effective tax levels for an IP holding company (acquired patent).

For each type of investment considered, i.e. for each combination of function and supposed source of funds used to (re-)finance that specific function's activity, we calculate the three different measures for the effective tax level discussed in the previous section. For each source of finance, equity and debt, respectively, the first row presents the costs of capital, the second row shows the corresponding EMTR values, and the third row displays the EATR.

Table 3: Effective tax burden on centralised headquarter functions in the Netherlands (in %), 2012

		(1)	(2a)	(2b)	(3)	(4)	(5)
		Benchmark Case: Manufacturing function	Holding Function[1]		Financing Function	R&D Function[2]	IP Function
Equity financing	CoC	6.9	6.5		6.7	2.8	7.0
	EMTR	27.6	23.2		25.1	-77.0	29.0
	EATR	25.9	23.2		-	-6.6	26.4
Debt financing	CoC	4.6	4.2	6.5	4.4	2.6	4.7
	EMTR	-9.0	-17.8	23.2	-13.4	-96.1	-5.9
	EATR	17.2	14.5	23.2	-	-7.9	17.7

Notes: [1] Column (2b) shows the effective tax burden if the holding re-finances with debt but is subject to binding interest deduction restrictions, i.e. the Dutch thin capitalisation rules.

[2] Effective tax burdens on the R&D function assume that both the Dutch Innovation Box regime and the R&D deduction are taken advantage of. We do, however, not include the (positive) impact of the Dutch wage tax incentive that is available for R&D employees ("WBSO"). For a detailed analysis of other scenarios with regard to the tax treatment of innovative activity, see table 4.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Benchmark case: Manufacturing affiliate

We start the discussion of the results for the Netherlands with an explanation of the benchmark findings calculated for the Dutch manufacturing affiliate. The effective tax levels shown in table 3, Column (1), are calculated assuming that, for production purposes, the Dutch manufacturing entity resorts, in equal proportions, to a bundle of five different assets. These assets are an industrial building, an acquired patent, machinery, inventory, and an interest-bearing financial asset.[6] Assuming that investment into the production affili-

[6] Describing investment in the manufacturing industry by this 5-asset bundle is a standard convention in the international comparison of effective tax burdens (see, e.g., the reports

ate, as represented by this 5-asset bundle, is financed with equity, the costs of capital amount to 6.9%. The costs of capital thus exceed the real market interest rate, representing the minimum post-tax rate of return required for the investment to be undertaken. In economic terms, the Dutch tax system provides a disincentive for corporate investment in the manufacturing sector and instead favours financial investment on the capital market.

The EMTR levied on equity-financed investment in the Dutch manufacturing affiliate amounts to 27.6%. In other words, 27.6% of the investment's costs of capital are related to tax. Assuming that the multinational group is not considering to extend an existing Dutch manufacturing facility but to invest in a profitable new production plant (so called greenfield investment), the EATR becomes the relevant indicator for the effective tax burden. The EATR value amounts to 25.9% which is close to the Dutch statutory tax rate of 25%. As discussed in the methodological part of this report, the EATR approaches the statutory tax rate with increasing levels of profitability. The economic rent earned on an investment is directly hit by the statutory tax rate because the income earned is no longer shielded from tax by available allowances or deductions (e.g. depreciations allowances, interest deductions).

If the investment in the production affiliate is financed with debt instead of equity, the effective tax levels are reduced.[7] Due to the tax deductibility of interest expenses, the marginal return on investment is shielded from taxation. Moreover, Dutch tax depreciation patterns for machinery allow for faster tax depreciation (5 years, straight-line basis) than economic depreciation,[8] implying favourable interest and liquidity effects for the company. As a result, the costs of capital fall even below the market interest rate of 5%. Corre-

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on behalf of the European Commission put forward by Devereux et al. (2009, 2010, 2011)).

[7] If in turn the Dutch thin capitalisation rules apply, interest expenses are not deductible. Broadly speaking, this is the case if the related party of the borrowing company debt exceeds three times the company's equity. Yet, due to the assumption that debt is only provided by third parties, the Dutch thin capitalisation rules which are limited to intra-group constellations do not apply. For further information see section A.2.5.

[8] The model assumes economic depreciation of machinery to follow a declining-balance pattern at a rate of 17.5%. See Table 25 in the appendix for details.

spondingly, the EMTR turns negative for the case of debt-financing the investment. With marginal returns left untaxed due to the tax deductibility of interest and generous depreciation patterns, the Dutch tax system is effectively subsidising debt-financed corporate investment, pushing required pre-tax returns below the real market interest rate. Furthermore, the Dutch tax system clearly favours debt-financing over equity-financing due to the differential treatment of interest expenses and equity payouts. This also becomes apparent when considering discrete investment in a profitable production plant. The EATR for the case of a debt-financed investment in the manufacturing function amounts to 17.2%. This is considerably lower than the rate of 25.9% computed for the case of equity-financing.

Specific headquarter function I: Holding function

The Dutch tax system eliminates double taxation of inter-company dividends by way of a participation exemption. Dividends (and capital gains) received from a (domestic or foreign) subsidiary are not included in the corporate income tax base if they relate to a qualifying participation.[9] Accordingly, profits generated from qualified shareholdings in foreign companies are taxed in the respective source countries but the associated dividend payouts are exempt from tax in the Netherlands. Opposite to this exemption on dividends received, the Netherlands levies a tax on dividends paid by means of a dividend withholding tax at a statutory rate of 15% (this rate is often reduced under applicable tax treaties). The impact of the Dutch dividend withholding tax is not taken into account in this report, because the analysis focuses on the holding function. Hence, the tax consequences at the level of the (foreign) shareholder of the holding company re not taken into account in the model.

The most relevant asset category held and managed by a holding company are shareholdings in affiliated companies. As the dividends received by the Dutch holding are tax-exempt in the Netherlands, foreign corporate income taxes levied in the source countries become the main drivers of the wedge between

[9] See section A.2.2. for the prerequisites of the Dutch participation exemption.

the costs of capital and the market interest rate.[10] For the purpose of this report, we use the statutory profit tax rate averaged across the EU-27 which amounts to 23.2%[11] in 2012 as a proxy for the foreign income taxes levied on the Dutch holding's subsidiaries. As we assume that the fully owned subsidiaries of the holding company are resident in a Member State of the European Union, the application of the Parent-Subsidiary Directive ensures that no withholding tax is levied upon the dividend distributions of the subsidiaries.

Table 3, column (2) shows the results. Again, as has been discussed above with respect to the benchmark investment, the source of finance employed plays an important role for the effective tax burden. Assuming that the Dutch holding re-finances with equity rather than debt, the costs of capital amount to 6.5%. Given the underlying real market interest rate of 5%, as assumed in our model computations, the tax driven share of the costs of capital, i.e. the EMTR, is 23.2% and thus equals the statutory profit tax rate averaged across the EU-27.

By contrast, if the Dutch holding resorts to debt in order to re-finance investment in its shareholdings, the associated interest tax shield brings the costs of capital down to 4.2% (see column (2a) in table 3). It must be recognised, however, that the interest tax shield is effective only if the holding has sufficient positive taxable income to set off the interest against. This is for example the case if the Dutch holding company received service fees for auxiliary services in addition to dividend income. With this precondition fulfilled, the interest shields income against a Dutch tax rate of 25% whereas associated foreign

[10] We assume that investments at the subsidiary level are financed with retained earnings or equity injections from the holding. Moreover, we refrain from making any assumptions with regard to the asset structure of investments and the associated depreciation allowances. Basically, this is equivalent to assuming that any available tax depreciation would match with the true economic depreciation of assets and therefore be generally neutral with respect to the effective tax burden.

[11] The statutory profit tax rate is determined for each EU Member State by taking into account the corporate income tax rate, surcharges or surtaxes levied on top of the corporation tax as well as local profit taxes. Furthermore, the deductibility of a certain tax from its own tax base is taken into account. The EU-27 average comprises the Member States tax rates in equal weights. Table 20 summarises the statutory tax rates of the EU-27 Member States.

profits are, on average, taxed at 23.2%. As a consequence, the costs of capital fall below the capital market interest rate of 5% and investments are, thus, effectively subsidised by the tax system. Accordingly, the EMTR shows a negative value of -17.8%.

If, however, the interest expenses are not deductible, the cost of capital and the effective marginal tax rate is equal to the case of equity-financing and amounts to 6.5% (see column (2b) in table 3). This may for example be the case if the Dutch thin capitalisation rule applies which denies the deduction of interest paid to related parties to the extent that the overall debt of the company exceeds three times the equity. For further details on the Dutch thin capitalisation rule and other anti-avoidance provisions limiting the deduction of interest expenses in the Netherlands see section A.2.5 in the appendix.

Finally, the effective tax burden on *profitable* investments which increase shareholder value is 23.2% if the Dutch holding re-finances with equity (which again equals the statutory profit tax rate averaged across the EU-27) and 14.5% if it takes up debt in order to finance its subsidiary (and interest is fully deductible).

Specific headquarter function II: Group financing and treasury function

An ordinary holding company is generally supposed to collect dividends paid from equity investments. By contrast, a group financing function receives or takes up funds to extend loans to other affiliates of the multinational group. Again, we start with considering the case where the investment financed by the group financing function is marginal in an economic sense. In this case, the return on investment is shielded from foreign corporate income tax because the foreign affiliate deducts the interest expenses paid to the Dutch financing company from its corporate tax base.[12] As a consequence, the Dutch corpo-

[12] As in the analysis with regard to the holding company, we again refrain from making assumptions on the asset structure of the investment at the level of the foreign affiliate. Tax depreciation of the assets is therefore not modelled or, equivalently, assumed to be neutral in economic terms. As a consequence, the analysis is valid no matter in which country the affiliate receiving the internal loan resides.

rate income tax rate plays the primary role for the size of the tax-induced wedge between the capital market interest rate and the costs of capital.

However, in how far the marginal return on investment, received as interest payments from the foreign affiliate, is indeed hit by the Dutch corporate income tax of 25% depends on the type of funds the financing function uses to re-finance the loans passed on to the affiliates of the multinational group. If the financing company receives equity injections, any interest received from the corresponding investment is fully subject to Dutch corporate income tax. Given the 25% tax rate and the further economic assumptions of a real market interest rate of 5% with inflation amounting to 2%, the costs of capital are 6.7%. Expressed in terms of the effective marginal tax rate, the effective tax burden is 25.1%. In contrast, if the financing functions re-finances with debt, the interest income is effectively shielded from tax in the function's country of residence. Given that tax legislation generally provides for the deduction of nominal interest expense, the costs of capital even fall below the real market interest rate of 5% and effective marginal tax rates are negative (EMTR: -13.4%). Still, with the financing function re-financed with debt and with the related interest being fully deductible from the income tax base, further local tax parameters of the potential countries of residence become almost irrelevant.

The deduction of interest expenses may, however, be limited by the Dutch thin capitalisation rule as well as several other anti-avoidance provisions. For further details on these rules see section A.2.5 in the appendix.

Given that a group financing function primarily extends intra-group loans (no equity) to affiliated companies, any returns on investment will be received in the form of interest payments. As these interest payments are subject to the arm's length principle, they are closely tied to the market interest rate. As a consequence, only the so-called marginal or ordinary return can be shielded from foreign income tax in the source country of profits. If the investment projects funded by the loans are, however, highly profitable, the excess return, i.e. the return exceeding the ordinary market interest rate, will be fully hit by the foreign income tax. Obviously, the effective tax burden on such highly profitable investment additionally depends on the tax parameters of the source country where profits are generated, and also on the tax regime of

the country in which the recipient of the dividends resides. The tax treatment of dividends received by Dutch entities of a multinational firm has, however, been separately discussed above. As the taxation of potential excess returns is not linked to the Dutch tax treatment of group financing functions, we do not calculate EATR results for this headquarter function, but refer the reader to the above discussion on the taxation of the holding function.

Specific headquarter function III: R&D function (self-developed IP)

Intellectual property is evermore perceived as an important value driver of a company. Moreover, intangibles, e.g. intellectual property rights, are considered as highly mobile assets which can be transferred internationally between the affiliates of a group at low costs. By means of, for example, contract R&D, the holding and exploitation of intangibles can be geographically separated from the affiliates where they have been created. For these reasons, multinational firms are supposed to carefully consider the geographical location of intangibles also from a tax perspective. Locating a group's intangible assets in a low-tax jurisdiction is a potential way to lower the overall tax burden of the firm. First, the return on innovation is generally taxed at favourable rates. Second, licensing the intellectual property rights out to other affiliates may give leeway for the determination of tax-optimal transfer prices and thus offers profit shifting opportunities.

Against this background, many countries have decided to put in place special tax regimes that target the innovative activity of firms. Incentives may relate to the input side of the innovation process, e.g. investment in R&D capacities and development activity, and also to the output side of R&D, in particular intellectual property rights, by taxing income from IP at reduced tax rates.

In the Netherlands, the so-called "Innovation Box" (prior to 2010: "Patent Box") provides an effective tax rate of 5% on the royalties derived from self-developed and patented intellectual property.[13] The decision on whether to opt into this special tax regime is made individually for each qualifying intellectual property right. If the Innovation Box is opted for, all research develop-

[13] The Innovation Box also applies to non-patented intangible assets created from R&D activities for which an R&D certificate was received.

ment costs previously deducted from the corporate tax base have to be recaptured first. Hence, only the income associated with the intellectual property exceeding the research and development costs is then subject to the reduced effective rate of 5%. In contrast to this, the share of IP income equalling the research and development costs is taxed at the ordinary corporate income tax rate.

In addition to royalty income, the Innovation Box also applies to other kinds of income from intellectual property such as proceeds from the sale of finished goods produced based on intangible assets secured by a patent and/or developed with an R&D certificate. In this respect it should be noted that, dependent on the facts and circumstances, not the entire income related to IP is eligible for the 5% effective tax rate, due to the fact that income generated by routine functions such as sales and marketing falls outside the scope of the Innovation Box. This leaves a smaller portion of income subject to the 5% effective tax rate. In practice this generally results in an effective tax rate of 15% to 18% which is still considerably lower than the general corporate income tax rate of 25%. This should, however, be taken into account when interpreting the outcome of this study which assumes that the entire income generated by the R&D function can benefit from the Innovation Box.

In addition to the Innovation Box which relates primarily to the output of corporate innovation in the form of intellectual property, the Netherlands also provide a tax incentive particularly designed to stimulate R&D activity. More specifically, the so-called "R&D deduction" facilitates investment in R&D equipment by providing for an additional 40% tax deduction of qualifying R&D investment expenses.[14]

The Innovation Box, on the output side of the innovation process, can be combined with the R&D deduction, relating to the input side of innovative activity. Under the Innovation Box regime, the initial development costs must be re-

[14] The R&D deduction is also available for current R&D expenditure with the exception of financing expenses, labour expenses and depreciation allowances. Within the scope of this study, which focuses on the taxation of companies, we do not consider the reduction of wage withholding tax for salaries of employees carrying out research and development activities. For further details see A.2.4.1.

captured at the general income tax rate. In contrast, the additional 40% tax deduction for investment expenses related to R&D is not clawed back and thus effectively deductible against the standard corporate income tax rate of 25%.

Any Dutch R&D company investing in the creation of intellectual property is thus faced with altogether four conceivable tax treatments. It might opt for neither of the incentive regimes. Consequently, its investment in self-created intangibles will be subject to ordinary tax treatment. Contrarily, it might opt for only one of the regimes, either on the input side ("R&D deduction") or on the output side ("Innovation Box") of the R&D process. If, for example, the function acts exclusively as an IP holding and contracts out all R&D activity, it will not be eligible for the additional tax deduction. Finally, the R&D function might, if eligible, take advantage of both regimes.

Table 4: Effective tax burdens on innovative activity in the Netherlands (in %), 2012

		(1)	(2)	(3)	(4)
		No tax incentives for R&D	R&D Deduction	Innovation Box	R&D Deduction & Innovation Box
Equity financing	CoC	5.0	2.3	5.0	2.8
	EMTR	0.0	-118.7	-0.7	-77.0
	EATR	18.8	8.6	3.6	-6.6
Debt financing	CoC	3.3	0.8	4.7	2.6
	EMTR	-53.4	-542.3	-6.6	-96.1
	EATR	12.2	2.9	2.3	-7.9

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Table 4 shows the effective tax burdens for each of these four scenarios. Results are again categorized according to whether they refer to equity or debt-financed investment. All main indicators for the effective tax burden, i.e. the cost of capital, the EMTR, and the EATR, are shown for each incentive regime and source of finance considered. Looking at table 4, the available special tax treatments of R&D activity and/or the associated proceeds (columns (2) to (4)

of table 4) come along with substantially reduced effective tax levels as compared to the case with no incentives claimed (column (1) of table 4). **Without special incentives**, the initial investment costs are immediately deducted from the corporate income tax base and the returns on investment, e.g. royalties received, are subject to the ordinary corporate income tax rate of 25%. As shown in column (1) of table 4, the corresponding costs of capital amount to 5% for the case of equity-financing the development. The tax savings associated with the immediate write-off of the intangible assets exactly compensate for the tax burden levied on the ordinary return of the R&D investment. The EMTR is thus 0%. Moreover, costs of capital amount to 3.3% and the EMTR to -53.4% if the R&D function finances with debt. EATR values amount to 18.8% and 12.2% respectively.

We now turn to the two available incentive regimes, analysed separately in columns (2) and (3) of table 4. The **R&D deduction** (see column (2)) substantially increases the present value of depreciation allowances and the associated tax savings. It thus has a particularly pronounced effect on the effective tax burden measures which relate to a marginal investment where the earnings exceed the expenses only slightly. Its impact is less visible in the EATR which supposes a highly profitable investment and is therefore much more driven by the statutory tax rate. After it all, the costs of capital amount to 2.3% and 0.8% respectively for the case of equity and debt-financing. It becomes very much apparent, especially for the case of debt-financing, that the Dutch tax system subsidises investment in R&D activity compared to financial investments. The EMTR show corresponding values of -118.7% and -542.3%. As said before, EATR values are less affected by the deduction and drop to 8.6% (equity-financing) and 2.9% (debt-financing).

Contrarily, the **Innovation Box** is particularly designed to reduce the tax rate on royalty income and other proceeds from innovation. As such, its effect is particularly pronounced for highly profitable innovation projects where earnings exceed the development costs by far and are thus immediately hit by the statutory tax rate. Correspondingly, the EATR drops to 3.6% in the case of equity-financing and to 2.3% in the case of debt-financing the R&D investment.

Both incentive regimes in combination (see column (4) of table 4) evidently lead to the most substantial reduction in the average effective tax rate. Profit-

able investments effectively receive a tax subsidy. This fact is again reflected by the EATR values, which show a negative sign no matter which source of financing is used. A negative EATR value implies that the after-tax net present value of the investment project even exceeds the before-tax net present value. In other words, the minimum required rate of return *before taxes* of an R&D investment project undertaken by the Dutch IP company undercuts the minimum rate of return *after taxes*, i.e. the market interest rate. As a consequence, there may be R&D investment projects which would never be undertaken unless they received the favourable tax treatment. Analogously, the net present values before corporate taxes are higher than the ones after taxation is taken into account.

Specific headquarter function IV: IP function (acquired IP)

Acquired intangible assets are capitalised and may be written off in line with the accounting treatment. Within the scope of our model this results in straight-line depreciation at a rate of 10%. Royalties earned from licensing out acquired intangibles, e.g. patents, are subject to the ordinary corporate income tax rate of 25% as the Innovation Box is generally not available for acquired IP. Under these conditions, i.e. with no specific tax incentives applicable, the costs of capital amount to 7.0% if the acquisition of the patent was financed with equity. The EMTR corresponds to 29.0% and the EATR is slightly lower with a value of 26.4%. In the case of debt-financing the costs of capital are 4.7% (EMTR: -5.9%). The EATR on the total return of a profitable investment is 17.7%. These results are also found in column (5) of table 3.

2.2.2 Ireland

Besides the Netherlands, Ireland is a frequently chosen alternative for the location of HQ services in Europe. The location attractiveness of Ireland, from a pure tax perspective, will be illustrated and discussed in the following. The effective tax levels reflecting the most important features of the Irish tax system are presented by following the same pattern as the analysis of the Dutch tax regime (see table 5). First, we will explain the results for the benchmark investment in a manufacturing affiliate (column (1) of table 5). Furthermore, effective tax burdens on the holding function (column (2)), the financing function (column (3)), the R&D function (column (4)) and the IP function (column

5)) are investigated. There will again be a comparison of results according to the supposed source of financing. The tax burdens are immediately comparable to the results of the Netherlands because the economic parameters used for the computations are the same.[15] This means in particular that again a real capital market interest rate of 5% and an inflation rate of 2% are assumed in the model calculations. Moreover, the rates of economic depreciation for the fixed assets are independent of the investment location.

Benchmark case: Manufacturing affiliate

Column (1) of table 5 shows the results for the Irish benchmark investment in a manufacturing affiliate. The assumption again is that the investment comprises, in equal proportions, industrial buildings, acquired patents, machinery, inventory and an interest-bearing financial asset. As for the Dutch results presented in the previous section, the table shows the values of the three main indicators for the effective tax burdens imposed on the investment. The costs of capital, which in a tax-free world would correspond to the real market interest rate, are raised above this level primarily by the Irish profit tax rate. The Irish tax rate levied on trading income amounts to 12.5%, whereas the rate for non-trading income is 25%.

In an international comparison, the Irish tax base definition, depreciation allowances in particular, is not overly generous. Nonetheless, depreciation still decreases the effective tax burden of Irish companies because Ireland, as most countries, still allows for faster than economic depreciation, effectively leading to a deferral of tax payments into the future. The deferral effectively reduces the present value of the tax burden levied on companies, an effect immediately captured by the effective tax burden indicators used for the purpose of this study.[16] In addition, it must be recognised that the asset bundle considered for the benchmark investment in a manufacturing affiliate also includes a

[15] A detailed comparison of country-specific findings will be separately presented in appendix A of this report.

[16] Intangible assets are depreciated on straight-line basis over 10 years, whereas machinery is depreciated according to the straight-line method over 8 years, i.e. at a rate of 12.5%. Respective economic depreciation instead is modelled to follow declining-balance patterns at rate and 15.35% and 17.5%, respectively for intangibles and machinery.

financial assets which yields non-trading income taxed at 25%. After all, given an assumed real interest rate of 5%, the rate of return which is supposed to be paid out to an equity investor must at least amount to 6.2% before taxes in order to see any investment into the production affiliate being undertaken. Correspondingly, the EMTR is 19.4%. This is higher than the effective tax rate on profitable investment, the EATR, which amounts to 16.2%.

Table 5: Effective tax burden on centralised headquarter functions in Ireland (in %), 2012

		(1)	(2a)	(2b)	(3)	(4)	(5)
		Benchmark Case: Manufacturing function	Holding Function[1]		Financing Function	R&D Function[2]	IP Function
Equity financing	CoC	6.2	6.5		5.5	-0.8	5.9
	EMTR	19.4	23.2		9.8	n/a	14.9
	EATR	16.2	23.2		-	-16.1	13.2
Debt financing	CoC	4.9	5.4	6.5	4.4	-1.4	4.9
	EMTR	-1.2	7.0	23.2	-13.4	n/a	-2.5
	EATR	11.0	18.8	23.2	-	-18.8	8.9

Notes: [1] Column (2b) shows the effective tax burden if the holding re-finances with debt but is subject to binding interest deduction restrictions, i.e. the British thin capitalisation rules.

[2] Effective tax burdens on the R&D function assume that only the R&D tion is taken advantage of as the Patent Box only comes effective from 2013. For a detailed analysis of other scenarios with regard to the tax treatment of innovative activity, see Table 8Table 8.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

The figures discussed so far all refer to an investment which is financed with equity rather than debt. If the investing firm resorts to debt-financing, the differential tax treatment of debt versus equity again comes into effect. Interest expenses reduce the taxable base whereas dividends are paid out of taxed profits. As a result, the effective tax burden on debt-financed investments is considerably lower than in the case of equity-financing. For the Irish bench-

mark investment in a manufacturing affiliate, the costs of capital amount to 4.9%, the EMTR is -1.2% and the EATR is 11.0%.

In the following, the analysis will deal with the tax burden levied on specific HQ services located in Ireland. All results are shown in table 5, columns (2) to (5).

Specific headquarter function I: Holding function

Ireland taxes income on a worldwide basis. Thus, foreign dividends received by Irish companies are fully taxable. If the foreign dividends have been (directly or indirectly) paid out of so-called trading profits[17], the corporate tax rate of 12.5% is applicable. However, a tax credit is granted for foreign withholding taxes and foreign profit taxes charged on the profits out of which the dividends are paid. An "onshore pooling“ system allows companies to pool their tax credits and offset them against the Irish tax liability on their aggregate foreign dividend income. Taking the average combined statutory profit tax rate in the EU-27 of 23.2%[18] and assuming that the Irish holding function considered receives dividends from subsidiaries in all EU Member States in equal proportions, it would find itself in an excess credit position with no further Irish taxes effectively levied on the aggregate of the foreign dividends.

Given an excess credit position, the economic implications of the credit system are comparable to those of an exemption system. Consequently, only the taxation in the source country of profits, i.e. foreign profit tax and for non-EU subsidiaries potentially also dividend withholding tax, drives the effective tax burden of the Irish holding company. Just like for the Dutch case, the wedge introduced between the market interest rate and the minimum required pre-tax rate of return on investment is, in this case, independent of the holding's local tax regime. As shown in column (2) of table 5, the costs of capital of the Irish holding, if re-financed with equity, are identical to those of its Dutch equivalent and amount to 6.5%. The costs of capital of debt-financed investment in foreign shareholdings is 5.4% and thus slightly higher than the result

[17] The prerequisites for the application of the trading income tax rate to foreign dividend income are described in section A.3.2.

[18] See footnote 11.

for the Netherlands. Please note that the interest is assumed to be deductible against the 12.5% tax rate which is the tax rate at which the relating income is taxed. Therefore, the interest tax shield resulting from debt-financing is less valuable for the Irish holdings as compared to that of the Dutch holding which deducts interest against a 25% tax rate. This is reflected in the Irish holding's higher costs of capital of a debt re-financed investment in foreign shareholdings. Yet, in contrast to the Netherlands, interest expenses relating to trading income are generally deductible under the "interest-as-a-charge" provision[19] and are not restricted by thin capitalisation rules.[20] Nevertheless, the loan agreement must be in line with the arm's length principle.

Accordingly, with the assumed real market interest rate to be 5% the Irish holding's EMTR on shareholdings amounts to 23.2% and 7%, respectively, for equity (column (2) in table 5) and debt-financing (column (2a) in table 5) of the holding. As explained above, the EMTR indicates which share of the pre-tax return of an economically marginal investment is taxed away by the government. The higher this relative wedge between pre-tax rates of return and the required after-tax return, equivalent to the capital market interest rate, the smaller the theoretically optimal scale of investment. If the requirements of the "interest-as-a-charge" provision are, however, not met, the effective tax rates equal the rates in case of equity-financing (see column (2b) in table 5).

The EATR instead represents the share of the net present value of a profitable investment which is taxed away. From a theoretical point of view, it should be relevant for the decision where to geographically locate profitable investment, here: the holding activity. The pre-tax rate of return for the computation of the EATR, in the model applied here, is set to 20%. Given this pre-tax return, the EATR is 23.2% (equity-financing) or, respectively 18.8% (debt-financing). Also with regard to the effective tax burden on such profitable holding activity only the foreign taxes are relevant as long as the holding finds itself in an ex-

[19] Interest expenses relating to non-trading income such as foreign dividend income are generally non-deductible. As an exception they may nevertheless deductible under the "interest-as-a-charge" provision. For the prerequisites of the "interest-as-a-charge" provision see section A.3.5.

[20] Interest expenses may, however, not be deductible in the case of intra-group transfers or assets.

cess credit position. This, however, is quite likely given the low Irish tax rate on trading income and the Irish pooling system for tax credits. The Irish profit tax rate against which the associated interest expense is deducted only plays a role if the holding is financed with debt. To conclude, in case of excess credits the difference in effective tax levels observed for an Irish versus a Dutch holding company are rather small. Slightly higher effective tax burdens only result in the case of debt-refinancing because the value of the interest tax shield from financing with debt is lower in Ireland as compared to the Netherlands, where interest is deducted against a tax rate of 25% instead of the Irish 12.5% rate.

For sake of completeness, it should be noted that, in contrast to the Netherlands, Ireland does not levy a withholding tax on dividends in case the parent company is either resident in an EU Member State or a country with which Ireland has concluded a tax treaty and this company is not controlled by Irish residents.

In view of the EU average profit tax rate of 23.2%, we deem an Irish holding company less likely to have excess credits if it receives **dividends paid out of non-trading income**.[21] In this case, the Irish tax rate amounts to 25%. If foreign taxes paid represent a smaller percentage of the underlying foreign profits, taxes will be levelled up to 25% in Ireland. So, if foreign dividends received by the holding function are paid out of non-trading income, the underlying economic non-trading activity is effectively taxed at 25%. This is immediately reflected in the effective tax burden indicators calculated for this case. The costs of capital amount to 6.7% in the case of equity-financing investments in the shareholdings, and to 4.3% if the holding re-finances with debt.

Please note that as in the case discussed above (dividends paid out of trading profits and subject to 12.5%) we assume the associated interest expense to be offset against non-trading income under the "interest-as-a-charge" provision.[22] Thus, the interest expenses shield income which would otherwise be taxed at a rate of 25%. As a result, ordinary returns earned from the share-

[21] Please note that the results for this special case are not shown in Table 5.

[22] For details of the "interest-as-a-charge" provision please refer to section A.3.5.

holdings effectively remain untaxed in the case of debt-financing the Irish holding. The corresponding EMTR is -15% for debt-financing and 25% for equity-financing. The effective tax burden on profitable investment amounts to 25% (equity-financing) and 16.3% (debt-financing). If the interest payments relating to the dividend income may not be deducted under the "interest-as-a-charge" provision, the effective tax rates equal the ones in case of equity-financing.

Specific headquarter function II: Group financing and treasury function

Turning to the financing function, it is again assumed that funds are passed on to affiliates in the form of intra-group loans. Assuming that interest is fully deductible from the profit tax base on the level of the debtor and that no withholding tax is levied, e.g. due to the application of the Interest & Royalty Directive, interest income is only subject to tax in the country of residence of the creditor. More specifically, foreign interest income received by Irish group financing and treasury companies may be considered to be trading income and consequentially taxed at the 12.5% tax rate. This requires that the Irish group financing company is actively and strategically managing business. In other words, it must be responsible for negotiating, monitoring, and securing the finance for the intra-group loans.[23] With these conditions fulfilled, the costs of capital of investment projects financed by the loans passed on to the affiliates are 5.5%. The effective marginal tax rate on investments funded by Irish financing companies correspondingly amounts to 9.8%.

Interest expenses paid at the level of the financing company for debt which has been forwarded to affiliates is fully deductible at the rate of 12.5%. Accordingly, the interest remains untaxed at the level of the financing function and was already deducted in the source country. The EMTR is -13.4% if the financing function takes up debt to channel these funds as loans to its affiliates. Again we do not consider EATR values for the financing function because the return on profitable investments cannot be fully repatriated in the form of interest, but the residual profit must take the form of dividends or capital

[23] According to recent Irish case law, the Ireland based employees must in addition have the relevant skills, expertise, experience and authority to carry out the

gains upon the disposal of the shareholding. Depending on where these pay-outs are taxed, the EATR on the investments co-financed by the financing company would differ.

If, in contrast, the Irish group financing company is not actively managing the intra-group financing and treasury function, the foreign interest income received constitutes non-trading income and is accordingly taxed at a rate of 25%.[24] Taxation in the source country remains irrelevant. As a consequence, the costs of capital of investments generating non-trading income amount to 6.7%. The EMTR is 25.1%. Turning to the case of the financing company taking up debt instead of receiving equity injections, the tax treatment of interest expenses again becomes relevant. According to Irish tax law, interest expense relating to non-trading income is only deductible under the "interest-as-a-charge" provision.[25] In case the requirements of the provision are met, and assuming that the company only generates income subject to the 25% rate against which the interest is deducted, the costs of capital of investments financed by the debt re-financed loans from the finance company amount to 4.4%. Again, the full return is shielded from taxation both at the level of the investing affiliate and the financing company. Interest income is just passed through the financing company. Accordingly, the effective tax rate charged on an economically marginal investment is again -13.4%. If the requirements of the "interest-as-a-charge" provision are not met, interest is not deductible and the effective tax rates for debt-financed investment are equal to the tax rates for equity-financed investment.

Specific headquarter function III: R&D function (self-developed IP)

An R&D company self-creates intellectual property by engaging in R&D activity. The created intellectual property is assumed to be legally protected as a patent. Foreign royalty income earned from licensing out the patents can be

[24] Please note that the results for this special case are not shown in Table 5.

[25] For further details see section A.3.5 .

considered to be trading income and accordingly subject to the 12.5% tax rate.[26]

In Ireland, the expenditure incurred for the development of innovation can be immediately deducted for tax purposes. The immediate write-off of all development costs brings about immediate tax savings given that the costs can effectively be offset against other taxable trading income. These immediate tax savings during the production phase of the patent imply that, in economic terms, the R&D company receives a no-interest loan from the government.[27] The interest saved on that implicit loan effectively lowers the costs of capital. As the implicit loan corresponds exactly to the immediate tax savings from the non-capitalisation of development costs, the interest implicitly saved fully compensates the tax due on the ordinary market return on investment. The effective tax burdens on the creation of intangible assets are shown in column (1) of table 6. The costs of capital equal exactly the real market interest rate of, in our model, 5%, and the effective tax rate on a marginal investment (EMTR) is 0%. If a profitable investment is assumed, the effective tax level goes up to a value of 9.4% because the economic rent earned, i.e. the part of the return exceeding the costs of capital, is directly hit by the statutory profit tax rate of 12.5%.

If the R&D company finances the development of new patents with debt, it additionally benefits from the interest tax shield resulting from the tax deductibility of interest against income. The costs of capital now amount to 4.1%. The Irish tax system thus implicitly promotes investment in R&D by pushing the minimum required pre-tax rate of return on investment below the market interest rate.[28]

[26] We assume that royalties are fully deductible from the profit tax base of the licensee.

[27] The firm's taxable profit in that early period clearly falls short of the true economic profit account for the fact that, economically, the development expenses are capitalised and depreciated over the economic life of the self-created patent. The implicit loan is paid back in later years of useful life when economic depreciation exceeds remaining available tax depreciation allowances.

[28] Please note that interest expenses are only deductible up to 80% of the total royalty income. However, with respect to the marginal investment no general conclusions can be drawn on the effects of this provision.

Table 6: **Effective tax burdens on innovative activity in Ireland (in %), 2012**

		(1)	(2)
		No tax incentives for R&D	R&D Tax Credit
Equity financing	CoC	5.0	-0.8
	EMTR	0.0	n/a
	EATR	9.4	-16.1
Debt financing	CoC	4.1	-1.7
	EMTR	-21.1	n/a
	EATR	5.6	-18.8

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Finally, in case of debt-financing the EMTR turns negative (-21.1%) and thus reflects this type of subsidy. The EATR exceeds the EMTR because the income not absorbed by financing costs and depreciation is fully hit by the statutory tax rate. Still, with a value of 5.6% the effective tax rate even on profitable investment remains very low in the case of debt-financing the R&D activity.

Similar to the Netherlands, the Irish tax system provides for important incentives to engage in R&D activity, i.e. the self-creation of intellectual property. Companies undertaking in-house R&D are granted a **tax credit** equal to 25% of qualifying R&D expenditure.[29] More specifically, for the first EUR 100,000 of R&D expenditure, the tax credit is granted on a volume basis. Thereafter, it is granted on an incremental basis and amounts to 25% of the incremental R&D expenditure, i.e. the difference between current levels of R&D expenditure and baseline expenditure. The baseline figure is set by reference to expenditure incurred in the year 2003. If the R&D activity has been outsourced the tax credit amounts to 5% in case of outsourcing to third-level academic institutions and 10% in case of outsourcing to other non-related parties.

[29] Please refer to section A.3.4.1 for the scope of expenditure qualifying for the Irish R&D tax credit.

The tax credit is generally deducted from the company's corporation tax liability in the year in which the expenditure is incurred. Any excess tax credit may be carried back to the previous period or refunded in future periods on a staggered basis.[30]

The resulting effective tax levels are shown in column (2) of table 6. If the R&D company is eligible for these incentives and makes use of them for its investments in innovative activity, the associated costs of capital do not only fall below the real market interest rate, but they even become negative (-0.8% for equity-financed R&D and -1.4 for debt-financed R&D). In other words, the Irish tax system, taking account of the special incentives it provides, does not only promote investment in R&D by pushing the minimum required pre-tax rate of return on investment below the market interest rate. It even provides for such a strong subsidy that the R&D investment may earn a *negative* pre-tax rate of return and would still be undertaken. Note that for this type of situation, the corresponding EMTRs are no longer interpretable in a meaningful way. Therefore, we do not show the EMTR for R&D activity benefitting from the tax credit regime in Ireland. By contrast, the EATR still yields intuitively interpretable insights. As profitable investments in R&D earn a higher return than required to cover the costs of financing and depreciation, their effective tax burden is particularly driven by the statutory tax rate. However, due to the considerable subsidy on innovative activity in Ireland, EATR on both equity (-16.1%) and debt-financed investments (-18.8%) are negative.

Specific headquarter function IV: IP function (acquired IP)

Royalty payments are generally tax deductible at the level of the licensee. Furthermore, within the European context it is plausible to suppose that the Interest and Royalty Directive applies and, thus, no withholding taxes are charged on royalty payments. As a consequence, royalty income is only subject to tax in the country of residence of the licensor. Similar to interest income received by a financing company, foreign royalty income may be quali-

[30] Yet, the payment is capped by reference to either the sum of payroll taxes arising in the accounting period in which the qualifying expenditure was incurred as well as in the previous accounting period, or the corporation tax paid in the 10 preceding accounting periods.

fied as trading income for Irish tax purposes if certain conditions are met. According to recent case law, for royalty income to qualify as trading income, the Irish IP company which holds and manages the intellectual property to be licensed out must be responsible for the exploitation of the intellectual property. Moreover, the income of a group IP company is considered as trading income if the company is indeed responsible for the worldwide marketing, sale, operation and support of the intellectual property. The Ireland based employees must have the relevant skills to operate these functions.

After it all, the IP company considered here acquires patents and licenses them out with the associated returns taxed at a rate of 12.5%. For tax purposes, patents are depreciated according to the straight-line method over a useful life of 10 years. Resulting effective tax burdens are shown in column (5) of table 5. The IP holding functions investments in patents must earn a minimum pre-tax rate of return of 5.9%. The cost of capital is again lower and amounts to only 4.9% if the acquisition of patents is financed with tax deductible debt. Corresponding EMTR values amount, respectively, to 14.9% and -2.5%. The 14.9% EMTR for the case of equity-financed patent acquisition well reflects the fact that straight-line tax depreciation of the patent over a 10-year period implies a slower depreciation than the model's assumed economic depreciation pattern of intangibles (15.35% declining balance). If tax depreciation was neutral, i.e. matched with the assumed economic depreciation scheme, the EMTR would equal exactly the statutory profit tax rate of 12.5%. The effective tax level on profitable investment amounts to 13.2% in the case of equity-financed acquisitions and goes down to 8.9% in case that tax deductible interest expenses provide for a tax shield.

Abandoning the assumption that the IP function considered meets all requirements for its royalty income to be qualified as trading income, the applicable tax rate is 25%.[31] On the one hand, the higher tax rate increases the present value of tax savings from the depreciation of the acquired patent.[32] On the other hand, a larger share of the royalties received is taxed away. In par-

[31] Please note that the results for this special case are not shown in Table 5.

[32] We assume that depreciation allowances are generally deducted against the 25% tax rate.

ticular, interest expenses relating to foreign royalty income not qualifying as trading income are generally not deductible for tax purposes. The "interest-as-a-charge" provision which is relevant particularly for holding and financing companies does not apply to borrowings used to invest in intangible assets. Accordingly, the tax treatment of equity and debt-financed investment is identical with general non-deductibility of financing expenses. The costs of capital in both cases amount to 7%. The corresponding EMTR value is 29%. The EATR (26.4%) is slightly lower than this EMTR value because the income above what is needed for covering financing costs and depreciation is taxed at a statutory rate of 25%. The relatively slow tax depreciation of patents has less impact on the effective tax burden if returns are supposed to be high, but instead the 25% tax rate becomes the main driver.

2.2.3 United Kingdom

The United Kingdom is clearly the largest among the four economies considered in this study. Despite being one of the largest European economies, in international tax burden comparisons (see e.g. Dressler et al., 2011) the United Kingdom is traditionally ranked top of similarly sized countries, i.e. France, Germany, and Italy. These comparisons generally focus on the taxation of profitable investment in the manufacturing industry.

The effective tax rate on manufacturing activities is also the benchmark referred to in this study. Investment in manufacturing capacities is again specified as investment in a 5-asset bundle which, in equal proportions, consists of industrial buildings, machinery, acquired patents, inventory and an interest-bearing financial asset. The results for the benchmark investment, and also for all other functions considered are displayed in table 7.

Benchmark case: Manufacturing affiliate

Column (1) of table 7 shows the effective tax burden levied on manufacturing firms in the United Kingdom. We first consider the effective tax burden for equity-financed investment. In this case, the costs of capital amount to 7.7%. Correspondingly, the EMTR is 35.4%. The main factors which drive the EMTR above the UK statutory tax rate of 24% are related to the taxation of buildings. Since 2011, buildings are no longer depreciated for tax purposes. Further-

more, a real estate tax (so called business rates) at the rather substantial effective rate of 1.6% is levied.[33] Tax treatment of intangible assets and, in particular, machineries all but reflects the economic returns earned on these assets with, e.g. for the case of machinery, allowable depreciation at declining-balance rates of 18%.[34]

Table 7: Effective tax burden on centralised headquarter functions in the United Kingdom (in %), 2012

		(1)	(2a)	(2b)	(3)	(4)	(5)
		Benchmark Case: Manufacturing function	Holding Function[1]		Financing Function	R&D Function[2]	IP Function
Equity financing	CoC	7.7	6.5		6.6	3.1	6.9
	EMTR	35.4	23.2		24.0	-62.8	27.9
	EATR	29.1	23.2		-	10.7	25.3
Debt financing	CoC	5.4	4.3	6.5	4.4	1.6	4.7
	EMTR	7.8	-15.3	23.2	-13.4	-220.6	-5.6
	EATR	20.3	14.8	23.2	-	4.9	17.0

Notes: [1] Column (2b) shows the effective tax burden if the holding re-finances with debt but is subject to binding interest deduction restrictions, i.e. the British thin capitalisation rules.

[2] Effective tax burdens on the R&D function assume that only the R&D tion is taken advantage of as the Patent Box only comes effective from 2013. For a detailed analysis of other scenarios with regard to the tax treatment of innovative activity, see Table 8Table 8.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Considering the case of debt-financing the investment, the statutory tax rate is no longer an adequate benchmark to be compared with the effective tax levels. The tax deductible interest expense shields the returns on investment

[33] For further details see table 22 in the appendix.

[34] Economic depreciation is assumed to be 17.5% declining-balance.

from taxation, lowering the effective tax burden on the proceeds from marginal investment to a level of 7.8%, corresponding to a cost of capital of 5.4%. However, relative to effective tax rates on debt-financed investments found e.g. for the Netherlands, these levels are not low. Again, the main underlying reason for the high UK tax levels on marginal investment is that especially tax depreciation of buildings falls far short of economic depreciation. Profitable investment, no matter how it is financed, benefits considerably from the statutory tax rate of 24% because the economic rent earned is taxed exactly at the statutory tax rates and available allowances are less of a concern. This results in an EATR of 29.1% for equity-financed investment and a corresponding value of 20.3% for debt-financed investment.

Specific headquarter function I: Holding function

Most profit distributions, including distributions from controlled companies, are exempt from corporation tax in the United Kingdom. Moreover, the Parent-Subsidiary Directive prevents the application of withholding taxes on dividends paid in relation to qualifying EU-shareholdings. Still, profits underlying the dividends paid have been subject to profit tax in the country of source. Accordingly, the cost of capital is predominantly determined by the source country's profit tax burden. In case of dividends received from all 27 EU Member States, the 2012 average statutory profit tax rate[35] amounts to 23.2%.

The effective tax burden on holding functions located in the UK is shown in column (2) of table 7. Just as in the case of the Dutch and Irish holding company, the costs of capital amount to 6.5% if the holding re-finances with equity. The EMTR is thus equal to the statutory rate of 23.2% and, correspondingly, the EATR also amounts to 23.2%. These values are all identical to the results found for the holding companies in the Netherlands and Ireland.[36] This

[35] See footnote 11.

[36] Please recall that the results for Ireland assume that the Irish holding is in an excess credit position because it receives dividends paid out of profits which, on average, have been subject to a higher tax rate than the 12.5% Irish tax rate on trading income. Furthermore, we totally abstract from the tax base definition in the EU source countries of profits earned. Implicitly, the tax base is assumed to be neutral, i.e. to closely reflect true economic profits of the investment projects. This assumption has no impact on the order-

is plausible as the dividends received remain effectively untaxed at the level of the holding also in these countries, either immediately by way of a participation exemption (the Netherlands, UK) or, under certain assumptions, within a credit system in which the holding is likely to find itself in an excess credit position (Ireland).

Results deviate between the three countries if the holding is considered to use debt-financing as a source of funds for equity investment in its shareholdings. This is due to the interest tax shield showing different values according to the tax rate against which interest is deductible. In the United Kingdom, interest is deductible against a tax rate of 24%. The tax rate against which additional interest expense can be deducted is thus higher than the average statutory tax rates on an additional unit of equity income in the source country. The source tax of 23.2%, on average, is thus more than compensated at holding level if debt is used as the marginal source of funds. Consequently, a debt-financed investment has costs of capital of 4.3% (see column (2a) in table 7), ranging below the real market interest rate. The advantage from tax deductible interest expense paid on debt passed on to finance equity investment in the shareholdings is less relevant if the total returns exceed ordinary returns on investment by far. With increasing profitability, the effective tax rate, e.g. the EATR, approaches the statutory tax rate of 23.2% levied, on average across all European source countries, on the profits earned from investment in the shareholdings. For a pre-tax rate of return of 20%, the EATR is 14.8%.

As in the case of the Netherlands, the deduction of interest expenses may be restricted. According to the British "Worldwide Debt Cap" rule, the deduction of aggregate net financing expenses which is available for companies resident in the UK is restricted to the consolidated gross financing expenses of the group.[37] In case the restriction applies the costs of capital and the effective tax rates are equal to the case of equity-financing (see column (2b) in table 7). In contrast to the Dutch thin capitalisation provision, the Worldwide Debt Cap

ing of effective tax levels computed for the four holding locations considered (the Netherlands, Ireland, UK, and Switzerland), as the source countries are assumed to be the same.

[37] For further details on the "Worldwide Debt Cap" provisions see section A.4.5 in the appendix.

rule is not limited to interest on loans provided by related parties but also restricts the deduction of interest paid to third parties including financial institutions. For further details on the Worldwide Debt Cap rule see section A.4.5 in the Appendix.

Finally, it should be highlighted that the United Kingdom does no levy a withholding tax on dividends paid to foreign companies. In contrast to the Netherlands and Ireland this applies irrespective of the residence country of the shareholder receiving the dividend.

Specific headquarter function II: Group financing and treasury function

The effective tax burden on financing functions located in the UK is shown in column (3) of table 7. Similar to the analysis of group financing companies in the Netherlands and Ireland, we assume that the interest paid by the foreign affiliates on the loans passed on to them is fully deductible from their taxable income. Furthermore, no withholding taxes are charged due to the application of the Interest & Royalty Directive. Consequently, the proceeds resulting from the investment financed by the debt claim are only subject to tax in the country of residence of the debtor, i.e. the financing company. The statutory profit tax rates which will apply to the interest income received by a financing company located in the United Kingdom amounts to 24%. Accordingly, the foreign investments funded by the loans from the financing company must at least earn their costs of capital of 6.6% in order to be worthwhile. Expressed in terms of the EMTR, the effective tax level is 24%.

Considering the case that the UK financing company itself takes up loans, instead of receiving equity injections, in order to pass them on to other affiliates, the interest expenses are deductible at the rate of 24%. Accordingly the costs of capital are again 4.4%, just as for all other countries. On the one hand, the interest effectively remains untaxed at the level of the financing company because interest received on the loan and the interest paid to re-finance it cancel out. At the same time, the nominal interest is deductible in the source country and thus shields the ordinary investment returns from tax. The EMTR is thus -13.4% if the financing company taps the capital market to channel

these funds as loans to its affiliates.[38] It should be noted that the deduction of interest expenses incurred by a Financing and Treasury company is not limited by the "Worldwide Debt Cap" rule as such companies are explicitly excluded from the scope of the provision.[39]

Specific headquarter function III: R&D function (self-developed IP)

Again similar to the analysis of R&D companies in the Netherlands and Ireland, the considered R&D function is supposed to engage in research and development activity in order to create patentable intellectual property. The effective tax burden on innovative activity located in the UK is shown in table 8.

Table 8: Effective tax burdens on innovative activity in the UK (in %), 2012

		(1)	(2)	(3)	(4)
		No tax incentives for R&D	R&D Deduction	Patent Box[1]	R&D Deduction & Patent Box[1]
Equity financing	CoC	5.0	3.1	5.0	3.3
	EMTR	0.0	-62.8	0.0	-51.2
	EATR	18.0	10.7	10.1	-2.8
Debt financing	CoC	3.3	1.6	3.3	1.8
	EMTR	-50.2	-220.6	-50.2	-181.8
	EATR	11.7	4.9	2.9	-3.8

Notes: [1] Please note that the Patent Box will be effective (phased-in) from 2013 onwards. It will fully come into effect in 2017. Our calculations anticipate its full impact on effective tax burdens based on 2012 tax parameters.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

[38] Again we do not consider EATR values for the financing companies because the return on profitable investments cannot be fully repatriated in the form of interest, but the residual profit must take the form of dividends or capital gains upon the disposal of the shareholding. Depending on where these payouts are taxed, the EATR on the investments co-financed by the financing company differs.

[39] See section A.4.5 in the appendix for further details.

The proceeds generated from licensing out the patent to other affiliates of the group will be subject to tax only in the country of residence of the licensor, i.e. the R&D company, because royalty payments are deductible from the profit tax base of the foreign licensee. Expenditure incurred for the development of the patent can be deducted immediately. If besides this implicit incentive no further advantageous tax regimes related to innovative activity are used, the costs of capital amount to 5% (assuming equity-financing of R&D). The tax savings associated with the immediate write-off of the intangible assets exactly compensate the tax burden levied on the ordinary return of the R&D investment (see column (1) of table 8). The EMTR is thus 0%. The EATR is again above this level because effective tax levels increase and approach the statutory profit tax rate with increasing rates of return. For a pre-tax rate of return of 20%, the EATR on R&D investment amounts to 18%. If, in addition, the R&D company takes up loans to finance its innovative activity, the interest tax shield reduces the costs of capital further to the level of 3.3%. The respective effective marginal tax rate thus amounts to -50.2%. The EATR for debt-financed but highly profitable R&D activity, again without taking advantage of specific tax incentives, is 11.7%.

In addition to an immediate one-time write-off for the development costs, the UK tax system offers substantial incentive regimes aiming at fostering innovative activity. These incentives relate both to the input side of the R&D process and to its output in the form of intellectual property. We start the in-depth analysis of these regimes by taking a look at the input side of innovation. In 2012, UK R&D companies may deduct an additional 30% of revenue expenditure for qualifying R&D from their profit tax base (**super deduction**). Qualifying revenue expenditure comprises employee costs, materials, utilities, and software. Capital allowances, however, do not qualify for the 30% R&D deduction. The effective tax burden on innovative activity benefitting from the super deduction is shown in column (2) of table 8. Assuming that the R&D costs incurred for the creation of the intangible asset consist of the eligible types of expenditure mentioned above, the cost of capital drop to a value of 3.1% (EMTR: -62.8%) for the case of equity-financing. This is because the tax savings from the super deduction which, according to the assumptions of the methodological framework adopted in this study, are immediately and fully deductible against income otherwise subject to tax at a rate of 24%, effectively

reduce the present value of the development costs. Accordingly, the pre-tax returns which must be earned for the investment to break even decrease to values below the real market interest rate. Even equity-financed innovation activity is thus subsidised by the tax system. If the R&D firm used debt to finance the R&D activity, the additional interest deductions with their associated tax shield further decrease the costs of capital to 1.6% (EMTR: -220.6%). The tax levels on profitable investment (i.e. EATR) amount to 10.7% and 4.9%, respectively, for debt and equity-financing.

In 2013 a **Patent Box** regime is supposed to be introduced in the United Kingdom which provides for an effective corporate tax rate of 10% for so-called qualifying residual profits derived from, inter alia, the licensing or sale of patent rights and the use of patented inventions in the company's trade.[40] Hence, the scope of the proposed Patent Box is comparably wide. It is not limited to royalty income but includes profits derived from the sale of qualifying patented invention or products incorporating qualifying invention as well as profits derived from the use of the patented invention in the company's trade.[41]

Yet, determining the share of the company's profits which finally qualifies for the Patent Box requires a three-step-procedure. Within the scope of the last step a return to marketing assets is deducted. The determination of this figure is at the discretion of the taxpayer. Yet, it must reflect the actual facts and circumstances and must meet arm's length requirements.[42] Though, under the small claims treatment the return to marketing assets correspond to 25% of qualifying residual profit which is the result of the second step of the calculation.[43] Consequentially, for the purpose of this study we determine the effective tax rate under the Patent Box regime applying to royalty income as

$$\tau_{PB} = 0.75 * 10\% + 0.25 * \tau_{Regular} = 7.5\% + 0.25 * 24\% = 13.5\%$$

[40] For details see section A.4.4.1.

[41] See HMRC, The Patent Box: Technical Note and Guide to the Finance Bill 2012 clauses, 2012, p. 8. Feedback from practitioners in the UK indicates that independent of the applicability of the small claims treatment, a return to marketing assets of 25% of residual profits would be a good first approximation.

[42] See footnote 41, p. 50-57.

[43] See footnote 41, p. 48-50.

The Patent Box will phase in over a period of four years during which qualifying profits are only partially subject to the Patent Box tax rate (60% in 2013, 70% in 2014 and so on). The application of the Patent Box requires that the company has undertaken "qualifying development by making a significant contribution to the creation or development of the invention claimed in the patent or a product incorporating this item."[44] Hence, the Patent Box is generally not available for contract R&D. Nevertheless, the company can qualify for the Patent Box with respect to a patent generated by an affiliate in case the company takes a significant role in managing the research & development activities and managing the qualifying rights created in the course of this activity.

While the Patent Box will apply no earlier than from 2013 onwards, we still analyse its effect in the following. To capture its effect on the effective tax burden on R&D activity, we hold all other tax parameters constant at 2012 levels. We compute the Patent Box effects assuming that it is fully phased in, i.e. that it applies to 100% of the "relevant intellectual property profits"[45]. It must be highlighted, that financing expenses (and financing income) are not taken into account when determining the profits that are taxed under the Patent Box.[46] Hence, interest expenses are deductible from income which is subject to the ordinary corporate tax rate of 24% unless other restrictions apply.

The effective tax burden on self-developed patents which fall under the Patent Box is depicted in column (3) of table 8 assuming that the Patent Box already fully becomes effective in 2012. Equity-financed production of intellectual property shows costs of capital of 5% under this special regime (EMTR: 0%). Taxation of the marginal return on self-created patents is thus fully avoided under the Patent Box. Given that the Patent Box provides for a quite favourable tax treatment of proceeds from innovation, it might seem surprising at first glance that the costs of capital do not fall below the real market interest

[44] Footnote 41, p. 9.

[45] The "relevant intellectual property profits" are the result of the three-step procedure to determine the amount of profits which are taxed under the Patent Box. For further details see section A.4.4.1 in the appendix.

[46] A routine return equalling 10% of expenses is deducted in order to derive the qualifying residual profit. This does, however, exclude R&D expenses.

rate. It must be recognised, however, that the effect from low taxation of patent returns is, at the margin, offset by the reduced tax savings from the immediate write-off which, under the Patent Box regime, is only deductible against the reduced tax rate of effectively 13.5% (taking into account a lump-sum deduction for the return to marketing assets). The generous tax treatment of self-created intangibles under the Patent Box is much more unveiled if highly profitable patents are considered. In this case, the low tax on patent returns more than outweighs the decreased tax value of the immediate write-off of development costs. The EATR thus falls from a value of 18% for the case of no tax incentives used to 10.1% if the Patent Box is taken advantage of. Considering the case of debt-financed development of intangible property, effective tax burdens again decrease relative to the equity-financed pendant. Given that interest expenses can be immediately deducted against the 24% ordinary tax rate, the interest tax shield, in contrast to the non-debt tax shield provided by the immediate write-off of development costs, maintains its full value even under the Patent Box. It thus significantly drives down the costs of capital to a level of 3.3% (EMTR: -50.2%). The EATR on the total return on intellectual property which has been self-created, using debt as source of funds, amounts to 2.9%. This low value reflects the combined effects from immediate write-off, the full tax deductibility of interest, and the low profit tax rate under the Patent Box.

So far, the UK R&D deduction and the Patent Box were analysed and discussed separately. However, both incentives are complementary and can be combined. Their joint effect on effective tax burdens thus has to be considered as well. The resulting effective tax burden is shown in column (4) of table 8. Assuming that the R&D company has sufficient profits to offset the super deduction and full development costs against, the costs of capital of equity-financed creation of intellectual property in the UK amount to 3.3% (EMTR: -51.2%). As the effects of the Patent Box are almost negligible for marginal investments in intellectual property, there is no big difference between the costs of capital or, respectively, the EMTR of intellectual property production benefitting from the R&D deduction only or, in addition, also from the Patent Box. This also holds true for the case of debt-financing where costs of capital are 1.8% (EMTR: - 181.8%) if both incentives are used, relative to 1.6% if only the R&D deduction is applied. As can be expected, the joint effect of the tax

incentives is the more pronounced the higher the return on innovation. Given that the beneficial tax treatment of the Patent Box adds to the favourable tax base definition effect of the super deduction, the EATR drops to 2.8% and -3.8%, respectively, for equity and debt-financing. A negative effective average tax rate implies that the subsidies provided by the tax system more than outweigh the taxes collected on profits earned. Negative effective average tax rates are much less frequently observed than negative effective tax rates on marginal investment, given that the latter only earn minimum returns and produce no economic rents which can be taxed away. After all, the UK tax system provides for such strong incentives that the net present value of profitable investment in intellectual property is increased, not reduced, by the tax system.

Specific headquarter function IV: IP function (acquired IP)

Acquired intangible assets are capitalised and may be written off in line with the accounting treatment. Within the scope of our model this results in straight-line depreciation at a rate of 10%. Royalties earned from licensing out the acquired intangibles, e.g. patents, are subject to the statutory tax rate of 24% as the Patent Box is generally not available for acquired IP. Under these conditions, i.e. with no specific tax incentives applicable, the costs of capital amount to 6.9% if the acquisition of the patent was financed with equity. The EMTR corresponds to 27.9% and the EATR is slightly lower with a value of 25.3%. In the case of debt-financing the acquisition of the IP, costs of capital are 4.7% (EMTR: -5.6%). The EATR on the total return of a profitable investment is 17%. These results are also found in column (5) of table 7.

2.2.4 Switzerland

2.2.4.1 Taxation of companies with commercial activity in Switzerland

Besides the Netherlands and Ireland, Switzerland is another particularly renowned location for HQ functions to be executed within multinational firms. In particular, favourable holding tax regimes have attracted numerous holding companies to the many cantons offering low effective tax rates. In particular, when discussing the Swiss tax system it must be recognised that the Swiss cantons have considerable discretion in the design of their respective tax poli-

cies. While federal income tax is levied at a rate of 8.5%, the Swiss cantons have a certain leeway with respect to the taxes levied on the cantonal and municipal level. While for income tax purposes, the tax base definition is largely harmonised between the cantons and the Swiss federal profit tax, the cantons can still set the tax rates for the cantonal and municipal income tax. The cantons have the option to set a headline tax rate to which cantonal and also municipal multipliers are applied. In these cases, the tax rates do not only vary between cantons but also within cantons, i.e. between the municipalities of the same canton. In an increasing number of cantons, however, a global tax rate on profits has been introduced, constituting the total profit tax liability at the cantonal and municipal level. Furthermore, it is in the cantons' discretion to set the net wealth tax rates. In any case, all income taxes as well as cantonal net wealth tax are deductible as a business expense when determining the income tax base.

As the assessment of the tax regime of all 26 Swiss cantons would clearly be beyond the scope of this study, we will restrict the focus of the analysis to the supposedly most established and, in terms of absolute numbers, most important Swiss location for HQ functions: the Canton of Zug. Before we plunge into the analysis of Zug's tax regime for specific HQ functions, we again discuss the effective tax burden levied on a rather standard manufacturing affiliate which employs five different assets: industrial buildings, machinery, acquired patents, inventory and an interest-bearing financial asset in equal proportions.

Benchmark case: Manufacturing affiliate

Table 9 shows the results for the benchmark investment in a manufacturing affiliate in the Canton of Zug. Given a combined statutory profit tax rate of 15.11%, including both the federal profit tax and the profit tax at cantonal and even at municipal[47] level, plus rather favourable Swiss depreciation rules for fixed assets (see tables 24 and 25), and a non-profit tax levied on the compa-

[47] The municipality considered is the cantonal capital of the canton of Zug, which is Zug.

nies' equity at an effective rate of 0.06%,[48] the costs of capital of an equity-financed investment in a Zug manufacturing affiliate combining the five assets listed above amount to 5.9%. As interest expense is fully tax deductible in Switzerland at all levels, the minimum required pre-tax rate of return drops to 4.6% if the company financing its investment with debt rather than equity. The EMTR values correspondingly amount to 15.2% and -9.1%. The effective tax burden on profitable investments, the EATR, instead amounts to 15.1% (equity-financed) and 9.6% (debt-financed).

Table 9: Effective tax burden on centralised headquarter functions in Switzerland (Canton of Zug) (in %), 2012

		(1)	(2)	(3)	(4)	(5)
		Benchmark Case: Manufacturing function	Holding Function	Financing Function	R&D Function	IP Function
Equity financing	CoC	5.9	6.6	5.9	5.0	5.6
	EMTR	15.2	24.2	14.7	0.0	11.1
	EATR	15.1	23.5	-	11.3	14.0
Debt financing	CoC	4.6	6.5	4.4	3.9	4.3
	EMTR	-9.1	23.2	-13.4	-26.6	-16.1
	EATR	9.6	23.2	-	6.9	8.4

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW

Specific headquarter function I: Holding function

In Switzerland, dividend income received from substantial participations is indirectly exempt from federal income tax as well as income tax at the cantonal/municipal level by way of the so-called participation relief mechanism. More specifically, the participation relief is deducted from the corporate in-

[48] The statutory tax rate is 0.05%. However, with cantonal and municipal multipliers applied and also taking into account the deductibility of the capital tax payments from the profit tax base, the effective rate is 0.06%. See footnote 88 in the appendix.

come tax liability. It amounts to the profit tax burden applying to the proportion of net participation income to total net income. As participation income is defined on a net basis, a proportional amount of financing expenses, administrative expenses, and, potentially, non-refundable withholding taxes can be deducted. The participation relief mechanism and all related regulations, e.g. governing the apportionment of costs related to the participation income, are supposed to apply equally in all cantons.[49]

As a consequence, assuming a Zug based holding company there will be no taxation of dividends received from its foreign shareholdings at the level of the holding itself. Nonetheless, the profits out of which the dividends have been paid have previously been subject to corporate profit tax in the respective country of source. The effective tax burden on holding functions located in the Swiss canton of Zug is shown in column (2) of table 9.

Again assuming that dividends are received out of investment activity in all 27 EU Member States in equal proportions, the statutory tax burden levied, on average, on the underlying profits amounts to 23.2%. The costs of capital amount to 6.6% if the holding re-finances with equity. The EMTR is thus 24.2% and the EATR amounts to 23.5%. These values are almost identical to the results found for the holding companies in the Netherlands, Ireland and the United Kingdom.[50] This is plausible as the dividends received remain effectively untaxed at the level of the holding also in these countries, either immediately by way of a participation exemption (the Netherlands) or, under certain assumptions, within a credit system in which the holding is likely to find itself in an excess credit position. The slightly higher values for the case of Switzerland are due to imposition of a net wealth tax at a rate of 0.06% levied on the net wealth which also comprises participations in other companies.

For sake of completeness, it has to be pointed out that in contrast to the United Kingdom (and Ireland), Switzerland levies a withholding tax on divi-

[49] For the requirements of the participation relief mechanism on the federal level as well as the cantonal level in the Canton of Zug see section A.5.2.

[50] Please recall that the results for Ireland assume that the Irish holding is in an excess credit position because it receives dividends paid out of profits which, on average, have been subject to a higher tax rate than the 12.5% Irish tax rate on trading income.

dends distributed by the holding company to its ultimate parent company. Moreover, compared to the Netherlands the withholding tax rates stipulated in tax treaties are generally slightly higher. As the analysis focuses on the taxation at the level of the holding function, this is, however, not taken into account.

Furthermore, results deviate between the three countries if the holding is considered to use debt-financing as a source of funds for investment in its shareholdings. This is due to the interest tax shield showing different values depending on the tax rate against which interest is deductible. In the Netherlands and the United Kingdom, interest is deductible against a rate of 25% or 24%, respectively, unless special anti-avoidance provisions apply, whereas in Ireland it is generally deductible against 12.5% if relating to dividends paid out of trading income. Given the same tax burden levied on the shareholdings at source, the Dutch and British effective tax burdens fall below the Irish. In the Swiss case, however, the situation is different. Here, the participation exemption only applies to net dividend income and associated interest expenses are effectively non-deductible. As a result, the effective profit tax burden on a Swiss holding is independent of its source of financing. Yet, debt is deductible when determining the tax base of the wealth tax levied in the Canton of Zug. Hence, in case of debt-financing the costs of capital amount to 6.5% in contrast to 6.6% if the investment is financed with equity. Accordingly, debt-financing also results in lower EMTR and EATR than equity-financing.

Finally, as in the case of the Netherlands and the United Kingdom, Switzerland limits the deduction of interest payments in the case of excessive debt-financing. The maximum allowable debt from related parties varies for different kinds of assets. In case of substantial participations debt-financing may not exceed 70% of the market value of the participation. For further details see section A.5.5 in the appendix.

If the Dutch, British and Swiss anti avoidance provisions indeed deny the deduction of interest expenses, the costs of capital and the effective tax rates are equal in all three countries. In this case, only Ireland stands out as it does pro-

vide an interest deduction restriction aimed at limiting excessive debt-financing.[51]

Specific headquarter function II: Group financing and treasury function

The effective tax burden on financing functions located in the Swiss Canton of Zug is shown in column (3) of table 9. According to plausible assumptions, i.e. full tax deductibility of interest in all source countries and non-applicability of withholding taxes due to the Interest & Royalty Directive, the proceeds resulting from the debt claims against foreign subsidiaries are only subject to tax in the country of residence of the financing company. As explained above, the combined statutory profit tax rates which will apply to the interest income received by a financing company located in the Canton of Zug amounts to 15.11%. Accordingly, the foreign investments funded by the loans provided by the financing centre must at least earn their costs of capital of 5.9% in order to be worthwhile. Expressed in terms of the EMTR, the effective tax level is 14.7%. As for the cases of the Netherlands, Ireland and the United Kingdom, respective values for the case of debt-financing the funds extended to affiliates are 4.4% (costs of capital) and -13.4% (EMTR).

Group financing and treasury services may be subject to special cantonal tax regimes, namely the holding company regime and the domiciliary/ mixed company regime, which are characterised by a reduction of the cantonal/municipal income tax rates applying to foreign source income. These regimes are addressed in section 2.2.4.2.

Specific headquarter function III: R&D function (self-developed IP)

The effective tax burden on R&D functions located in the Swiss Canton of Zug is shown in column (4) of table 9. Again similar to the analysis of R&D companies in the Netherlands, Ireland, and the UK, the considered R&D function is supposed to engage in research and development activity in order to create patentable intellectual property. The proceeds generated from licensing out

[51] Loan agreements must, however, be in line with the arm's length principle. Moreover, interest relating to intra-group transfers of assets may not be deductible.

the patent to other affiliates of the group will be subject to tax only in the country of residence of the licensor, i.e. the R&D company, because royalty payments are deductible from the profit tax base of the foreign licensee. Expenditure incurred for the development of the patent can be immediately deducted. Just like in the case of the Irish and the British R&D company, the costs of capital amount to 5%, i.e. the real market interest rate. The tax savings associated with the immediate write-off of the intangible assets exactly compensate the tax burden levied on the ordinary return of the R&D investment.[52]

If, in addition, the R&D company takes up loans to finance its innovative activity, the created interest tax shield reduces the costs of capital further to the level of 3.9%. The respective effective marginal tax rate thus amounts to 0% for the case of equity-financing and it even turns negative for debt-financing (-26.6%). If the returns from innovation exceed the costs of capital and the R&D investment thus is profitable, effective tax levels approach but remain below the combined statutory tax rate of 15.11%. The effective average tax levels do not reach statutory tax burdens due to the favourable effects from the immediate write-off, and, in case of debt-financing, also the interest tax shield. They amount to 11.3% and 6.9%, respectively for equity and debt-financed R&D activity.

Specific headquarter function IV: IP function (acquired IP)

In analogy to the analysis of IP functions located in the Netherlands, Ireland and the United Kingdom, the IP company considered is supposed to acquire patents to hold and manage them. In particular, patents are licensed out to other affiliates of the group. The effective tax burden on IP holding functions located in the Swiss Canton of Zug is shown in column (5) of table 9. Again, the royalty income earned from this activity is subject to tax only at the level of the IP holding itself, i.e. the licensor. This is due to the fact that withholding taxes are assumed to be non-existent, e.g. due to application of the Interest &

[52] Besides this implicit tax incentive for R&D activities, Switzerland only offers a provision for future R&D expenditure. This measure is, however, not taken into account in the calculations.

Royalty directive and that royalties are usually tax deductible at the level of the licensee. The combined statutory tax rate levied on the royalty income received by the Zug based IP company is 15.11%. Depreciation of intangible assets in Switzerland follows a declining balance scheme at a generous rate of 40%. Again, the acquired patents have to generate at least an after-tax return equal to the capital market interest rate. The pre-tax rate of return which must at least be earned if the investment is supposed to take place thus amounts to 5.6% (EMTR: 11.1%) in the case of equity-financed patent acquisitions. The costs of capital are 4.3% (EMTR: -16.1%) in the case of debt-financing. In particular, the very generous depreciation pattern drives the effective tax rate on marginal investments in intangibles down to comparably low levels. The depreciation schemes in the Netherlands and Ireland are considerably less generous, whereas the Swiss tax law allows for a rate of tax depreciation which is much higher than what is supposed to be the rate of economic depreciation of the patent. The resulting positive interest effects are reflected in low effective marginal tax burdens. Moreover, the effective tax burden on profitable patent investment remains comparably low due to the very moderate combined statutory tax rate applicable in the Canton of Zug. The EATR is 14.0% if the patent investment is equity-financed. It is 8.4% if the IP function resorts to debt-financing of the patent acquisitions.

The exploitation and management of intellectual property may be subject to special cantonal tax regimes, namely the holding company regime and the domiciliary/ mixed company regime. These regimes are addressed in the following.

2.2.4.2 Cantonal tax regimes

The Swiss cantons provide for several tax regimes aimed at attracting headquarter services, namely the holding company regime, the domiciliary company regime, and the mixed company regime. These tax regimes comprise reduced income and net wealth taxes on foreign income and mainly do not require any substance in Switzerland. On the contrary, especially the application of the holding company and the domiciliary company regimes even precludes commercial activity in Switzerland whereas under the mixed company regime companies may carry on commercial activity in Switzerland to a limited

extent. Hence, the cantonal tax regimes mainly aim at attracting paper profits. The basic features of these regimes are equal in all Swiss cantons.

Cantonal holding company regime

Holding companies may benefit from the holding company regime available at the cantonal level. In order to qualify for the holding company regime the company's main purpose must be – according to statutory charter of incorporation – the long-term management of participations which involves that the company holds at least one substantial participation.[53]

The application of the holding company regime precludes any commercial activity in Switzerland. Yet, in addition to the holding of participations certain other activities are permissible as secondary aims of the company if they are of minor importance compared to the holding of participations. These comprise i.a.:

- management and administration activities related to the participations,
- group auxiliary services,
- the governance of group companies,
- and the mere holding of intellectual property.

In case the requirements for the holding company regime are met, the company is fully exempt from income tax at the cantonal and municipal level. The tax exemption covers all foreign income earned by the holding company qualifying for the holding company regime.[54] Consequentially, in addition to dividend income which already benefits from the participation relief mechanism addressed above service fees for management, administration and auxiliary services which constitute relevant kinds of income generated by holding companies are of importance. Assuming that such fees are fully deductible from the base of corporate income tax levied in the country of source and further-

[53] For detailed information on the requirements of the holding company regime see section A.5.2.

[54] With the exception of income for which treaty relief is effectively obtained meaning that the tax treaty relief is not waived.

more not subject to withholding tax at source only the federal income tax is decisive. Besides this, companies qualifying for the holding company regime are subject to a reduced effective net wealth tax rate of 0.0025% instead of 0.06%.[55]

Table 10 shows the results for the headquarter functions under the application of the holding company regime. Only genuine research and development activities do not qualify for the holding company regime. The exploitation of IP only qualifies if this does not require commercial activity in Switzerland.[56] For the holding function the lower effective wealth tax burden under the holding company regime results in a small decrease of the costs of capital from 6.6% (column (2), table 9) to 6.5% (column (1) table 10). However, this only holds true in the case of equity-financing.

Table 10: Effective tax burden under the holding company regime in Switzerland (Canton of Zug) (in %), 2012

		(1)	(2)	(3)	(4)	(5)
		Holding Function	Financing Function	R&D Function	IP Function	Auxiliary services
Equity financing	CoC	6.5	5.2	-	5.3	5.4
	EMTR	23.2	3.9	-	5.0	7.8
	EATR	23.2	-	-	7.1	7.8
Debt financing	CoC	6.5	4.4	-	4.7	4.7
	EMTR	23.2	-13.4	-	-7.1	-7.1
	EATR	23.2	-	-	4.2	4.4

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

[55] In order to determine the effective net wealth tax rate the deductibility of the net wealth tax from the corporate income tax base is taken into account. See footnote 88 in the appendix.

[56] See section A.5.2.

Whereas the effect of the holding company regime on the holding function is limited to the lower net wealth tax burden, the costs of capital of the financing function, the IP function as well as auxiliary services is significantly lower than under the general tax provision. This is mainly due to the fact that the effective federal income tax amounting to 7.8% under the holding company regime is considerably lower than the combined income tax of 15.1%. Consequentially, for the financing company the effective marginal tax rates are 3.9% (column (2) in table 10) instead of 14.7% (column (3) in table 9). Accordingly, the effective marginal tax rates of the IP function are reduced from 11.1% to 5% (column (4)). Moreover, the favourable taxation under the holding company regime is also available with respect to income from auxiliary services (column (5)). Hence, a considerably lower combined effective income tax rate of 7.8% applies instead of the general rate of 15.1%. In line with this, the effective average tax rates are reduced significantly for the financing function, the IP function and the rendering of auxiliary services compared to the general tax regime (see table 9) rendering Switzerland an even more attractive location for these headquarter services. The holding company regime is, however, only available to financing functions and the exploitation of IP if these activities are of minor importance compared to the long-term management of participations.

Finally it should be noted that in case of debt-financing, the application of the holding company regime even results in an increase of the effective tax rates applicable to the IP function from -16.6% (EMTR) and 8.4% (EATR) (see column (4), table 9) to -7.1% (EMTR) and 4.4% (EATR) (column (4) in table 10). The reason for this is the lower value of the interest shield due to the exemption from cantonal income tax under the holding company regime.

Cantonal domiciliary/mixed company regime

Although the holding company regime extends to financing and treasury services, the exploitation of IP, and auxiliary group services, it first and foremost applies to holding companies due to the requirement that the company's main purpose must be the holding and management of participations and any other activities including the previously mentioned ones must be of minor importance. Yet, the domiciliary and the mixed company regime are available at the cantonal level irrespective of the nature of the activity.

Both tax regimes comprise that net-income from qualifying participations[57] is fully exempt from income tax levied in the canton whereas other foreign-source (net) income such as fees for group services are taxed at the general cantonal income tax rates but only to the extent that the income can be attributed to the management activities of the company.[58] If the company does not have any activity in Switzerland, namely no employees and no offices, foreign-source income such as service fees for management, administrative and auxiliary services as well as interest and royalty income is fully exempt from cantonal and municipal income tax. In all other cases the foreign-source income is partly taxed at the cantonal level depending on the extent of the business activity performed in Switzerland.

The differentiation between the domiciliary company status and the mixed company status results from the fact that a "domiciliary company" may not perform any commercial activity in Switzerland whereas a "mixed company" is allowed to derive up to 20% of its total income from Swiss sources.[59] Within the scope of this report we focus on companies with a certain extent of activity in Switzerland comprising employees and offices in contrast to pure letterbox companies. Nevertheless, we discuss the tax consequences of the domiciliary company regime as it constitutes one extreme at the scale to which extent to which foreign source income is subject to tax in Switzerland: at 0% under the domiciliary company regime and at 10%, 15%, 20% or 25% (depending on the extent of business activity in Switzerland) under the mixed company regime.

[57] The definition of a qualifying participation is analogous to the participation exemption relief.

[58] For the purpose of this provision the scope of the management activity in Switzerland is mainly determined based on the number of employees. Accordingly, only 10% of the foreign income (other than income from qualifying participations) is subject to income tax on the cantonal level in case of less than 6 employees, 15% in case of 6 to 10 employees, 20% in case of 11 to 30 employees and 25% in case of more than 30 employees. In case persons with seat or domicile in Switzerland hold a qualifying participation in the company, the proportion is increased by 10 percentage points but only up to 25%. With respect to foreign income exceeding CHF 200 million the allocation is generally 10%. Foreign income up to CHF 200 million is included according to the above mentioned proportions.

[59] Some cantons furthermore require that only up to 20% of the overall expenses are of Swiss origin. As pointed out in A.5.2 the canton of Zug does not strictly require this.

In case of debt-financing both tax regimes require that interest is apportioned to the different kinds of income which are subject to differing tax treatment (income from substantial participations, other Swiss-source income and other foreign-source income). This may be done based on the book value of the respective assets. Consequentially, interest expenses relating to foreign source income which is only partially subject to the cantonal income tax are only deductible at the same proportions.

Finally, both tax regimes also comprise a reduction of the net wealth tax. Hence, in the Canton of Zug the effective net wealth tax rate[60] is 0.0095% under the domiciliary company regime whereas the mixed company regime is characterised by a slightly higher effective tax rate of 0.0126%.[61]

Table 11: Effective tax burden under the domiciliary company regime in Switzerland (Canton of Zug) (in %), 2012

		(1)	(2)	(3)	(4)	(5)
		Holding Function	Financing Function	R&D Function	IP Function	Auxiliary services
Equity financing	CoC	6.5	5.2	-	5.3	5.4
	EMTR	23.4	3.9	-	5.2	7.8
	EATR	23.2	-	-	7.1	7.8
Debt financing	CoC	6.5	4.4	-	4.7	4.8
	EMTR	23.2	-13.4	-	-7.1	-3.4
	EATR	23.2	-	-	4.4	5.1

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Table 11 shows the results for the domiciliary company tax regime which requires that the company neither has employees nor offices in Switzerland. Accordingly, foreign income is not taxed at the cantonal/municipal level but

[60] See A.5.2.

[61] For the determination of the net wealth tax see footnote 88 in the appendix.

only subject to federal income tax. The only difference compared to the holding company regime is the slightly higher net wealth tax burden due to a higher effective net wealth tax of 0.0095% (Canton of Zug) under the domiciliary company regime compared to 0.0025% (Canton of Zug) for companies qualifying for the holding company regime. Consequentially, as shown in table 11 the domiciliary company regime results in only slightly higher tax burdens for equity-financed investments than the holding company regime. As the net wealth tax burden is zero in case of investment financed with debt, the results are even equal for debt-financing.

In contrast to this, the mixed company regime is available if the company has employees and offices in Switzerland. Yet, the share of Swiss-source income (and expenses) may not exceed 20% of the overall income.[62] The maximum share of foreign-source income other than dividends included in the cantonal income tax base is 25% in case of more than 30 employees. In combination with the federal income tax rate this results in an effective income tax rate of 9.8% in the Canton of Zug instead of 7.8% under the domiciliary company regime (and the holding company regime). Furthermore, the effective net wealth tax is 0.0126% and thereby slightly higher than under the domiciliary company regime.

Yet, this affects the costs of capital as demonstrated by table 12 only to a limited extend. Hence, the mixed company regime is hardly inferior to the domiciliary company regime in terms of the effective tax burden but much more flexible as it allows for a limited extent of business activity in Switzerland. Consequentially, the mixed company regime significantly further increases Switzerland's attractiveness as a location for genuine business activity as well as profits. This especially holds true for the financing function and the IP function. Assuming the case of equity-financing, the effective marginal tax rates of the financing function are reduced from 14.7% (column (3) in table 9) to 7.1% (column (2) table 12). In turn, for the IP company the mixed company regime is associated with effective tax rates of 6.5% (EMTR) and 8.9% (EATR) (column (4) in table 12), whereas the tax rates amount to 11.1% and 14.0% (column (5) in table 9) under the general tax system.

[62] See section A.5.2 on the requirements of the mixed company regime.

Table 12: Effective tax burden under the mixed company regime in Switzerland (Canton of Zug) (in %), 2012

		(1)	(2)	(3)	(4)	(5)
		Holding Function	Financing Function	R&D Function	IP Function	Auxiliary services
Equity financing	CoC	6.5	5.4	5.0	5.3	5.5
	EMTR	23.4	7.1	0.0	6.5	9.8
	EATR	23.2	-	7.3	8.9	9.8
Debt financing	CoC	6.5	4.4	4.3	4.6	4.8
	EMTR	23.2	-13.4	-15.7	-9.2	-4.4
	EATR	23.2	-	4.3	5.4	6.4

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

In the case of the R&D company the mixed company regime only affects the tax burden of profitable investment resulting in a reduction of the effective average tax rate from 11.3% (see column (4) in table 9) to 7.3% (see column (3) in table 12). In contrast to this, equity-financed marginal R&D investments are generally unaffected by taxation due to the immediate deduction of the research and development costs. Finally, due to the application of the participation relief mechanism under the general tax regime the holding function only benefits from the lower net wealth tax rate available under the mixed company regime. Hence, the effective tax rates are only slightly reduced from 24.2% (EMTR) to 23.4% and 23.5% (EATR) to 23.2%.

Under debt-financing, the application of the domiciliary and the mixed company regime even results in an increase of the effective tax rates applicable to the R&D function and the IP function. Analogous to the holding company regime this is due to the lower value of the interest shield resulting from the fact that interest expenses may only be deducted in the same proportions as foreign source income to which it relates is included in the income tax base.

For the purpose of the cross-border comparison carried out in section 2.2.5 we take into account the mixed company regime in addition to the general Swiss

tax system since in the case of the financing function, the R&D function and the IP function with offices and employees in Switzerland mixed company regime is the only available special tax regime at the cantonal level. In turn, the holding company regime is decisive for the holding function.

Excursus: Innovation Box available in the Canton of Nidwalden

In 2010 the Canton of Nidwalden has introduced an Innovation Box which provides for a reduced income tax rate of 20% of the ordinary cantonal income tax rate. As the effective cantonal income tax rate in Nidwalden amounts to 5.66% this results in a combined effective statutory tax rate of 8.8% including the federal income tax.

The Innovation Box is available for domestic and foreign net licence or royalty income derived from self-developed as well as acquired IP irrespective of whether it has been acquired from third parties or other group companies. Furthermore, capital gains on the sale of IP also qualify for the Innovation Box. The net licence or royalty income is determined by deducting proportionate financing expenses, proportionate administration expenses (allocated in proportion to the income) and proportionate taxes. The License Box may not be applied simultaneous to the other special cantonal tax regimes (holding company regime and domiciliary/ mixed company regime).

Table 13 contrasts the costs of capital and the effective tax rates for R&D functions and IP functions in the Swiss Canton of Nidwalden in case of the general tax provisions on one hand and under the License Box on the other. In the case of R&D activities the effect of the License Box is most pronounced for profitable investment projects. This is reflected by the decrease of the effective average tax rate from 9.5% (see column (1) in table 13) to 6.6% (see column (2) in table 13) whereas the effective tax rate is not affected. The reason for this is the immediate deduction of the research and development cost which leaves the effective marginal tax rate unaffected from taxation irrespective of the application of the License Box.

Table 13: Effective tax burdens on innovative activity in Switzerland, Canton of Nidwalden (in %), 2012

		(1)	(2)	(3)	(4)
		R&D function		IP function	
		No tax incentive	License Box	No tax incentive	License Box
Equity financing	CoC	5.0	5.0	5.5	5.3
	EMTR	0.0	0.0	8.3	5.8
	EATR	9.5	6.6	11.5	8.0
Debt financing	CoC	4.2	4.4	4.4	4.7
	EMTR	-19.2	-14.0	-12.7	-6.5
	EATR	6.0	3.8	7.0	5.2

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

The IP function benefits more from the License Box than the R&D function in terms of changes in the tax burden. As the expenditures for the acquisition of the patent have to be capitalised, the statutory tax rate is the most important tax driver for the effective marginal and effective average tax rates of the IP function. Hence, the effective tax rates are decreased from 8.3% (EMTR) and 11.5% (EATR) (see column (3) in table 13) to 5.8% (EMTR) and 8.0% (EATR) (see column (4) in table 13).

2.2.5 Cross-country comparison

In this section, the country-specific analyses and the insights derived are recapitulated and arranged according to the different types of HQ functions considered. This allows for a direct between-country comparison of the effective tax burdens on a certain headquarter function. The tax legislation underlying the identified effective tax levels, both on marginal and profitable investment, will not be discussed again in detail. For the in-depth analysis of the main driving factors behind the respective tax burdens, the reader is referred to the country-specific sections 2.2.1 to 2.2.4. As in these previous analyses, the dis-

cussion will focus on the distinct HQ functions one by one, starting with the benchmark of a typical manufacturing affiliate investing in asset bundles which comprise, in equal proportions, industrial buildings, machinery, acquired patents, inventory and an interest-bearing financial asset.

Benchmark case: Manufacturing affiliate

Table 14 presents an overview of the results for the benchmark case of investment in a manufacturing affiliate. The costs of capital, effective marginal tax rates, and average tax rates are presented for the four countries considered in this study, for equity and debt-financed investments, respectively.

It becomes apparent that Switzerland is an attractive location for manufacturing activity. Independent of the source of finance used, Switzerland features the lowest effective tax rates both on marginal investment (EMTR: 15.2% if equity-financed, -9.1% if debt-financed) and on profitable investment (EATR: 15.1% if equity-financed, 9.6% if debt-financed). The main reason is that Switzerland, more specifically the Swiss Canton of Zug, does not only set comparably low tax rates for all types of income but, in addition, provides for generous depreciation allowances on tangible and intangible assets. As a consequence, it ranks above countries such as the Netherlands, Ireland or the UK which feature much less generous depreciation rules for machinery, industrial buildings and intangible assets.

Table 14: Effective tax burden of a manufacturing affiliate (in %), 2012

		(1)	(2)	(3)	(4)
		The Netherlands	Ireland	United Kingdom	Switzerland (Zug)
Equity financing	CoC	6.9	6.2	7.7	5.9
	EMTR	27.6	19.4	35.4	15.2
	EATR	25.9	16.2	29.1	15.1
Debt financing	CoC	4.6	4.9	5.4	4.6
	EMTR	-9.0	-1.2	7.8	-9.1
	EATR	17.2	11.0	20.3	9.6

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Specific headquarter function I: Holding function

The most relevant asset category held and managed by a holding company are shareholdings in affiliated companies. For the purpose of this study, it was assumed that participations are held at 100%. Furthermore, we assume that investments at the subsidiary level are financed with retained earnings or equity injections from the holding. Moreover, we refrain from making any assumptions with regard to the asset structure of investments and the associated depreciation allowances. Basically, this is equivalent to assuming that any available tax depreciation would match the true economic depreciation of assets and therefore be generally neutral with respect to the effective tax burden.

The dividends received from the holdings located in the Netherlands, the United Kingdom, and Switzerland are generally exempt from tax. Ireland applies the credit system to provide for relief from economic double taxation of inter-company dividends. Given the very low Irish statutory tax rate on trading income of 12.5% which also applies to dividends paid out of trading income, it seems, however, plausible to assume that Irish holding companies with shareholdings across the EU-27 (average statutory profit tax rate of 23.2%) find themselves in an excess credit position. Consequently, the economic implications of the Irish credit system are comparable to those of the exemption method because no additional tax burden would be charged on dividends received by the Irish holding. Furthermore, assuming that the holding function considered holds qualified participations meeting the requirements of the EU Parent-Subsidiary Directive, no withholding taxes are levied on dividends paid to the holding either. Under these conditions, the effective tax burden on the holding's equity investments in its European subsidiaries is predominantly determined by the tax regimes of the respective source countries where the economic activity takes place and profits are generated. We take a simple unweighted average of EU-27 statutory profit tax rates (including surcharges and local profit tax rates) to reflect the diversity of source country tax regimes holding functions are confronted with. Table 15 presents an overview of the effective tax burdens levied on holding functions in the four countries considered in this report.

Table 15: Effective tax burden of the holding function (in %), 2012

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands[1]	Ireland	United Kingdom[1]	General system	Holding company regime
Equity financing	CoC	6.5	6.5	6.5	6.6	6.5
	EMTR	23.2	23.2	23.2	24.2	23.2
	EATR	23.2	23.2	23.2	23.5	23.2
Debt financing	CoC	4.2	5.4	4.3	6.5	6.5
	EMTR	-17.8	7.0	-15.3	23.2	23.2
	EATR	14.5	18.8	14.8	23.2	23.2

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

If the holding company re-finances investments in its shareholdings with equity, effective tax burdens both on marginal and profitable investment are indeed largely identical across the four locations considered in this report. For Dutch, Irish and British holdings, the costs of capital amount to 6.5%, the EMTR is 23.2% and the EATR is also 23.2%, thus reflecting, under the assumptions outlined above, the statutory tax rates in the source countries of the profits which are distributed as dividends. One particularity is the Swiss capital tax which is effectively a non-income tax levied on the holding's equity. It is particularly relevant for the effective tax burden on marginal investments and less relevant for profitable investments where the returns on investment are very high and the statutory tax rates strongly determine the amount of taxes paid. As a consequence, the Swiss EMTR exceeds the respective values for the three other considered countries by one percentage point (EMTR: 24.2%) whereas the EATR takes on a value almost identical to the tax level born by Dutch, Irish and British holding: 23.5%. The effect of the net wealth tax is further mitigated in case the holding company regime applies which is characterised by a reduced net wealth tax rate. Hence, the effective tax rates equal the tax rates applicable to holding companies in the Netherlands, Ireland and the United Kingdom.

However, as soon as debt becomes the preferred source of funds for the holding company to re-finance equity investments in its subsidiaries, the statutory tax rates at the holding location becomes an additional primary tax parameter which has an influence on the effective tax levels charged on these investments. The tax rates against which the debt-related interest expenses are deducted determine the value of the associated interest tax shield. The higher the tax rate, the more valuable is an additional unit of tax-deductible interest expense. As a result, the effective tax burden falls particularly sharply in those countries where the local profit tax rate is higher than the average tax rate in the EU-27 source countries (23.2%). This is the case in the Netherlands (25%) and the UK (24%). Accordingly, the costs of capital of holding participations in these two countries are the lowest with values of, respectively, 4.2% in the Netherlands (EMTR: -17.8%) and 4.3% in the UK (EMTR -15.3%). It must be recognised, however, that in Switzerland relief is granted for the participation income *net* of financing expenses. This implies that interest expense is de facto non-deductible. Accordingly, Switzerland displays the highest effective tax burdens for debt re-financed investments undertaken by the considered holding function. The unfavourable effect of the net wealth tax levied in Switzerland is, however, eliminated in case of debt-financing as the wealth tax levied by the Swiss cantons constitutes a net wealth tax.

Specific headquarter function II: Group financing and treasury function

Table 16 presents an overview of the effective tax burdens levied on financing functions in the four countries considered in this report. According to plausible assumptions, i.e. full tax deductibility of interest in all source countries and non-applicability of withholding taxes due to the Interest & Royalty Directive, the proceeds resulting from the debt claims of financing functions against the foreign affiliates are only subject to tax in the country of residence of the financing company. Thus, the statutory profit tax rates which will apply to the interest income received by a financing company becomes, in principle, the decisive driver of effective tax burdens on investments funded by the financing function. In line with this, the costs of capital and the effective marginal tax rates are highest in the Netherlands and the United Kingdom which levy corporate income tax at rates of 25% and 24%, respectively, compared to only 12.5% and 15.1% in Ireland and Switzerland.

Table 16: Effective tax burden of the financing function (in %), 2012

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands	Ireland	United Kingdom	General system	Mixed company regime[1]
Equity financing	CoC	6.7	5.5	6.6	5.9	5.4
	EMTR	25.1	9.8	24.0	14.7	7.1
	EATR	-	-	-	-	-
Debt financing	CoC	4.4	4.4	4.4	4.4	4.4
	EMTR	-13.4	-13.4	-13.4	-13.4	-13.4
	EATR	-	-	-	-	-

Notes: [1] For the Swiss mixed company regime the figures are based on the assumption that the number of Swiss-based employees exceeds 30. Hence, 25% of foreign source income is subject to cantonal income tax.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

Moreover, the Swiss effective tax rates are even lower under the mixed company regime which comprises a combined effective income tax rate of 9.8% (see column (5) table 16). Consequentially, the effective marginal tax rates are lowest in case the mixed company regime is available (7.1% in Switzerland under mixed company regime compared to 9.8% in Ireland). This is the case if at least 80% of the overall income generated by the company is of foreign origin.[63] The figures displayed in column (5) of table 16 are based on the assumption that the company employs more than 30 people in Switzerland. Accordingly, 25% of foreign source income is taxed at the cantonal level. In case the number of employees falls below this threshold, the effective marginal tax rate under the Swiss mixed company regime is even lower.

[63] Some cantons, but not the Canton of Zug, furthermore require that at least 80% of the overall expenses are incurred abroad. See A.5.2.

If the financing functions re-finances with debt, the interest income is effectively shielded from tax in the function's country of residence. Given that tax legislation generally provides for the deduction of *nominal* interest expense, the costs of capital even fall below the real market interest rate of 5% and effective marginal tax rates are negative.[64] Still, with the financing function re-financed with debt and with the related interest being fully deductible from the income tax base, further local tax parameters of the potential countries of residence become irrelevant and the effective rate rates are equal in all four jurisdictions.

Specific headquarter function III: R&D function (self-developed IP)

The considered R&D function is supposed to engage in research and development activity in order to create patentable intellectual property. The proceeds generated from licensing out the patent to other affiliates of the group will be subject to tax only in the country of residence of the licensor, i.e. the R&D company because royalty payments are generally deductible from the profit tax base of the foreign licensee. In all four countries, expenditure incurred for the development of the patent can immediately be deducted. However, most of the four countries considered in this study go beyond this implicit tax incentive for R&D activity and provide for more explicit incentive regimes targeted at the input side of the innovation process, the output side or even both. These regimes were described in the previous country-specific analyses and their implications for effective tax burdens on R&D functions were assessed in-depth.

Table 17 provides an overview of the most generous regimes or combination of regimes available in the respective countries. In the Netherlands we assume that the R&D function opts for the Innovation Box regime and, at the same, time takes advantage of the available 40% super deduction on R&D expenses. In Ireland, the R&D function benefits from a tax credit which amounts to 25% of incremental R&D expenses. In the United Kingdom, we assume that the R&D function can only benefit from the 30% R&D super deduction as the Pat-

[64] The value of the interest tax shield in the source countries of profits has been calculated on the basis of the EU-27 average statutory profit tax rate of 23.2%.

ent Box is phased in starting from 2013 and only fully becomes effective in 2017. Finally, Switzerland is the location which does least foster R&D activity by means of specially designed tax incentives.[65] No incentive beyond the mere immediate write-off of development expense is available there.[66]

Table 17: Effective tax burden of the R&D function (in %), 2012

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands[1]	Ireland[2]	United Kingdom[3]	General system	Mixed company regime[4]
Equity financing	CoC	2.8	-0.8	3.1	5.0	5.0
	EMTR	-77.0	n/a	-62.8	0.0	0.0
	EATR	-6.6	-16.1	10.7	11.3	7.3
Debt financing	CoC	2.6	-1.4	1.6	3.9	4.3
	EMTR	-96.1	n/a	-220.6	-26.6	-15.7
	EATR	-7.9	-18.8	4.9	6.9	4.3

Notes: [1] Effective tax burdens on the R&D function assume that both the Dutch Innovation Box regime and the R&D deduction are taken advantage of.
[2] Effective tax burdens on the R&D function assume that a tax credit amounting to 25% of qualifying R&D expenditure is taken advantage of.
[3] Effective tax burdens on the R&D function assume that only the R&D deduction is taken advantage of.
[4] For the Swiss mixed company regime the figures are based on the assumption that the number of Swiss-based employees exceeds 30. Hence, 25% of foreign source income is subject to cantonal income tax.
Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.
Source: ZEW.

After it all, the results shown in table 17 make clear that the considered tax regimes, with the exception of Switzerland, tend to provide substantial tax

[65] The only exception to this is a tax provision for future R&D expenses which is not taken into account.

[66] Please not that we do not consider the License Box available in the Canton of Nidwalden here.

subsidies for innovative activity. These favourable regimes relate both to the creation of intellectual property and also to its exploitation. Considering marginal investments, the costs of capital range above zero but below the real market interest rate for R&D related investments in the Netherlands and in the United Kingdom. In these countries, the R&D projects may generate rates of returns falling below the market interest rate and would still be worthwhile. In Ireland, pre-tax rates of return may even be negative. This means that R&D projects are so heavily subsidised by the tax regime that the firm even engages in projects that would generate losses if there were no subsidies. The incentive regimes put in place in the Netherlands and Ireland (as well as the UK as of 2013) all come along either with reduced tax rates on the returns from innovation or with tax credits. Accordingly, they particularly favour highly profitable investment. The difference in effective tax burdens on R&D projects between these countries and Switzerland are thus most pronounced when considering the effective tax level on highly profitable investment, i.e. the EATR. Taking equity-financed R&D investments, the EATR in the Swiss Canton of Zug under the general tax system amounts to 11.3% compared to 10.7% in the UK (only taking into account the super deduction) whereas it is even negative in the Netherlands (-6.6%) and Ireland (-16.1%). In these countries, the available tax subsidies are so voluminous that even the tax burden levied on created economic rents does not compensate the incentives provided

In the case of Switzerland the effect of the mixed company regime on equity-financed R&D activities is limited to the effective average tax rates, as equity-financed marginal R&D investments are unaffected by taxation due to the immediate deduction of the research and development costs. In the case of debt-financing, the attractiveness of the mixed company regime compared to the general Swiss tax system depends on the profitability of the investment project. Whereas the effective marginal tax rate under the mixed company regime is higher (less negative) than in case the general tax provisions apply (-15.7% under the mixed company regime compared to -26.6% under the general tax regime (see columns (5) and (4) in table 17)), the effective average tax rate is lower under the mixed company regime than under the general tax regime (4.3% (column (5) in table 17) compared to 6.9% (column (4) in table 17). The reason for this is that the mixed company regime requires that interest expenses are taken into account in the same proportion as foreign source

income to which they relate. Hence, the value of the interest shield is reduced when the mixed company regime applies instead of the general tax regime. In case of profitable investment projects, the interest deduction is, however, less decisive.

Finally, if one takes the British Patent Box into account assuming that it already fully applies in 2012 (see column (4) in table 8) one major difference between the Dutch Innovation Box and the Patent Box relating to debt-financing becomes apparent. In the Netherlands, interest expenses on borrowings used to fund expenditure for R&D must be allocated to income from intellectual property to determine the profits taxed at the beneficial Innovation Box tax rate. The British Patent Box does not require such an apportionment. Hence, interest expenses may be deducted against the general corporation tax rate of 24% irrespective of whether they relate to income qualifying for the Patent Box. In line with this, the costs of capital of debt-financed R&D activity carried out in the Netherlands are 2.6% (see column (1) table 17) and thereby only slightly lower than under equity-financing (2.8%). In contrast to this, if the British Patent Box applies in addition to the super deduction for R&D expenditure debt-financing reduces the costs of capital from 3.3% to 1.8% (see column (4) in table 8).

Specific headquarter function IV: IP function (acquired IP)

Table 18 provides an overview of the tax treatment of acquired intellectual property rights. Generally, the tax treatment does not differ too much between the countries considered. Tax incentives are much more focused on the self-creation of intellectual property than on its acquisition. No immediate write-off of acquisition costs is available. In contrast, purchased intangibles must be activated and periodically depreciated for tax purposes.

The observed differences in the effective tax burdens are thus mainly due to differences in the applicable statutory profit tax rates and available tax depreciation allowances. While acquired patents are depreciated under the declining balance method at a rate of 40% in Switzerland, the Netherlands, Ireland, and the UK offer straight-line depreciation over the useful life of the intangible asset (10% within the scope of the model). The generous depreciation rules in Switzerland drive down the effective tax levels on marginal investment (EMTR:

11.1% if equity-financed) relative to all other countries considered. Focusing on the general tax systems, the lowest EATR on acquired patents financed with equity, however, is levied in Ireland (13.2%). Here, the very low tax rate on royalty income constituting trading income[67] of 12.5% is the main underlying factor. Yet, if the Swiss mixed company regime is available on the cantonal level Switzerland becomes even more attractive as a location for IP holding companies than Ireland in terms of effective tax burdens (8.9% compared to 13.2% in Ireland; see columns ((2) and (5) in table 18). This result also holds true in the case of debt-financing.

Table 18: Effective tax burden of the IP function (in %), 2012

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands	Ireland	United Kingdom	General system	Mixed company regime[1]
Equity financing	CoC	7.0	5.9	6.9	5.6	5.3
	EMTR	29.0	14.9	27.9	11.1	6.5
	EATR	26.4	13.2	25.3	14.0	8.9
Debt financing	CoC	4.7	4.9	4.7	4.3	4.6
	EMTR	-5.9	-2.5	-5.6	-16.1	-9.2
	EATR	17.7	8.9	17.0	8.4	5.4

Notes: [1] For the Swiss mixed company regime the figures are based on the assumption that the number of Swiss-based employees exceeds 30. Hence, 25% of foreign source income is subject to cantonal income tax.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

[67] This requires a certain extent of genuine business activity of the IP holding company. For further details see section A.3.4.2.

3 Conclusion

To sum up, the comparison of effective tax burdens computed in this study reveals considerable diversity between the countries considered, between the various types of investments in general and the different types of headquarter services in particular. Table 19 displays the results in aggregate form.

Table 19: Summary table of effective tax burdens, 2012

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands	Ireland	United Kingdom	General system	Special tax regime[1]
Benchmark case: Manufacturing affiliate						
Equity financing	CoC	6.9	6.2	7.7	5.9	-
	EMTR	27.6	19.4	35.4	15.2	-
	EATR	25.9	16.2	29.1	15.1	-
Debt financing	CoC	4.6	4.9	5.4	4.6	-
	EMTR	-9.0	-1.2	7.8	-9.1	-
	EATR	17.2	11.0	20.3	9.6	-
Specific headquarter function I: Holding function						
Equity financing	CoC	6.5	6.5	6.5	6.6	6.5
	EMTR	23.2	23.2	23.2	24.2	23.2
	EATR	23.2	23.2	23.2	23.5	23.2
Debt financing	CoC	4.2	5.4	4.3	6.5	6.5
	EMTR	-17.8	7.0	-15.3	23.2	23.2
	EATR	14.5	18.8	14.8	23.2	23.2
Specific headquarter function II: Group financing and treasury function						
Equity financing	CoC	6.7	5.5	6.6	5.9	5.4
	EMTR	25.1	9.8	24.0	14.7	7.1
	EATR	-	-	-	-	-
Debt financing	CoC	4.4	4.4	4.4	4.4	4.4
	EMTR	-13.4	-13.4	-13.4	-13.4	-13.4
	EATR	-	-	-	-	-

		(1)	(2)	(3)	(4)	(5)
					Switzerland (Zug)	
		The Netherlands	Ireland	United Kingdom	General system	Special tax regime[1]
Specific headquarter function III: R&D function (self-developed IP)[2]						
Equity financing	CoC	2.8	-0.8	3.1	5.0	5.0
	EMTR	-77.0	n/a	-62.8	0.0	0.0
	EATR	-6.6	-16.1	10.7	11.3	7.3
Debt financing	CoC	2.6	-1.4	1.6	3.9	4.3
	EMTR	-96.1	n/a	-220.6	-26.6	-15.7
	EATR	-7.9	-18.8	4.9	6.9	4.3
Specific headquarter function IV: IP function (acquired IP)						
Equity financing	CoC	7.0	5.9	6.9	5.6	5.3
	EMTR	29.0	14.9	27.9	11.1	6.5
	EATR	26.4	13.2	25.3	14.0	8.9
Debt financing	CoC	4.7	4.9	4.7	4.3	4.6
	EMTR	-5.9	-2.5	-5.6	-16.1	-9.2
	EATR	17.7	8.9	17.0	8.4	5.4

Notes: [1] In the case of the holding function the cantonal holding company regime is taken into account. With respect to the financing function, the R&D function and the IP function, the mixed company regime is applied assuming that the number of Swiss-based employees exceeds 30 which implies that 25% of foreign source income is included in the cantonal income tax base.

[2] The following tax incentives are taken into account in the case of the R&D function: for the Netherlands the Innovation Box and the super deduction of 40%, for Ireland the 25% tax credit and for the United Kingdom only the 30% super deduction as the Patent Box regime will only be introduced in 2013 and will not fully become effective until 2017. Wage tax incentives for the employment of R&D personnel are not included in the calculations, such as the Dutch "WBSO". Accordingly the positive impact of these type of incentives is not measured in the report.

Abbr.: CoC - Cost of capital, EMTR - Effective marginal tax rate, EATR - Effective average tax rate.

Source: ZEW.

In general, in all countries under consideration headquarter functions are taxed less heavily than ordinary investments considered as the benchmark case. From the headquarter functions, the R&D function receives the strongest tax relief. Available relief is tied both to the input side of the innovation process and to its output and exploitation. While R&D super deductions in the Netherlands and the UK substantially reduce the effective investment costs, tax credits (Ireland) or reduced tax rates (so called Patent or Innovation Boxes in the Netherlands and the UK) provide for reduced taxation of the returns from innovation (in the case of the UK only from 2013 onwards). Innovation Box regimes exert a particularly favourable effect on the effective tax rates of highly profitable innovation projects because they reduce the tax levied on the economic rents earned from R&D. They should thus play an important role in the decision of firms on where to locate such investments. So far, tax incentives for research and development activities and the exploitation of intellectual property are generally of little importance in Switzerland. Yet, the introduction of a License box in the Canton of Nidwalden in 2010 has triggered a discussion on whether such a regime should be introduced in other cantons or even on the federal level.

Table 1 reveals that the effective tax burden on HQ functions is not always at the full discretion of the respective countries of residence. In contrast, source country taxation plays an essential role. This is particularly the case if holding functions receive tax exempt dividends or are in an excess credit position (Ireland). Here, local tax parameters of the holding country may however play a role when it comes to the value of the tax shield from interest expenses relating to the potential debt-financing of investments. The latter can be influenced by interest deduction restrictions and also the tax rate against which the interest expenses can effectively be deducted.

Moreover, financing functions are taxed equally across countries, if the investment is financed by debt. After all, Ireland is the country which displays the lowest tax burden for most headquarter functions (i.e. the financing function and the R&D function). Given the very low Irish statutory tax rate, debt-financing in Ireland however comes with a comparably low interest tax shield.

Switzerland is an attractive place also for the benchmark investment (manufacturing affiliate) and acquired IP (IP function) because it shows highly attrac-

tive general tax parameters (low statutory tax rates and attractive tax depreciation schemes). This is even more the case if the special cantonal tax regimes apply which are characterised by reduced cantonal income tax rates for foreign source income (other than income from qualifying participations). With respect to the financing function and the IP function Switzerland (Zug) even surpasses Ireland in case the mixed company regime is available. This, however, requires that the share of Swiss-source income does not exceed 20%. The possible allocation of the activities of Swiss finance companies to a (deemed) foreign permanent establishment (so called "Swiss Finance Branch"), resulting in a corresponding low effective tax burden in Switzerland, is not included in the report, as the scope of the report is limited to domestic activities in each of the jurisdictions under consideration.

The Netherlands, the UK (as of 2013) and also the Swiss canton of Nidwalden clearly put a focus on the generous tax treatment of innovative activity by means of their Patent/Innovation Boxes. In the case of the Netherlands and the UK the comparably high ordinary tax rates furthermore provide for a high value of tax deductible interest, which is reflected in low costs of capital for debt-financing HQ functions.[68]

Comparative Analyses

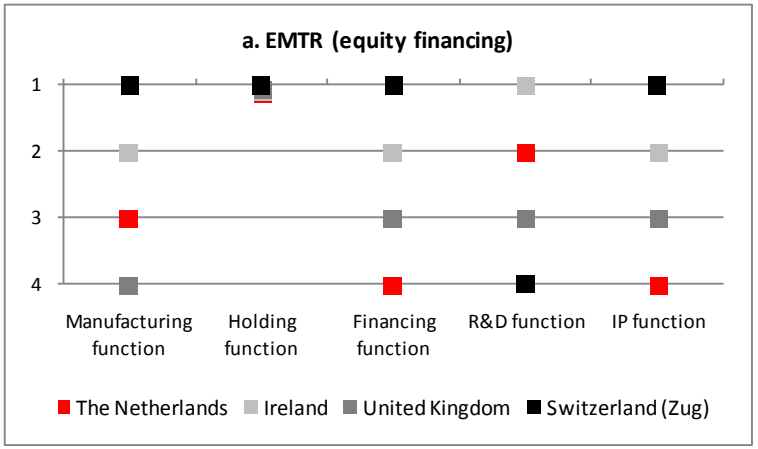
Figure 1 depicts the ranking of the four countries with regard to their tax attractiveness as locations for the HQ functions considered. Each country is marked by a coloured square, with the Netherlands in red, Ireland in light grey, the UK in dark grey and Switzerland (Canton of Zug) in black. There are four distinct graphs in Figure 1, each referring to either the effective tax rate on investment just covering its costs of capital (EMTR) or to profitable investment earning excess profits (EATR). For both types of investment, financing with either equity or debt is considered. So, Figure 1.a shows the rankings for

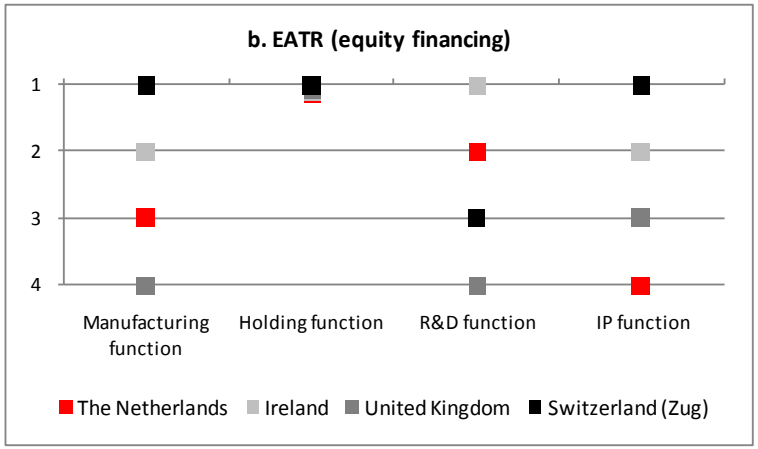
[68] Please note that for the United Kingdom and Switzerland the figures in Table 1 do reflect the effects of the Patent Box and the License Box whereas the Patent Box will only be introduced in 2013 and the License Box is only in place in the Canton of Nidwalden.

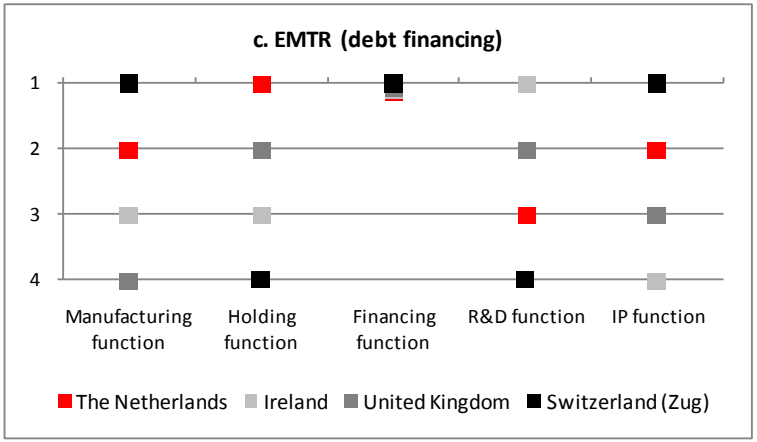
the EMTRs of equity-financed investment. Figure 1.b shows the rankings for the EATRs of equity-financed investment. Correspondingly, Figures 1.c and 1.d, respectively, refer to the EMTRs and EATRs of debt-financed investment. The y-axis of each graph shows the ranks numbered from 1 to 4, where 1 is the top rank with the lowest effective tax rate and 4 is the last rank with the highest tax level.

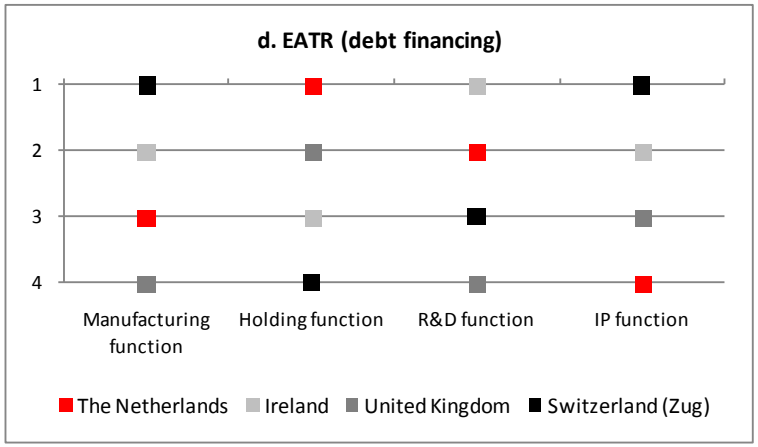
Looking at Figure 1, it becomes clear that among the four countries considered, the Netherlands rarely hold a top position in terms of tax attractiveness. Considering equity-financed investments, the relative advantage for the Netherlands is most pronounced for profitable R&D activity which results in self-developed intellectual property generating returns which by far exceed the costs of the invested capital (see Figure 1.b, “R&D function”). In this particular case, the very low profit tax rate on proceeds from innovation under the Dutch Innovation Box regime takes full effect. Only Ireland, with its R&D tax credit regime, ranks top of the Netherlands for this type of profitable investment. Among the peer group considered, the Netherlands rank mostly third or fourth with respect to the other HQ functions under consideration. These lower ranks are due to a relatively high corporate income tax rate of 25% and a tax base definition which is somewhat broader than the ones found in other countries of the peer group. As a result, the Netherlands stays behind for those scenarios where either the tax base or the *ordinary* profit tax rate is particularly important, e.g. the financing function whose interest income is taxed at the ordinary profit tax rate.

Figure 1: Country ranking









Turning to debt-financed investment, the Netherlands show up more often among the top ranks of the four countries. The reason for this is that the Netherlands feature the highest statutory tax rate of all these countries. As a consequence, debt deductibility provides for a particularly valuable interest tax shield. So, if the HQ functions are supposed to be financed with debt, the Netherlands are a particularly attractive location. However, it should be borne in mind that interest expense is often not tax deductible in the Netherlands, and even further limitations, in particular for holding companies, have been announced taking effect from 2013. The interest tax shield has a heavy weight as determinant of the overall effective tax burden if the investment considered is of low profitability (see Figure 1.c). If investment is highly profitable, it is again the taxation of the excess profits which is most decisive. Therefore, the Netherlands lose one rank, for example, in the ranking of the tax attractiveness for manufacturing functions when turning from economically marginal investment (Figure I.c) to profitable investment (Figure I.d). They can instead improve one rank from the 3rd to the 2nd rank in the ranking of effective tax levels on the R&D function (Figure I.c and 1.d, respectively) because under the Innovation Box excess profits are taxed at rates far below the ordinary Dutch corporate income tax rate.

Overall conclusion and policy statements for the Netherlands

As an overall conclusion, it becomes clear that the Netherlands no longer has a competitive advantage as a holding company location, given similarly attractive regimes in the other jurisdictions under consideration. The Netherlands still seems to be relatively attractive in case of debt funded holding activities, but only to the extent that the related interest expense is tax deductible, which is not always the case and which will be subject to further limitations as of 2013. The impact of dividend withholding tax on dividends distributed by holding companies has not been taken into account in the model, which may be relevant when interpreting the outcome of the calculations, if we compare the Netherlands (15% WHT rate) for instance with the UK, which does not levy a WHT on outbound dividends. On the other hand, Controlled Foreign Company regimes, such as the regime in place in the UK, have not been included in the model either, which could also influence the outcome of decision makers

upon choosing an appropriate jurisdiction for establishing holding company functions.

As for group finance and treasury functions, the EU code of conduct for business taxation and EU state aid rules seem to have resulted in a level playing field for both equity and debt funded group finance activities. It will be difficult for the Netherlands to distinguish itself from the other jurisdictions in this respect, other than by means of maintaining its vast network of tax treaties and maintaining its professional and easily accessible administrative practice of obtaining certainty in advance from the Dutch tax administration.

For the R&D and IP functions, the Netherlands seems to be on the right track in terms of attractiveness. The very positive outcome for the Netherlands due to the Innovation Box and super deduction (RDA), should be interpreted in light of the assumption that all the income from technical know-how can be taxed under the beneficial 5% effective tax rate of the Innovation Box. It should be borne in mind however that dependent on the facts and circumstances, not always the entire income can be allocated to the Innovation Box.

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A Appendix: Description of the tax systems under consideration

A.1 Overview

In the following, we give an overview of the tax system of the Netherlands, Ireland, the United Kingdom, and Switzerland in relation to the taxation of headquarter services.[69] In this respect, the focus is on the holding of participations, group financing and treasury services, research & development (R&D), and the exploitation of intellectual property (IP).

In doing so we address the following aspects:

- The taxation of domestic and foreign dividend income (dividend exemption versus foreign tax credit), foreign interest income and foreign royalty income focussing on the applicable statutory tax rate
- The deduction of financing costs related to (foreign) dividend income, interest and royalty income including thin capitalisation provisions and the like
- The treatment of costs relating to self-developed intangible assets
- Tax incentives for research & development activities such as capital allowance, super deductions and tax credits
- Special tax regimes for the holding of participations, financing and treasury services, and the exploiting of intellectual property
- Capital taxes

In addition, specific tax provision implemented in the jurisdictions under considerations which are aimed at administrative and auxiliary services are addressed as far as applicable.

Yet, beforehand we summarise the main tax provisions for the taxation of manufacturing activities which constitutes the benchmark case of our quanti-

[69] The information presented on the applicable tax provisions has mainly been derived from the IBFD Taxation Platform as well as from local KPMG tax practitioners.

tative analysis. In doing so we consider the following issues in addition to the aspects mentioned above

- The effective statutory profit tax rate applying to trading profits
- Tax depreciation for machinery, industrial buildings, and intangible assets, namely patents
- The tax treatment of inventories and financial assets
- Capital taxes including net wealth taxes and real estate taxes

Within the scope of this study we only consider intra-group dividend, interest, royalty, and services fee payments between companies resident in the European Union. We assume that the payments are derived from associated companies in the meaning of the Parent-Subsidiary Directive and the Interest & Royalty Directive. Hence, no withholding taxes on dividends, interest and royalties are taken into account.

A.2 The Netherlands

A.2.1 Taxation of manufacturing activities

The general Dutch corporate income tax rate amounts to 25%. Income up to EUR 200.000 is taxed at a reduced rate of 20%. No surcharge or surtax is levied in addition to corporate income tax. Industrial buildings, patents, and machinery are eligible to depreciation allowances on a straight line basis over the useful life of the asset. Yet, the maximum rate for machinery is 20%. Industrial buildings may be depreciated at a rate of 2% to 5% per year. Inventories are valued applying the last-in-last-out-method (lifo) whereas for financial assets the first-in-first-out method (fifo) is decisive.

A.2.2 Taxation of holding activities

Participation exemption

Dividends received from qualifying participations are exempt from Dutch corporate income tax under the *participation exemption*. This requires that an ownership test (mandatory) and in addition either a motive test, an asset test or a “subject-to-tax“ test are satisfied. In case of domestic shareholdings (other than in investment funds) *de facto* only the ownership test is decisive.

According to the **ownership test** the participation exemption applies to a participation of at least 5% in the nominal paid-up share capital of an active subsidiary. In case of subsidiaries resident in a Member State of the European Union, the ownership of at least 5% of the voting rights is also sufficient for the participation exemption to apply. This, however, requires that the applicable tax treaty allows for a reduction of the dividend withholding tax rate on the basis of voting rights. The ownership test does not call for a minimum holding period.

To satisfy the **motive test**, the participation must be held for business reasons and not as a mere portfolio investment. Yet, if the directly held subsidiary together with its lower-tier subsidiaries mainly carry out group financing, group licensing or leasing activities, the subsidiary is deemed to be a passive portfolio subsidiary and the motive test is not met. The same is true if more than 50% of the assets consist of portfolio shareholdings (5% or less). The level of tax of the subsidiary and its lower-tier subsidiaries is not relevant for this test.

The **asset test** stipulates that the participation exemption regime does not apply in case of low-taxed investment participations. A subsidiary is considered to be a low-taxed investment participation if its assets (including those of lower-tier subsidiaries) are composed of more than 50% low-taxed portfolio investments having no business function such as excess cash, liquid investments, portfolio shareholdings of less than 5%. Furthermore, low-taxed subsidiaries that (alone or together with lower-tier subsidiaries) mainly render passive group financing, leasing or licensing services to related companies are also considered to be investment participations unless these services meet specific substance criteria in line with which these activities are classified as active. Under an de minimis exception, however, low-taxed passive assets owned by a subsidiary or a lower-tier subsidiary which do not exceed 30% of the balance sheet total of this company can either be considered as active assets or may be ignored (dependent on various circumstances).

Finally, the **subject to tax** test requires that the directly owned subsidiary is taxed at a statutory rate of at least 10% in its country of residence. The tax base must, however, not deviate too much from the Dutch tax base. Other-

wise, the effective tax rate is decisive. In certain cases, a lower statutory rate of 10% (levied at a similar tax base) is accepted.[70]

Withholding tax levied on out flowing dividends and interest

As the dividends received by the holding company may be further distributed to the ultimate parent company, withholding taxes levied on dividends paid to the ultimate parent company are of importance as they may increase the overall tax burden of the multinational group and thereby have an impact on the establishment climate for holding companies in the Netherlands.

In the case of dividends relating to qualifying participations paid to EU/EEA Member States, no withholding tax is levied in line with the Parent Subsidiary Directive. The same holds true in the case of Swiss parent companies under art. 15 of the Swiss-EU Savings Agreement. In all other cases, double taxation agreements concluded by the Netherlands stipulate withholding tax rates which vary between 0% and 15% depending on the percentage of the participation. The treaty concluded with the United States for example reduces the withholding tax rate to 0% in case of a participation of at least 80% which has been held over a period of at least one year at the point of time when the dividends are declared.

Finally, it should be noted that the Netherlands do not levy any withholding taxes on interest paid to non-resident corporate creditors. This is especially of importance if acquisitions are financed by way of debt provided by related parties e.g. group financing companies.

A.2.3 Taxation of financing and treasury activities

Foreign interest income is fully taxable at the general corporate income tax rate. Currently, no specific tax regimes or tax incentives are available for financing and treasury activities carried out in the Netherlands.

[70] This i.a. comprises the case of the lower rate being part of a progressive tax schedule with a standard rate exceeding 10% or which has a standard in excess of 10%. Furthermore, a rate below 10% is accepted if it does not fall below of the applicable effective Dutch tax rate (e.g. within the scope of the Dutch Innovation Box).

A tax credit is granted for foreign withholding tax levied at source. The foreign tax credits are calculated on an item-per-item and country-per-country basis and are limited to the Dutch corporate income tax liability relating to the foreign interest income. This may result in excess tax credit positions. Under certain conditions the taxpayer can, however, apply for the so-called "overall method" for calculating the available foreign tax credit.

A.2.4 Taxation of research & development activities and the exploitation of intangible assets

A.2.4.1 Tax treatment of research and development costs and depreciation rules for intangible assets

Research and development (R&D) costs are fully deductible as normal business expenses. Self-developed intangible assets such as patents do not have to be capitalised.

Capitalised intangible assets such as trademarks and patents are eligible to depreciation allowances on a straight line basis over the useful life of the asset. Tax depreciation may follow the accounting treatment.

The super deduction for R&D expenditure

A super deduction amounting to 40% of the cost and expenditure for R&D other than wage costs is available in addition to the general deduction of R&D expenses. Revenue expenses as well as capital expenditure qualify for the R&D deduction. In detail, qualifying expenditure are for instance but are not limited to consumables for tests and trial batches, raw materials and parts for prototypes, commission of prototypes by third parties, licenses for project specific software, expenses for testing of prototypes, equipment used for testing, and rental expenses for equipment and facilities. Capital allowances for assets used for R&D do not qualify for the R&D deduction.

In case of a capital expenditure exceeding EUR 1 million only 20% of that expenditure may be included per annum when determining the R&D deduction over a period of 5 years. Furthermore the R&D deduction is not available if the expenses are not incurred for the risk and account of the respective taxpayer

(the party for which risk and account the expenses are made may nevertheless apply for the R&D deduction).

Wage withholding tax reduction

The Netherlands furthermore provide a wage withholding tax reduction for salaries of employees carrying out research and development. The reduction amounts to 50% (as of 2011) of the total wages relating to research and development activities. 50%. The total deduction is, however, capped at EUR 14 million per year and per employer or fiscal unity. As this study focuses on the taxation of companies, we do not take the wage withholding tax deduction into account when determining the effective tax burden of R&D activities.

A.2.4.2 Taxation of foreign royalty income

Income in relation to intangible assets such as foreign royalty income is generally fully taxable at the general corporate income tax rate of 25%. A tax credit is granted for foreign withholding tax levied at source. According to Dutch treaty practise, foreign tax credits are calculated on an item-per-item and country-per-country basis. However, under certain conditions the taxpayer can apply for the so-called „overall method" for calculating the available foreign tax credit. The tax credits are generally limited to the Dutch corporate income tax liability relating to the foreign royalty income.

The Dutch Innovation Box

Under the Dutch Innovation Box[71] only 20% of income derived from qualifying self-developed intangible assets is included in the corporate income tax base resulting in an effective tax rate of 5% (instead of 25%). On the basis of the relevant legislation the innovation box can be applied per intangible asset, but in practice agreements are often made on basis of a portfolio approach. In case R&D activities are outsourced, the company is still eligible for the Innovation Box provided that the R&D activities are carried out for the risk and account of the company.

[71] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from Nijhof and Kloes, 2010.

Qualifying assets

The Innovation Box is also applicable in case of intangible assets for which only an R&D certificate – but no patent - is granted. This comprises software development, the development of more production processes or other corporate processes, and the development of all types of sustainable (resource) technologies. In contrast to this, logos and trademarks do not qualify for the Innovation Box. Furthermore, the Innovation Box regime generally does not apply to acquired patents and other kinds of intangible assets, unless these are sufficiently further developed.

Qualifying income

The Innovation Box is not limited to royalty income, provided that the income sufficiently relates to intangible assets and technical know-how as stipulated above. For instance the sale of finished goods, which are produced based on intangible assets secured by a patent and/or developed with an R&D certificate. In order to determine the portion of income that is attributed to a qualifying intangible asset, in practice a residual profit method is often applied. When applying such a method, profit is first allocated to standard routine functions, such as marketing, sales, distribution, and the residual part is allocated to the non-routine functions such as the R&D activities. The portion of income allocated to the qualifying intellectual assets is then taxed against an effective tax rate of 5% and the remainder against an effective tax rate of 25%. Typically, the application of the Innovation Box and the allocation of income to the Innovation Box is agreed with the Dutch tax authorities in an Advance Tax Ruling.

In case of contract R&D, the residual income generated by the contractor who has carried out R&D activities for the risk and account of a Dutch tax resident company can also be taxed under the Innovation Box.

Determining the profits which are subject to the Innovation Box

As the reduced effective tax rate of 5% only applies to qualifying profits that exceed the intangible asset's development costs, the development costs for self-developed intangible have to recaptured first. Hence, upon election of the Innovation Box the accumulated research & development costs have to be recaptured at the ordinary corporate income tax rate. In practice, practical

arrangements can be agreed on with the Dutch tax authorities to spread-out the recapture over multiple years as a result of which the low Innovation Box tax rate becomes effective sooner.

Interest expenses relating to qualifying income is deductible when determining the amount of profits taxed under the Innovation Box. Interest expenses are attributed to qualifying income by way of tracking and tracing. However, in practice the taxpayer and the tax authorities often negotiate about the practical details of the application of the Innovation Box and the result usually is that for a number of years a fraction of the taxpayer's EBIT can be allocated to the Innovation Box. In this case, interest expenses remain deductible against the general corporate income tax rate (unless other kinds of interest deduction restrictions apply).

A.2.5 Deduction of interest expenses incurred for the financing of investment

In general, interest payments on loans, bonds, debentures and other debts of the company are fully deductible as normal business expenses. This also applies to interest expenses incurred in respect to qualifying participations which are subject to the participation exemption.

Yet, the Dutch tax system comprises numerous provisions which restrict the deduction of interest expenses in certain constellations. These provisions are summarised below.

The Thin Capitalisation Rule (art. 10d Vpb)

Article 10d Corporate Income Tax Act 1969 prevents interest paid on excessive loans from being deductible. In the first place, article 10d Corporate Income Tax Act 1969 applies only if the lending company is part of a group as defined in article 2:24 of the Civil Code. Furthermore the interest must be paid to a related company as defined in article 10a Corporate Income Tax Act 1969 which will be addressed below.

Definition of excessive debt

The Dutch thin capitalisation rule is based on a debt-to-equity ratio. In this respect the excessive debt is the part of the annual average debt exceeding

three times the annual average equity of the company and furthermore exceeding EUR 500,000. Hence, even if the debt-to-equity ratio of 3:1 is not met, interest relating to debt which does not exceed the threshold amount of EUR 500,000 remains deductible.

The annual average is the arithmetic mean of the values at the beginning and at the end of the financial year. For the purpose of determining the debt-to-equity ratio "equity" includes profit reserves and the annual profit but excludes special reserves which have been established for tax purposes. In case the equity is negative or zero the equity is deemed to be EUR 1, so in that case the interest paid will be deductible to the extent that the intercompany debt does not exceed EUR 500.000. "Debt" comprises the balance of loans payable and loans receivable and is not limited to related party debt.

Exemptions

Net interest income paid to related parties: Interest paid to related parties remains deductible up to interest received by related parties.

Group debt-to-equity ratio test: Instead of drawing on the individual debt-to-equity ratio, the tax payer may – upon request - determine the non deductible interest paid to related parties based on the group's debt-to-equity ratio as derived from the group's consolidated financial accounts. Yet, the aforementioned EUR 500,000 threshold and the netting of interest payable to and interest receivable from related parties are not available in this case.

The Dutch thin capitalisation provision does not provide for the possibility to demonstrate that the excess debt is still at arm's length, and/or has been caused by business reasons.

Further interest deductibility restrictions

Article 10a Corporate Income Tax Act (CITA) 1969 is a limitation rule on interest specifically meant to prevent erosion of the Dutch tax base by 'converting' Dutch equity into debt. Based on this provision, interest on borrowings that are legally, or in fact, directly or indirectly owed to a related entity is (in principle) not deductible to the extent that the borrowing relates (legally or in fact (in)directly) to one of the following transactions:

- A distribution of profit or a repayment of paid-up share capital to a related entity or a related individual by the borrower; or a related entity (that is subject to Dutch corporate income tax).
- A capital contribution to a related entity by the borrower; or a related entity (that is subject to Dutch corporate income tax) or related individual (who is a Dutch tax resident); or
- The acquisition or increase of an interest in an entity, which after the acquisition or increase will qualify as a related entity, by the borrower; or a related entity (that is subject to Dutch corporate income tax) or related individual (who is a Dutch tax resident).

A related entity is an entity that satisfies one of the following conditions:

- The borrower owns at least a one-third interest in the entity (interest refers both to paid-in and issued capital, and includes both direct and indirect relations), or
- The entity owns at least a one-third interest in the borrower, or
- A third party owns at least one-third interest in both the borrower and the entity.

A related individual is an individual who owns at least a one-third interest in either:

- The borrower, or
- An entity related to the borrower (see above).

However the interest is deductible after all if the debt **and** the related transactions are primarily engaged in for valid business reasons. For example an external acquisition is a businesslike transaction. Still the debt has to be engaged in for valid business reasons as well, which could be problematic if the loan is routed via a low taxed lending entity. In principle, the taxpayer has to prove that there are valid business reasons, but the tax inspector has the burden of proof if the following conditions are satisfied:

- the interest on the loan is subject to a tax on profit that is “sufficient” according to Dutch standards (this means that it results in a

levy of at least 10% on a tax basis determined according to Dutch rules)

- the recipient is not entitled to a loss carry-forward or other entitlement from years preceding the year in which the debt was issued (e.g. excess foreign tax credits) if this has the effect that no sufficient tax is due.

Furthermore, with respect to acquisitions an interest deduction limitation rule (**article 15ad** Corporate Income Tax Act 1969) applies as of January 1, 2012 if the acquisition has been debt-financed and the acquiring party and the target have entered into a fiscal unity for corporate income tax purposes on or after November 15, 2011. This rule was introduced to prevent that the interest paid on the debt (engaged by the holding company) could be set off against the profits of the subsidiary (by entering into the fiscal unity) resulting in a very small (or no) taxable base. This interest deduction limitation rule is applicable to interest paid to third (non-related) parties as well.

Based on article 15ad Corporate Income Tax Act 1969 the "acquisition interest" is (only) deductible up to the amount of the “own profit”, i.e. the fiscal unity’s profit minus the part of the profit (before the deduction of acquisition interest) attributable to the acquired company/companies that have been included in the fiscal unity. However, if the acquisition interest exceeds the own profit, but the excess amount is less than EUR 1 million (threshold) or in case there’s no “excessive amount of debt”, the interest will still be deductible in full. There’s an excessive debt if the acquisition debt exceeds 60% of the acquisition price in the year of acquisition, which percentage subsequently declines by 5% over a 7-year period to 25%. If there are several acquisition debts, the debts relating to an acquisition in the same year are added to calculate the percentage of the (total) acquisition price.

In case the excess amount of the acquisition interest exceeds EUR 1 million **and** there is an excessive amount of debt, the interest deduction limitation rule is only applicable to the lowest of the following amounts:

- The excess amount minus EUR 1 million; or
- The amount of interest paid on the excess amount of debt.

If a certain amount of paid interest is not deductible in one year, this amount of interest can still be deducted up to the amount of the 'own profit' in the following years.

Furthermore, if the interest paid on acquisition debt is already limited by article 10a Corporate Income Tax Act 1969, article 15ad Corporate Income Tax Act 1969 is not applicable. On the other hand, it is possible that a certain amount of the interest paid on a loan is limited by article 10d Corporate Income Tax Act and article 15ad Corporate Income Tax Act 1969 applies as well.

Finally, **article 10b** CITA denies the deduction of interest on loans to related entities (whether an entity is related is subject to a much broader definition than the definition that applies to article 10a and 10d), if

- the loan has no maturity date or a maturity of more than 10 years, and
- interest paid is more than 30% below the at arm's length interest rate.

A.3 Ireland

A.3.1 Taxation of manufacturing activities

Industrial buildings, machinery, and intangible assets receive allowances on a straight line basis. For industrial buildings and machinery the depreciation rates are 4%, and 12.5% per year, respectively. Patents may be depreciated over a period of 15 years at a rate of 7% per year (2% in the final year), or alternatively according to accounting treatment over the expected useful life. Depreciation allowances for intangible assets (plus relating interest expenses) are nevertheless limited to 80% of income derived from the use of the IP.

The Irish corporate income tax rate for trading profits amounts to 12.5%. Non-trading income such as interest income not arising in the course of a trade is subject to tax at a rate of 25%.[72] No surcharge or surtax is levied in addition to that (except in case of certain income of closely held companies). Industrial

[72] Please see section A.3.3 concerning the cases in which interest income does not qualify as trading income.

buildings, machinery, and intangible assets are eligible for depreciation allowances on a straight line basis at 4%, 10% and 12.5% per year, respectively. Inventories are valued according the accounting treatment. Yet, the last-in-first-out method is not accepted for tax purposes. The first-in-first-out method and the weighted-average-cost method are in turn accepted. For financial assets the first-in-first-out method is decisive.

A.3.2 Taxation of holding activities

Foreign dividends are fully taxable. Under certain conditions, a taxpayer can make a claim to tax dividend income paid by a subsidiary resident in the European Union or a country with which Ireland has signed a double taxation treaty or a convention on mutual administrative assistance and sourced out of trading profits at the corporate tax rate of 12.5% which generally applies only to trading income.[73]. On the one hand, a claim to apply the 12.5% rate applies to the extent the dividends are paid out of the trading profits of the dividend paying company and the provisions allow the tracing of the source of a dividend ultimately paid from trading profits of a subsidiary through multiple tiers of intermediary subsidiary companies including holding companies. On the other hand, eligibility for the 12.5% rate can also arise where at least 75% of the profits of the period of the company paying the dividend comprise trading profits and the Irish recipient of the dividends and its subsidiaries meet an asset based test which broadly requires at least 75% of the value of the assets used by the sub group (excluding intra group shareholdings and loans) at the end of the accounting period to be used for trading purposes. If the conditions are not fulfilled so as to permit a claim to tax the dividend at a rate of 12.5%, foreign dividends not arising in the course of the trade of the recipient company are subject to the tax rate that applies to non-trading income amounting to 25%.

[73] Dividends paid in relation to portfolio shareholding, not held as trading assets, where the company holds not more than 5% of the share capital or the voting rights in a company resident in a Member State of the European Union or a country with which Ireland has signed a tax treaty also qualify for the 12.5% rate. Yet, this does not apply to portfolio dividends forming part of trading income which dividends are exempt from tax. The 12.5% tax rate also applies to dividends paid by subsidiaries resident elsewhere if quoted group conditions are met.

A tax credit is granted for foreign withholding taxes on dividends as well as foreign profit taxes which have been levied on the profits out of which the dividends are paid. The latter includes surcharges levied on top of corporate income tax and local profit taxes where the surcharge is itself a tax on profits. The first step is to calculate the credit on an item-per-item basis. The amount of the tax credit is limited to the Irish tax liability on the dividend income which is subject to double taxation. Under the Irish "onshore pooling system" companies are permitted to pool their double tax credits within a 12.5% and 25% taxed pool and offset them against their corporation tax liability on the aggregate amount of their foreign dividend income within that pool. Excess pooling credits may be carried forward.

Tax credits granted for dividend income which is subject to the trading income tax rate of 12.5% may not be offset against dividends which are considered to arise from non-trading income subject to the higher corporate tax rate of 25%.

In case the dividends received by the holding company are further distributed to the ultimate parent company resident abroad no withholding tax is levied. This, however, requires that the recipient company is not resident in Ireland and is controlled by persons who are resident in an EU Member States or a tax treaty country. In case the holding company finances the acquisitions with debt provided by foreign corporate creditors, no withholding tax is levied on interest paid to a company resident in another EU Member State or in a tax treaty state in the ordinary course of the payer's business where interest from foreign sources is generally taxed in that state.

A.3.3 Taxation of financing and treasury activities

Foreign interest income is fully subject to the corporation tax. Currently, no specific tax regimes or tax incentives are available for financing and treasury activities carried out in Ireland.

Foreign interest income received by group financing and treasury companies may be considered to be trading income and consequentially be subject to the lower 12.5% tax rate. This, however, requires that the Irish group financing and treasury company is actively managing the financing and treasury services which means that the company is responsible for negotiating, monitoring and securing the finance for the intra-group loans. Hence, the company must be

making the strategic decisions in relation to the financing and treasury activities. According to case law the Irish based employees must additionally have the relevant skills, expertise, experience and authority to carry out the proposed activities of the company.

If in contrast to this, the Irish company does not actively manage the financing and treasury services but merely executes the business decisions of other group companies the financing and treasury company is not considered to be a trading company and is taxed at the 25% corporate tax rate.

The same holds true for comparable activities such as intra-group leasing, factoring and insurance services (captives). Consequentially, upon meeting certain activity requirements such companies may qualify as trading companies which are taxed at the lower tax rate of 12.5%.

On a unilateral basis a tax credit is granted for foreign withholding tax on interest on an item-by-item and source-by-source basis where the interest income arises in the course of the conduct of a trade. Where the income of the company arises in the course of a trade, the lender may pool creditable withholding taxes arising on interest income from associated companies (requiring a 25% common relationship) resident in tax treaty countries.

A.3.4 Taxation of research & development activities and the exploitation of intangible assets

A.3.4.1 Tax treatment of research and development costs and depreciation rules for intangible assets

In some instances accounting standards may require that self developed intangibles are capitalised. This accounting treatment does not prevent the taxpayer from including the relevant costs in the R&D expenditure eligible for current year deduction and (the R&D tax credit addressed in the following).

Patents may be depreciated over a period of 15 years at a rate of 7% per year (2% in the final year), or alternatively according to accounting treatment. This also applies to other forms of intellectual property including brands, brand names, trademarks, service marks, copyrights, design rights as well as know-how related to manufacturing, processing or commercial activities.

The R&D tax credit

Companies undertaking in-house R&D undertaken within the European Economic Area (EEA) are granted a tax credit equal to 25% of qualifying expenditure on research and development (R&D).[74] For the first EUR 100,000 the tax credit is available on a volume-basis. Thereafter, the tax credit is granted on an incremental basis at 25% of the amount of expenditure incurred in the period in excess of baseline expenditure. The baseline figure is set by reference to expenditure incurred in the year 2003. Qualifying expenses include both revenue and capital expenditure incurred for on plant and machinery used for research and development activities. The tax credit is not available for the acquisition of patents.

In the case of self-developed intangible assets the immediate deduction available for R&D costs and the tax credit may be combined.

In case the R&D activities are outsourced to a non-related party a tax credit equal to the greater of 10% of the total R&D expenses or EUR 100,000 is available. In turn, if this unrelated party is a third-level academic institution resident in the EEA such as an university the tax credit only amounts to the greater of 5% or EUR 100,000.

In all cases the tax credit is deducted from the company's corporation tax liability in the year in which the expenditure is incurred. In case the tax credit exceeds the tax liability the corporate tax paid in the preceding accounting period is refunded and any unused amounts are carried forward to future periods. Alternatively, the tax credit is paid out on a staggered basis. Yet, the payment is capped by reference to either the sum of payroll taxes arising in the accounting period in which the qualifying expenditure was incurred as well as in the previous accounting period, or the corporation tax paid in the 10 preceding accounting periods.

[74] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from Irish Revenue, Revenue Guidelines for Research and Development Tax Credit, February 2011.

A.3.4.2 Taxation of foreign royalty income

Foreign royalty income is fully subject to corporation tax. The exemption of royalty income received by Irish residents with respect to patents developed in Ireland or a Member State of the European Economic Area has been abolished in 2010.

Foreign royalty income received by group companies exploiting intellectual property (IP) may qualify as trading income and consequentially be subject to the lower corporate tax rate of 12.5%. According to case law principles this requires that the company is responsible for seeking out potential opportunities for the exploitation of the IP product licensing and development opportunities globally. The income of a group company exploiting IP may be considered to be trading income in case the company is responsible for the worldwide marketing, sales, operation and support of the IP. Moreover, the Irish based employees should have the relevant skills and expertise to manage the relevant intellectual property.

If the IP company does not actively manage the IP the royalty income is not considered to be trading income and is consequentially taxed at the higher corporate income tax rate of 25%.

On a unilateral basis a tax credit is granted for foreign withholding tax levied on royalty payments arising in the context of the conduct of a trade on an item-by-item and source-by-source basis.

Yet, a measure of pooling relief is available in addition which allows for a deduction to be taken for creditable withholding tax in excess of the Irish corporation tax payable on the foreign royalty income to be used to reduce the Irish tax payable income from other foreign royalty income of the trade which is subject to foreign withholding tax.

A.3.5 Deduction of interest expenses incurred for the financing of investment

Interest expenses incurred for trading purposes are generally deductible. This also applies in case of interest paid to related parties. The Irish tax system does not comprise thin capitalization rules or the like.

Yet, interest expenses relating to non-trading income such as foreign dividend income[75] are generally non-deductible.

The Interest-as-a-charge provision

As an exception interest expenses relating to non-trading income may nevertheless be deductible under the "interest-as-a-charge" provision. This, however, requires that the interest expenses have already been paid and i.a. relate to loans which are used to acquire a trading company, a holding company of such companies or used to on-lend funds to such companies. Moreover, in all three constellations the "interest-as-a-charge" provision requires that

- the investing company controls more than 5% of the target company,
- the investing company and the target company have a common director, and
- the capital is not recovered (actual or deemed) by the borrower company during the period that interest is payable on the borrowing.

In contrast to this no interest deduction is available for interest relating to funds used to acquire intellectual property which are not used in the course of a trade. Hence, companies exploiting intellectual property in the course of an activity which is not regarded as a trade (due to a lack of active business character of the activity as pointed out in section A.3.4.2) may not deduct financing expenses.

Under the "interest-as-a-charge" provision the interest expenses are deductible in the course of determining the overall profits. Hence, it is at the taxpayer's discretion whether to deduct the interest expenses from income which is taxed at the 12.5% rate, income which is subject to the higher tax rate of 25% or chargeable gains.

[75] Although the foreign dividends are taxed at the corporate tax rate for trading income – under the conditions laid out above – they do not constitute trading income.

Financing expenses relating to income arising from the exploitation of IP

Interest on borrowings in relation to expenditure on qualifying intellectual property (plus capital allowances for IP) may not exceed 80% of the income arising from the exploitation of IP such as royalty income in the course of the trade. Hence, royalty income and other income arising from IP may not fully be stripped by way of deducting interest expenses due to excessive debt-financing of the acquisition or creation of IP.

A.4 United Kingdom

A.4.1 Taxation of manufacturing activities

Corporate income tax rate is currently levied at a rate of 24%. No surcharge or surtax is levied in addition. The British tax system provides for capital allowance for machinery under the declining balance method at a rate of 18%. For the purpose of the capital allowance assets must be pooled together. Industrial buildings do not receive capital allowances. Patents acquired from 2002 onwards may be depreciated on a straight-line basis at a rate of 4% or alternatively according to the accounting treatment. Inventories are valued applying the last-in-last-out-method (lifo) whereas for financial assets the first-in-first-out method (fifo) is decisive.

A.4.2 Taxation of holding activities

Most profit distributions received by medium or large companies from their subsidiaries including distributions from controlled companies are exempt from tax in the United Kingdom irrespective of source. In order for the exemption to apply, the dividends received must fall into one of the numerous “exempt classes”. The exempt classes i.a. comprise

- distributions from controlled companies,
- distributions in respect to non-redeemable ordinary shares,
- distributions in respect to portfolio shareholdings,
- dividends derived from transactions not designed to reduce UK tax,

- dividends in respect to shares accounted for as liabilities. Broadly, this comprises shares in an unconnected company which are treated as debt in the issuer for accounting purposes.

In addition, numerous anti-avoidance provisions must be considered.

In case the participation is re-financed with debt, interest expenses relating to exempt dividends are nevertheless deductible from the corporate income tax base unless specific interest deductibility restrictions apply. These will be addressed in section A.5.5.

Due to the exemption of foreign dividends, no tax credit is granted for foreign withholding taxes levied by the source country.

In case the holding company distributes the dividend income received from its subsidiaries to the ultimate parent company, no withholding tax is imposed in the United Kingdom. In contrast to this, in case of debt-financing interest payments to foreign corporate creditors are generally subject to a 20% withholding tax rate unless the Interest & Royalty Directive or Swiss-EU Savings Agreement apply. Moreover, double taxation treaties generally reduce the withholding tax rate to 0% to 15%.

A.4.3 Taxation of financing and treasury activities

Interest income is fully subject to corporation tax irrespective of its source. A tax credit is granted for foreign withholding taxes levied on the interest payments. The tax credit is determined on a strict source-by-source and item-by-item basis and limited to the British corporation tax liability relating to the foreign interest income. This may result in excess tax credit positions.

The British tax system does not comprise any special tax regimes for treasury and financing companies (although certain financing and treasury companies can elect to be excluded from the “Worldwide Debt Cap” rule – see section A.4.5).

A.4.4 Taxation of research & development activities and the exploitation of intangible assets

A.4.4.1 Tax treatment of research and development costs and depreciation rules for intangible assets

Expenditure incurred for self-developed assets can be deducted immediately. It is not required to capitalise research and development costs for self-developed intangible assets such as patents upon meeting the conditions for qualifying as an asset.

Patents acquired from 2002 onwards may be depreciated at a straight-line basis at a rate of 4% or alternatively according the accounting treatment.

The super deduction for R&D expenditure

A super deduction is available at a rate of 30% (in 2012) of revenue expenditure incurred for qualifying R&D.[76] This comprises employee costs, cost for staff providers, Payments to clinical trials volunteers, materials, utilities, software as well as subcontracted R&D expenditure. Capital allowances, however, do not qualify for the 30% R&D deduction.

Furthermore, a research and development allowance (RDA) is available for qualifying capital expenditure at a rate of 100%. Qualifying expenditure comprise expenditure incurred for carrying out research and development, and expenditure incurred for providing facilities for carrying out research and development. Yet, the RDA is not available for rights derived from R&D such as patents.

A.4.4.2 Taxation of foreign royalty income

Foreign royalty income is currently fully subject to corporation tax at the general rate of 24%. A tax credit is granted for foreign withholding tax levied on the royalty payments. The tax credit is limited to the UK corporation tax at-

[76] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from HMRC, http://www.hmrc.gov.uk/ct/forms-rates/claims/randd.htm.

tributable to the foreign income and calculated on a source-by-source and item-by-item basis.

The Patent Box

In 2013 a **Patent Box** regime[77] is supposed to be introduced in the United Kingdom which provides for an effective corporate tax rate of 10% for so-called qualifying profits derived from, inter alia, the licensing or sale of patent rights and the use of patented inventions in the company's trade.[78] Hence, the scope of the proposed Patent Box is comparably wide. It is not limited to royalty income but includes profits derived from the sale of qualifying patented invention or products incorporating qualifying invention as well as profits derived from the use of the patented invention in the company's trade.[79]

Qualifying assets

In order to qualify for the Patent Box profits must relate to patents which have been granted by the UK Intellectual Property Office, the European Patent Office or the national patent office of selected Member States of the European Economic Area.[80] The Patent Box also applies in case of patents generated by way of contract research in case the contractor is a group company. Contract research carried out by third parties only qualifies for the Patent Box if the company – the commissioning party – has managed the R&D activities and the contractor only constitutes the performing agent. Furthermore, profits generated from exclusive licenses also qualify.

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[77] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from HMRC, 2012; Sullivan, 2012, .

[78] For details see A.4.4.2.

[79] See HMRC, The Patent Box: Technical Note and Guide to the Finance Bill 2012 clauses, 2012, p. 8. Feedback from practitioners in the UK indicates that independent of the applicability of the small claims treatment, a return to marketing assets of 25% of residual profits would be a good first approximation.

[80] These comprise Austria, Bulgaria, The Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Poland, Portugal, Romania, the Slovak Republic, and Sweden. See footnote 79, p. 5.

Determining the profits benefiting from the Patent Box

Although the scope of the Patent Box is planned to be comparably wide, only a share of the profits which to some extent related to a patented invention is finally subject to the Patent Box tax rate.

Determining the share of the company's profits which finally qualifies for the Patent Box requires a three-step-procedure within the scope of which the profits benefitting from the Patent Box are calculated as a fraction of the overall profits of the trade.

First, the share of the overall profits constituting "relevant intellectual property income", namely income which is derived from the qualifying patent, is determined. This may be done by apportioning the total profits according to the ratio of "relevant intellectual property income" to total gross income.[81]

"Relevant intellectual property income" first and foremost includes the income from the sale of a patent right, the sale of a patented items or items incorporating a patented item, as well as license fees and royalties.[82]

Financing income and expenses are fully beyond the scope of the Patent Box. This means that interest expenses on loans used to finance the creation of intellectual property remain deductible against the general corporation tax rate of 24% even in case income relating to intellectual property is taxed at a lower tax rate of 10% under the Patent Box.

Second, a routine return has to be removed. This is based on the perception that companies earn a routine return even if they do not apply any unique intellectual property or other intangible assets. Hence, the routine return is deducted from the profits attributed to the "relevant intellectual property income" under step one. The result of this second step is the "qualifying residual profit".

[81] Alternatively, profits derived from qualifying income can be determined by way of allocating expenses to 'relevant intellectual property income' on the one hand and non-qualifying income on the other.

[82] For additional information see footnote 79, pp. 10, 32-40.

The return is set at 10% of relevant expenses comprising tax deductions made with respect to personnel, premises, plant and machinery including capital allowances as well as different kinds of services within the context of determining the corporation tax base.[83] Research and development expenses are not included reflecting the fact that the routine return is only supposed to cover the return from ordinary – not innovative - business activity. Hence, the application of the Patent Box does not mitigate the effect of the research and development deduction. Both tax incentives may be applied simultaneously.

The **third** step finally requires deducting the return to marketing assets as the Patent Box does not apply to profits relating to marketing assets such as logos, trademarks and brands. Removing the marketing asset return from the "qualifying residual profit" is either done by deducting a "notional marketing royalty" for the use of marketing assets or under the small claims treatment - by simply deducting 25% of the "qualifying residual profit", the result of the second step of the calculation.

The notional marketing royalty is the proportion of the "relevant intellectual property income" that a company would pay an unrelated party for the exclusive right to exploit the relevant marketing assets. Hence, the "notional marketing royalty" must be determined drawing on the arm's length principle taking into account the specific facts and circumstances of the respective case as well as certain prescribed assumptions.[84] Consequentially, the determination of the "notional marketing royalty" is to some extent at the discretion of the taxpayer but will require some effort. In case the taxpayer has incurred actual marketing royalties these are deducted from the "notional marketing royalty" in order to determine the return to marketing assets.

In contrast to this, the small claims treatment is much more straight-forward. But it is only available in case either of the following two conditions is fulfilled. On the one hand, the small claims treatment is available if the sum of the "qualifying residual profit" of all the company's trades does not exceed GPB 1 million. On the other hand it may be applied if the sum of the "qualifying re-

[83] For further details see footnote 79, p .47.

[84] See footnote 79, pp. 51-57.

sidual profit" of all the company's trades does not exceed the amount of GPB 3 million divided by the number of associated companies which have effectively elected for the Patent Box to apply increased by one and if it has furthermore not determined the marketing asset return based on the "notional marketing royalty" in the previous four years.[85]

The Patent Box will phase in over a period of four years during which qualifying profits are only partially subject to the Patent Box tax rate (60% in 2013, 70% in 2014 up to 100% in 2017). The application of the Patent Box requires that the company has undertaken "qualifying development by making a significant contribution to the creation or development of the invention claimed in the patent or a product incorporating this item."[86] Hence, the Patent Box is generally not available for a company that performs outsourced contract R&D. Nevertheless, a company can qualify for the Patent Box with respect to a patent generated by an affiliate if the company takes a significant role in managing the research & development activities and managing the qualifying rights created in the course of this activity.

A.4.5 Deduction of interest expenses incurred for the financing of investment

Interest is generally deductible even if relating to exempt dividend income. Since, 2009 deduction of interest expenses is restricted by way of the "worldwide debt cap".

The Worldwide Debt Cap provision

The "Worldwide Debt Cap" provision[87] stipulates that the deduction of aggregate net financing expenses of UK companies ("tested expense amount") is restricted to the consolidated gross financing expenses of the group ("avail-

[85] For more details on the small claims treatment see footnote 79, pp. 48-50.

[86] Footnote 79, p. 9.

[87] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from HMRC, http://www.hmrc.gov.uk/manuals/cfmmanual/cfm90160.htm; Webber, 2010, p. 696.

able amount"). Small and medium sized companies are excluded from the scope of the "Worldwide Debt Cap" provision.

Furthermore, Financing expense and financing income amounts are excluded from all debt cap calculations if such amounts arise to a group treasury company in the sense of section 316 of the Taxation (International and Other Provisions) Act 2010 and such company makes the relevant election. In order for a company to qualify as a group treasury company at least 90% of its income must be derived from treasury activities undertaken for the group i.e. managing surplus cash or overdrafts, lending cash, investing in debt securities and hedging assets, liabilities, income or expenses.

Determining non-deductible interest under the "Worldwide Debt Cap"

The "tested expense amount" comprises the total net financing expenses payable by the UK group companies on intra-group as well as external borrowings. Hence, the "tested expense amount" is the aggregate of each relevant group company that has a net financing deduction as far as the respective amount exceeds GBP 500,000 (the current Finance Bill includes a provision which should allow companies to elect that this de minimis limit is not to apply).

The "available amount" is the worldwide group's gross external finance expense from consolidated accounts. This figure neither includes financing income nor intra-group payments.

Prior to this, a "gateway test" applies a quick, accounts based test. If this test is passed, the "Worldwide Debt Cap" rules do not apply. The gateway test requires that the amount of net debt owed by each relevant group company (excluding those companies with net debt of less than GBP 3 million) is added together to produce a total figure of UK net debt. A relevant group company that has net cash assets is ignored. If the total of UK net debt is less than 75% of the worldwide group's consolidated gross external debt the test is passed and the actual "Worldwide Debt Cap" provision is not applicable.

To avoid double taxation of interest due to the application of the "Worldwide Debt Cap" rules, financing income (either external or intra-group) received by UK group companies is exempt from corporation tax where there has been a disallowance of interest expense. The calculation of net finance income is made analogous to the calculation of net finance expenses. Yet, the disre-

garded amount of financing income may not exceed the total amount disallowed or the "tested income amount" (which is the sum of the net financng income amounts, but excluding such amounts from relevant group companies where the net finance income is less than GBP 500,000). (The current Finance Bill includes a provision which should allow companies to elect that this de minimis limit is not to apply).

A.5 Switzerland (Zug)

Within the scope of the Swiss tax system two levels of taxation are of importance: taxation at the federal level and taxation on the cantonal/ municipal level. The Swiss cantons have considerable discretion in the design of their tax policies. While the federal income tax rate is levied at a rate of 8.5%, the Swiss cantons set the tax rates for the cantonal income tax themselves which results in differing income tax rates across Switzerland. The tax rates for the cantonal net wealth taxes also vary among the cantons. In contrast to this, the tax base definition is largely harmonised between the cantons and the Swiss federal income tax.

A.5.1 Taxation of manufacturing activities

Federal income tax is levied at a rate of 8.5%. Cantonal income tax rate of the canton of Zug is 3% for income below CHF 100,000) and otherwise 6.25%. The multipliers which are applied to this rate are 82% for the canton, 60% for the municipality (Zug) and 6.82% for the parish.

Industrial buildings, machinery and intangible assets (patents) are eligible to depreciation on a declining balance basis over the useful life at rates of 8%, 30% and 40%, respectively. Alternatively, straight-line depreciation is available at half the declining balance rates. Inventories are valued by applying the last-in-last-out-method (lifo) whereas for financial assets the first-in-first-out method (fifo) is decisive.

No capital taxes are levied on the federal level. The Canton of Zug levies a net wealth tax but no real estate tax. The nominal net wealth tax rate is 0.05%. The same multipliers as under the cantonal income tax apply resulting in a

nominal tax rate of 0.07%. As net wealth tax is deductible from the corporate income tax, the combined effective net wealth tax rate amounts to 0.06%.[88]

A.5.2 Taxation of holding activities

Participation relief

Dividend income received from substantial participations is indirectly exempt from federal income tax as well as cantonal/ municipal income tax by way of the **participation relief mechanism**.[89] The participation relief which is deducted from the corporate income tax liability is equal to the corporate income tax burden which applies to the proportion of net participation income in the total taxable income.

The net participation income is calculated by deducting a proportional amount of financing expenses administrative expenses, and non-refundable foreign withholding taxes. The financing expense may be allocated to dividend income based on the ratio of the book value of the dividend paying participation(s) to total assets. For the administration expenses a lump sum equal to 5% of the dividend and capital gains income is granted unless the taxpayer proves the actual lower costs. In order for the participation relief mechanism to apply, a minimum participation of 10% in the corporation's share capital or profit and reserves is required. Alternatively, the relief applies if the investment has a market value of at least CHF 1 million. Due to the Federal Tax Harmonization Law these conditions should apply equally in all cantons.

Holding company regime

In addition to this, holding companies may benefit from the **holding company regime**[90] available at the cantonal and municipal level. In order to qualify for

[88] The effective rate accounts for the deductibility of the net wealth tax (τ_{NWT}) from the corporate income tax base (τ_{CIT}). It is determined by $\tau_{NWT} * (1 - \tau_{CIT})$ where τ_{NWT} is the nominal net wealth tax rate taking into account the various multipliers.

[89] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from Finanzdirektion Steuerverwaltung Kanton Zug, participation exemption 2011.

[90] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from Finanzdirektion Steuerver-

the holding company regime the company's main purpose must be – according to statutory charter of incorporation – the long-term management of participations which involves the company holding at least one substantial participation.

A substantial participation is characterised by a participation of at least 10% of the share capital or a market value of CHF 2 million. Furthermore, a minimum holding period of 1 year is required.

In addition to the holding of participations, certain other activities are permissible as secondary aims of the company if they are of minor importance compared to the holding of participations. These comprise i.a.:

- management and administrative activities related to the participations,
- group auxiliary services such as governance, reporting, organizational support, marketing research for the purpose of the whole group, tax and legal advice, human resource support relating to the managerial staff, and finally group financing services by way of taking on funds at the capital market and forwarding them to other group companies,
- the governance of group companies,
- and the mere holding of intellectual property.

In case the requirements for the holding company regime are met the company is fully exempt from income tax at the cantonal and municipal level. Hence, the income is only subject to the effective federal income tax of 7.8%. The cantonal tax exemption covers all income derived by a qualifying holding company except income from immovable property located in Switzerland and income for which treaty relief is effectively obtained (meaning not waived). Consequentially in addition to dividend income which already benefits from the participation relief mechanism addressed above interest, royalties, management fees and any other service fees can be collected tax free. For holding

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waltung Kanton Zug, holding companies 2009; Finanzdirektion Steuerverwaltung Kanton Zug, holding companies 2011.

companies service fees for management, administrative and auxiliary services are of importance. Assuming that such fees are fully deductible from the tax base of corporate income tax levied in the country of source and are furthermore not subject to source country withholding tax only the federal income tax is decisive.

The holding company regime furthermore comprises a reduced net wealth tax of 0.002%. This results in an effective net wealth tax rate of 0.0025% when applying the multipliers to the basic rate and taking into account that the net wealth tax is deductible from the income tax base.[91]

Domiciliary/mixed company regime

Furthermore, holding companies may benefit from the cantonal/municipal **domiciliary company regime** and the **mixed company regime**.[92] Both tax regimes comprise that net-income from qualifying participations[93] is fully exempt from income tax levied in the canton. Other foreign-source income such as fees for group services is taxed at normal rates of cantonal income tax but only to the extent that it can be attributed to the company's management activities. Under both regimes the extent of the management activity in Switzerland is mainly based on the number of employees.[94] Yet with respect to foreign income exceeding CHF 200 million the allocation portion is generally 10%.

[91] See footnote 88 on the determination of the effective net wealth tax rate.

[92] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from Finanzdirektion Steuerverwaltung Kanton Zug, domicliary companies 2009; Finanzdirektion Steuerverwaltung Kanton Zug, mixed companies 2009; Finanzdirektion Steuerverwaltung Kanton Zug, management companies 2011.

[93] The definition of a qualifying participation is analogous to the participation exemption relief.

[94] In case of less than 6 employees only 10% are subject to income tax on the cantonal level, 15% in case of 6 to 10 employees, 20% in case of 11 to 30 employees and 25% in case of more than 30 employees. In case persons with seat or domicile in Switzerland hold a qualifying participation in the company, the proportion is increased by 10 percentage points but only up to 25%. With respect to foreign income exceeding CHF 200 million the allocation is generally 10%. Foreign income up to CHF 200 million is included according to the above mentioned proportions.

If the company does not have any activity in Switzerland, namely no employees and no offices, foreign-source income other than income from qualifying participations such as fees for management, administration and auxiliary services is fully exempt from cantonal income tax and only the federal income tax is levied ("domiciliary company"). In this case, the cost of capital is equal to the case of the holding company regime discussed above. In all other cases, the foreign-source income is partly taxed at the cantonal level ("mixed company"). The differentiation between the domiciliary company status and the mixed company status results from the fact that the domiciliary company may not perform any commercial activity in Switzerland whereas the mixed company is allowed to derive up to 20% of its total income from Swiss sources and up to 20% of its overall expenses may be of Swiss origin. Some cantons including the Canton of Zug do not strictly require 80% of the expenses to originate abroad.

Although the mixed company regime is associated with some extent of tax levied at the cantonal level, it still significantly reduces the tax burden. In the most advantageous case (less than 6 employees) only 10% of foreign source income other than income from qualifying participations is taxed on the cantonal level resulting in an effective cantonal income tax rate of 2.1% and a combined effective tax rate of 8.6%. In the least advantageous situation, namely when the number of employees in Switzerland exceeds 30, 25% of the foreign income is taxed at the cantonal level and the combined effective tax rate is 9.8% which is still significantly below the combined effective rate of 15.1% under the general tax system.

Interest and administration expenses have to be allocated to foreign source income which is exempt (income from qualifying participations and other foreign income under the holding company regime and the domiciliary company regime) or only partly subject to cantonal income tax (other foreign income under the mixed company regime). This is usually done proportionally to the ration between the book value of the respective asset and total assets. Hence, the value of the interest deduction is determined by the effective combined tax rate applying under the respective regime. Interest expenses relating to favourably taxed income may not be deducted against the full cantonal tax rate.

Finally, the effective net wealth tax rate is 0.0095% (basic rate 0.0075%) and 0.0126% (basic rate 0.01%) respectively under the domiciliary company regime and the mixed company tax regime when taking into account that the net wealth tax is deductible from the income tax base.[95]

Summing up, neither the holding company regime nor the domiciliary/mixed company regime require any substance in Switzerland. Yet, for companies with a certain amount of activity in Switzerland, namely offices and employees, only the mixed company regime is of relevance.

Since the EU commission's state aid decision with respect to the holding and domiciliary/mixed company regimes Switzerland has been under some pressure by the EU commission and single EU Member States to abolish or restrict these beneficial tax regimes. By now the Swiss authorities have not decided to modify or abolish the cantonal tax regimes, but this could happen in the near future.

Withholding tax on dividends and interest paid to foreign companies

In case the dividend income received by holding companies located in Switzerland is distributed to the ultimate parent company Switzerland imposes at 35% withholding tax which is reduced to 0% to 20% by way of tax treaties. In the case of a parent company resident in the United States the withholding tax amounts to 5% in case of a participation of at least 10% in the capital or voting power in the Swiss company. Furthermore, no withholding tax applies to dividends paid to companies resident in the EU Member States in case of qualifying participations due to the Swiss-EU Savings Agreement. If in turn the acquisitions are financed with debt provided in the form of ordinary loans no withholding tax is imposed on interest paid to foreign corporate creditors.

A.5.3 Taxation of financing and treasury activities

Interest income is fully subject to federal as well as cantonal income tax irrespective of its source. Yet, on the cantonal level, several special tax regimes are available which result in a reduction of the effective cantonal income tax burden up to zero.

[95] See footnote 88.

Under domestic tax law foreign withholding taxes levied at source may be deducted from the income tax base in order to mitigate double taxation. According to double taxation treaties a tax credit is usually granted for foreign withholding tax. A taxpayer may credit the lower of the two amounts:

- the tax withheld (and not reclaimable) in countries with which Switzerland has a double tax treaty
- the Swiss income taxes paid on the income for which withholding tax was withheld and for which the taxpayer asks for a credit

The calculation is made by taking into account all relevant income parts that are subject to withholding tax and for which a credit is asked for together (overall limitation).

The maximum credit calculated above is reduced:

- by two thirds if the foreign income in question is only subject to income tax on the federal level (e.g. in case of a holding status)
- by one third if the foreign income in question is only subject to income tax on the cantonal/communal level

The cantonal **holding company regime** is available for foreign interest income in case the group financing services are of minor importance compared to the holding of participations and do not qualify as commercial activity. Hence, pure group finance and treasury companies do not qualify for the holding company regime. In contrast to this, the financing and treasury activities can be pursued as a main business objective. Consequentially, the **domiciliary/mixed company regime** discussed in section A.4.2 is of more relevance for financing and treasury companies located in Switzerland. The requirements and the functioning of the domiciliary/mixed company regime do not depend on the kind of activity. Hence, the information given with respect to holding companies also apply to financing and treasury companies.

A.5.4 Taxation of research & development activities and the exploitation of intangible assets

A.5.4.1 Tax treatment of research and development costs and depreciation rules for intangible assets

Research and development (R&D) costs are fully deductible as normal business expenses. Self-developed intangible assets such as patents do not have to be capitalised. Acquired intangible assets such as patents may be depreciated according to the declining balance method at a rate of 40% over the assets' useful life.

Accelerated depreciation, super deductions or tax credits for research and development expenses are neither available at the federal nor at the cantonal level.

A.5.4.2 Taxation of foreign royalty income

Foreign royalty income is generally taxable at the general income tax rate (effectively 15.1% in the Canton of Zug). Yet, on the cantonal level, several special tax regimes are available which result in a reduction of the effective cantonal income tax burden up to zero.

The cantonal company tax regimes

The application of the **holding company regime** is limited to royalty income derived from the mere holding of intellectual property as an auxiliary activity (of minor importance) to the holding of participations. Companies that first and foremost exploit IP do not qualify for the holding company regime. Furthermore, any advancing of IP is precluded from the holding company regime.

IP holding companies may qualify for the **domiciliary/mixed company regime** depending on the number of employees in Switzerland and the share of Swiss-source income in the overall income. Certain cantons furthermore strictly require that no more than 20% of the expenses may be incurred in Switzerland. Notwithstanding, in case of a company creating intellectual property the application of the mixed company regime can be ensured by outsourcing research and development activities to a foreign party carrying out the R&D activities in order to meet this requirement. Yet, the Canton of Zug mainly fo-

cuses on the requirement that no more than 20% of the overall income is generated in Switzerland.

The domiciliary/mixed company regime is especially attractive for IP companies as it does not require any substance in Switzerland. This also comprises that the intellectual property located in Switzerland must not be developed further, neither in Switzerland nor abroad.

Excursus: License Box in the Canton of Nidwalden

So far, a special tax regime for royalty income is only available in the Canton of Nidwalden, namely a **License Box**[96] which comprises a reduced income tax rate of 20% of the ordinary cantonal income tax rate. As the effective cantonal income tax rate in Nidwalden amounts to 5.66% this results in a combined effective statutory tax rate of 8.8% including the federal income tax.

The License Box is available for domestic and foreign net licence/ royalty income derived from "old IP" (held prior to the introduction of the Innovation Box on 1 January 2011) as well as "new IP". Moreover it equally applies to self-developed and acquired IP irrespective of whether it has been acquired from third parties or other group companies. In this respect; the License Box differs substantially from comparable regimes in place/ proposed in the Netherlands and the United Kingdom which do not apply to profits derived through acquired intellectual property.

The scope of income qualifying for the License box is in line with article 12 (2) of the OECD model convention. It comprises payments of any kind (also from related parties) for the use of or the right to use patents, trademarks, designs and models, plans, secret formulas or processes, information on industrial, commercial or scientific experiences as well as copyrights of literary, artistic or scientific work. Furthermore capital gains on the sale of the kinds of intellectual property named above also qualify for the Innovation Box.

[96] In addition to the IBFD Taxation Platform and information provided by local KPMG practitioners the details presented in the following are drawn from Can, 2012; Hausmacher et. al., 2012; Schäuble and Giger, 2010.

The net licence/royalty income is determined by deducting proportionate financing expenses, administration expenses and taxes. Financing expenses comprise interest as well as expenses which are interest in nature. The law does not stipulate how financing expenses should be allocated. One reasonable possibility would be to allocate financing expenses (and taxes) in proportion to the share of license income to overall income seems. Administration expenses are allocated in proportion to the share of license income to overall income unless the effective administration expenses are lower. Finally, depreciation allowances relating to license income have to be deducted as well as license payments for sub-licenses.

A.5.5 Deduction of interest expenses incurred for the financing of investment

Interest expenses incurred for the purpose of the business are generally deductible. This also applies to interest expenses in relation to dividends that are subject to the participation relief. However, a proportional amount of financing and administrative expenses is deducted from dividend income when determining the amount of relief.

With respect to interest on loans provided by related parties the following restriction applies. The total debt provided by shareholders or affiliated parties should not exceed the aggregate market value of the following assets of the company at the end of the year reduced by the total interest-bearing debt capital from independent third parties at the end of the tax year:[97]

- 100% of cash
- 85% of receivables on goods and services
- 85% of other receivables
- 85% of inventory
- 85% of other current assets
- 90% of domestic or foreign bonds in CHF
- 80% of foreign bonds in foreign currency

[97] See ESTV, 1997; Untersander, 2008, pp. 720 et seq.

- 60% of shares quoted on a stock exchange
- 50% of non-quoted shares
- 70% of participations[98]
- 85% of loans
- 50% of machinery and equipment
- 70% of operating real estate, holiday homes, villas, condos and land for construction
- 80% of other immovable property
- 0% of costs for foundation, costs for capital increase or organizational costs
- 70% of other intangibles

For finance companies, the maximum portion of debt-financing relevant under the Swiss thin capitalization legislation amounts to 6/7 of total assets.

Step-wise approach in order to determine the re-characterised interest:

1. The TCR only apply to related party loans. Guarantees for third party debt provided by related parties may be regarded as intercompany debt as well as for thin capitalisation purposes.
2. The maximum debt-financing is calculated in relation to the assets owned by the corporation (hypothetical debt)
3. In order to determine the deemed equity the hypothetical debt diminished by the third party debt is deducted from the related party debt. If third party debt exceeds hypothetical debt, all related party debt constitutes deemed equity.
4. The amount of interest attributable to the deemed equity is finally calculated by deduction the product of multiplying the hypothetical debt

[98] According to article 665a (2) of the Swiss Code of Obligations participations (Beteiligungen) are capital shares which are held for the purpose of a long-term investment. Voting stock of at least 20% is considered to be a participation.

with the applicable safe harbour interest rates[99] from the incurred interest expenses.

Interest payments on hidden equity are regarded as constructive dividends. In addition, they are subject to withholding tax of 35%.

If interest on related party debt is paid at rates below the safe haven rates, it may also be that payments on hidden equity are acceptable. However, the overall amount of interest payments to related parties must not exceed the maximum permissible related party debt multiplied by the applicable safe haven rate.

If the financing is not in line with the safe haven rules, the assumption of deemed equity and the non-deductibility of interest payments can be avoided if the company proves that the financing is at arm's length.

[99] For 2012 the following safe harbor interest rates apply for loans denominated in CHF which are paid to related parties. For loans received within the scope of the company's business the maximum rate is 3.75% in case of trading or production companies and 3.25% in case of holding or administration companies. In case of real estate loans the maximum rate varies from 1.5% to 2.75% depending on type of the loan and level of debt financing. See Swiss Federal Tax Administration, Circular of 21 February 2012.

B Appendix: Tax Parameters (2012)

Table 20: Corporation tax rates and statutory tax rates (%), 2012

	Nominal corporate income tax rate	Surcharge	Local profit tax rates (nominal)	Effective statutory profit tax rates
Austria	25.00	-	-	25.00
Belgium	33.00	3.00	-	33.99
Bulgaria	10.00	-	-	10.0
Cyprus	10.00	-	-	10.00
Czech Republic	19.00	-	-	19.00
Denmark	25.00	-	-	25.00
Estonia	21.00	-	-	21.00
Finland	24.50	-	-	24.50
France	33.30	3.33	1.50	35.42
Germany	15.00	5.50	15.30	31.16
Greece	20.00	-	-	20.00
Hungary	19.00	-	2.30	20.86
Ireland	**12.50**	**-**	**-**	**12.50**
Italy	27.50	-	3.90	31.12
Latvia	15.00	-	-	15.00
Lithuania	15.00	-	-	15.00
Luxemburg	21.00	5.00	6.75	28.80
Malta	35.00	-	-	35.00
Netherlands	**25.00**	**-**	**-**	**25.00**
Poland	19.00	-	-	19.00
Portugal	25.00	2.50	-	27.50
Romania	16.00	-	-	16.00
Slovak Republic	19.00	-	-	19.00
Slovenia	20.00	-	-	20.00
Spain	30.00	-	7.50	35.25
Sweden	26.30	-	-	26.30
United Kingdom	**25.00**	**-**	**-**	**25.00**

	Nominal corporate income tax rate	Surcharge	Local profit tax rates (nominal)	Effective statutory profit tax rates
EU-27 average	**21.71**			**23.20**
Switzerland (Zug)	**8.5**	**-**	**9.3**	**15.11**

Remarks:

For details on the determination of the effective statutory profit tax rates see Devereux et al. (2010, 2011).

Table 21: Alternative nominal statutory corporation tax rates (%), 2012

	Tax rate	Types of income
Ireland	25	Non-trading income

Table 22: Real estate and net wealth tax for corporations (%), 2012

	Real estate tax		Net wealth tax	
	Nominal[(1)]	Effective[(2)]	Nominal	Effective
Ireland	0.49	0.42	-	-
Netherlands	0.36	0.25	-	-
United Kingdom	2.17	1.60	-	-
Switzerland (Zug)			0.0700	0.0632
- general rate	-	-	0.0700	0.0632
- holding company regime			0.0020	0.0025
- domiciliary company regime			0.0075	0.0095
- mixed company regime			0.0100	0.0126

(1) The nominal tax rate already accounts for possible valuation effects.

(2) The effective rate accounts for the deductibility of real estate tax (τre) from corporate income tax (τcor). It is determined by τre * (1 - τcor). E.g. in the Netherlands, the effective rate amounts to 0.36% * (1 – 25%) = 0.25%. The same holds true for the case of the net wealth tax in Switzerland.

Remarks:

Investments in industrial buildings trigger liability to real estate tax in most countries. The tax base of real estate tax often is the book value or market value of the industrial building. In several countries however, the tax base is a value determined by the tax offices which is not directly connected to the book value of the building but to the building's location. Some of these values relate to the location's market values in the past and do not have any link to recent market values. In these cases, we have to make assumptions concerning the country-specific relation between the acquisition cost we use in the model and the tax value determined by the tax offices. These assumptions are confirmed by tax practitioners from PwC and have been applied in numerous previous studies on behalf of the European Commission (Devereux et al., 2009, 2010, 2011).

Table 23: Tax treatment of inventories, 2012

	Inventory valuation
Ireland	Weighted average
Netherlands	LIFO
United Kingdom	FIFO
Switzerland (Zug)	LIFO

Remarks:

Valuation of inventories represents the most tax-efficient possibility; other possibilities are ignored.

Table 24: Capital allowances for industrial buildings (%), 2012

	Kind of allowance	Allowance rate	Length of period (years)
Ireland	SL	4	25
Netherlands	SL	2.5	40
United Kingdom	-	-	-
Switzerland (Zug)	DB	8	ufd

DB: Declining- balance
SL: Straight line
ufd: Until fully depreciated

Remarks:

Kind of allowance represents the most tax-efficient possibility; other possibilities are ignored.

Table 25: Capital allowances for machinery (%), 2012

	Kind of allowance	Allowance rate	Length of period (years)
Ireland	SL	12.5	8
Netherlands	SL	20	5
United Kingdom	DB	18	ufd
Switzerland	DB	30	ufd

DB: Declining- balance
SL: Straight line
ufd: Until fully depreciated

Remarks:

Kind of allowance represents the most tax-efficient possibility; other possibilities are ignored.

If the depreciation period depends on the useful life of the asset, we assume a period of 7 years for the calculation of the allowance rate.

Table 26: Capital allowances for intangibles – specifically the purchase of a patent (%), 2012

	Kind of allowance	Allowance rate	Length of period (years)
Ireland	SL	7	15
Netherlands	SL	10	10
United Kingdom	SL	10	10
Switzerland	DB	40	ufd

DB: Declining- balance
SL: Straight line
ufd: Until fully depreciated

Remarks:

Kind of allowance represents the most tax-efficient possibility; other possibilities are ignored. If the depreciation period depends on the useful life of an intangible asset and no period is specific in the national tax codes or tax depreciation may follow the accounting treatment, a period of 10 years was assumed for the calculation of the allowance rate.

Table 27: Treatment of foreign source dividends received by parent companies from EU subsidiaries (qualified participation), 2012

	Elimination of double taxation of dividends	Amount of tax-exempt dividends (%)	Deductibility of costs related to tax-exempt foreign dividends
Ireland	Credit with limitation		yes
Netherlands	Exemption	100	no
United Kingdom	Exemption	100	yes
Switzerland	Exemption	100	yes

Table 28: Taxation of patent income, 2012

	Specific tax regime	Tax base	Tax rate (%)
Ireland	None	(net royalty income)	(12.5)
Netherlands	Innovation Box	net royalty income, profits derived from the sale of finished goods produced based on a patent	5
United Kingdom	Patent Box	"relevant IP profits"	10
Switzerland (Nid-walden)	Patent Box	net royalty and license income, capital gains from the sale of IP	8.8

Remarks:

Ireland: No specific tax regime applies in Ireland for royalty income. Yet, royalty income may qualify as trading income (12.5%) (see section A.3.2 for more details on this).

United Kingdom:

The tax base for the Patent Box is determined as follows:

Adjusted taxable trading profit (adjusted EBIT)
* qualifying income/ total trading income
= "Relevant IP income"
./.Trading expenses * 0.15 (mark-up)
= "Qualifying residual profit" (QRP)
./.marketing asset return (=25%*QRP under the small claims treatment)
= "Relevant IP profits"

Qualifying income comprises license fees and royalties, income from the sale of a patent right, patented items or items incorporating a patented item.

Table 29: R&D tax incentives, 2012

	Kind of tax incentive	Rate	Base
Ireland	tax credit	25	
Netherlands	R&D deduction	40	
United Kingdom	R&D deduction	30	
Switzerland	-	-	

C Appendix: Formulas

Table 30: Economic Parameters

True economic depreciation rate (%)	δ	
- intangibles		15.35
- industrial buildings		3.1
- machinery		17.5
real interest rate (%)	r	5
inflation rate (%)	π	2
pre-tax rate of return for EATR (%)	p	20
Nominal interest rate	i	7.1

Table 31: Tax Parameters

Corporate tax rate (%)	τ
Interest deduction	β
Periodical capital allowances (%)	φ
Capital allowances upon acquisition	φ_0
NPV of capital allowances	A
Treatment of inventories and financial assets	v
Tax rate of capital taxes (real estate tax and net e worth tax)	

The **Cost of Capital** is defined as

$$\tilde{p} = \frac{(1-A)(\rho + \delta(1+\pi) - \pi) + v\tau\pi + +(1+\rho)e}{(1+\pi)(1-\tau)} - \delta - \frac{F(1+\rho)}{\gamma(1+\pi)(1-\tau)}$$

where for the case of investment financed with retained earnings

$F^E = 0$

Finally, for the case of investment financed with debt and in the absence of personal taxes

$$F^D = \frac{(1-\tau\varphi_0)\big(\rho - i(1-ß\tau)\big)(1-e)}{(1+\rho)}$$

Add effect of net wealth tax!

Hence,

$$\tilde{p}_D = \tilde{p}_E - \frac{(1-\varphi_0)(\rho - i(1-ß\tau))(1+e)}{(1+\pi)(1-\tau)}$$

The term $v\tau\pi$ reflects both the case of taxation of financial assets and inventories valued on a FIFO basis. In both cases, $v = 1$ (in case of LIFO, $v = 0$; in case of weighted average cost method, $v = 0.5$). This reflects, for example, the taxation of nominal interest payments.

The term $(1+\rho)e$ reflects real estate tax and -if applicable - net wealth tax at rate e payable in the period in which the investment is undertaken. This also affects the amount of finance which must be raised and hence e also appears in both the finance terms, F^{NE} and F^D.

The parameter φ_0 reflects any immediate deductions or tax credits available upon investment and also affects the funds which have to be raised. In addition, the deductibility of interest expenses from the profit tax base is considered by way of the parameter ß, where $ß = 1$ in case interest is fully deductible.

Based on this, in the absence of personal taxes the **effective marginal tax rate (EMTR)** is defined as,

$$EMTR = \frac{(\tilde{p} - r)}{\tilde{p}}$$

Finally, the **effective average tax rate** is defined as (in the absence of personal taxes),

$$EATR = \frac{R^* - R}{\frac{p}{1+r}}$$

where R^* is the economic rent of the project in the absence of taxes

$$R^* = \frac{p - r}{1 + r} = \frac{0.2 - 0.05}{1.05} \approx 14.29\%$$

Hence,

$$EATR = \frac{0.1429 - R}{0.1905}$$

In turn, R is the economic rent of the project in the presence of taxes and is defined as

$$R = \frac{\gamma}{(1+\rho)}\{(p + \delta)(1 + \pi)(1 - \tau) - v\tau\pi - [\rho + \delta(1 + \pi) - \pi](1 - A) - (1 + \rho)e\}+F$$

D Appendix: Worked examples Netherlands

Table 32: Tax Parameters Netherlands, 2012

Corporation tax rate (%)	τ	25
Interest deduction	ß	1
Capital allowances for standard depreciation	A_d	
- intangibles (%)		10 sl
- industrial buildings (%)		2.5 sl
- machinery (%)		14.29 sl
R&D deduction (%)	A_0	40
Treatment of inventories (LIFO)	v	0
Taxation of financial assets (FIFO)	v	1
Effective real estate tax rate (%)	e	0.2
Effective tax rate Innovation Box (%)	τ_{IB}	5
EU-27 average effective statutory profit tax rate (%)	τ_{EU-27}	23.2

D.1 Net Present Value of capital allowances

Industrial buildings, intangibles, and machinery receive allowances on a straight line basis at 2.5%, 10% and 14.29% per year, respectively.

$$A_{BUILD} = \varphi * \tau * \{\frac{1}{1+\rho}^{1} + \frac{1}{1+\rho}^{2} + \cdots + \frac{1}{1+\rho}^{40}\}$$

$$A_{BUILD} = 0.025 * 0.25 * \left\{\frac{1}{1.071}^{1} + \frac{1}{1.071}^{2} + \cdots + \frac{1}{1.071}^{40}\right\} \approx 8.24\%$$

$$A_{INTANG} = 0.1 * 0.25 * \left\{\frac{1}{1.071}^{1} + \frac{1}{1.071}^{2} + \cdots + \frac{1}{1.071}^{10}\right\} \approx 17.48\%$$

$$A_{MACH} = 0.1429 * 0.25 * \left\{\frac{1}{1.071}^{1} + \frac{1}{1.071}^{2} + \cdots + \frac{1}{1.071}^{7}\right\} \approx 19.18\%$$

D.2 Cost of Capital – only corporate taxes

D.2.1 Taxation of holding activities

Due to the Dutch participation exemption relief in place, the source country profit taxes are decisive for the costs of capital of investments in participations. Assuming that the holding company has participations in all Member States of the EU (including the Netherlands) which pay the same amont of dividends the effective source country tax rate is the EU-27 average statutory profit tax rate of 23.2% taking into account surcharges levied on top of corporation tax as well as local profit taxes. Furthermore, the deductibility of any of these taxes from their own tax base or the tax base of any of the other profit taxes is taken into account.

$$\tilde{p}^{E}_{Holding} = \frac{(\rho - \pi)}{(1+\pi)(1-\tau_{EU-27})}$$

$$\tilde{p}^{E}_{Holding} = \frac{(0.071 - 0.02)}{(1+0.02)(1-0.232)} \approx 6.5\%$$

Interest expenses relating to exempt foreign dividends are nevertheless deductible from the corporate income tax base (ß = 1).

$$\tilde{p}^{D}_{Holding} = \tilde{p}^{E}_{Holding} - \frac{\rho - i(1 - ß\tau_{NL})}{(1+\pi)(1-\tau_{EU-27})}$$

$$\tilde{p}^{D}_{Holding} = \tilde{p}^{E}_{Holding} - \frac{0.071 - 0.071 * (1 - 1 * 0.25)}{(1+0.02) * (1-0.232)} = 0.065 - 0.023$$

$$\tilde{p}^{D}_{Holding} \approx 4.2\%$$

D.2.2 Taxation of financing and treasury activities

Assuming that interest is fully deductible from the tax base of the profit tax base of the payer/ debtor and that no withholding tax is levied due to the application of the Interest & Royalty Directive, the proceeds resulting from the debt claim are only subject to tax in the country of residence of the creditor.

$$\tilde{p}^{E}_{Financing} = \frac{\rho - \pi - i\tau_{EU-27}}{(1+\pi)(1-\tau_{EU-27})}$$

$$\tilde{p}^{E}_{Financing} = \frac{(0.071 - 0.02) + 0.071 * (0.25 - 0.232)}{(1+0.02) * (1-0.232)} \approx 6.7\%$$

In case the investment in the debt claim is refinanced with debt, the interest expenses remain effectively untaxed in the country of residence of the creditor.

$$\tilde{p}^{D}_{Financing} = \frac{\rho - \pi - i * \tau_{EU-27}}{(1+\pi)(1-\tau_{EU-27})}$$

$$\tilde{p}^{D}_{Financing} = \frac{0.071 - 0.02 - 0.071 * 0.232}{(1+0.02) * (1-0.232)} \approx 4.4\%$$

D.2.3 Taxation of R&D activities

Expenditure incurred for self-developed assets do not need to be capitalised but can be deducted immediately instead. Hence, the NPV of depreciation allowances is $A = \varphi_0 \tau = 1 * 0.25$ and the cost of capital amount to

$$\tilde{p}^{E}_{R\&D} = \frac{(1-A)(\rho + \delta(1+\pi) - \pi)}{(1+\pi)(1-\tau)} - \delta$$

where $A = \varphi_0 \tau = 1 * \tau = 25\%$

$$\tilde{p}^{E}_{R\&D} = \frac{(1-0.25) * (0.071 + 0.1535 * (1+0.02) - 0.02)}{(1+0.02) * (1-0.25)} - 0.1535 = 5\%$$

In case of debt-financing, the immediate deduction of the capital expenditure affects the amount of funds. Hence, the cost of capital is

$$\tilde{p}^{D}_{R\&D} = \tilde{p}^{E}_{R\&D} - \frac{(1-\varphi_0\tau)(\rho - i(1-ß\tau))}{(1+\pi)(1-\tau)}$$

$$\tilde{p}^{D}_{R\&D} = \tilde{p}^{E}_{R\&D} - \frac{(1-0.25) * (0.071 - 0.071 * (1 - 1 * 0.25))}{(1+0.02) * (1-0.25)} \approx 3.3\%$$

R&D Deduction

Companies may deduct an additional 40% (in 2012) of the expenditure – including investment spending - for qualifying in-house R&D. Wage costs, financing costs and cost relating to contract R&D do not qualify for the deduction.

Taking into account the R&D deduction, the NPV of capital allowances for self-developed intangible assets amounts to

$$A = A_{RD\ Deduction} + \varphi_0 \tau = 0.4 * 0.25 + 1 * 0.25 \approx 35\%$$

Consequentially, the Cost of Capital decrease to

$$\tilde{p}^{E}_{R\&D,Deduction} = \frac{(1 - 0.35) * (0.071 + 0.1535 * (1 + 0.02))}{(1 + 0.02) * (1 - 0.25)} - 0.1535$$

$$\tilde{p}^{E}_{R\&D,Deduction} \approx 2.3\%$$

$$\tilde{p}^{D}_{R\&D,Deduction} = \tilde{p}^{E}_{R\&D,Deduction} - \frac{(1 - \tau\varphi_0)\big(\rho - i(1 - ß\tau)\big)}{(1 + \pi)(1 + \tau)}$$

$$\tilde{p}^{D}_{R\&D,Deduction} = \tilde{p}^{E}_{R\&D,Deduction} - \frac{(1 - 0.35) * (0.071 - 0.071 * 0.75)}{(1 + 0.02) * (1 - 0.25)}$$

$$\tilde{p}^{D}_{R\&D,Deduction} \approx 0.8\%$$

Innovation Box

Under the Innovation Box royalties derived from self-developed intangible assets may be taxed at an effective corporate tax rate of 5% instead of the general tax rate of 25% by taking into account only 5/25 of the net profits. The Innovation Box furthermore requires that the R&D expenses which have been deducted in the past have to be recaptured first. Consequentially, only net profits from qualifying intangible assets are taxed at an effective tax rate of 5% instead of the general corporate income tax rate of 25%.

Applying the Innovation Box results affects the Cost of Capital as follows

$$\tilde{p}^{RE}_{R\&D,IB} = \frac{(1 - A_{IB})(\rho + \delta(1+\pi) - \pi)}{(1+\pi)(1-\tau_{IB})} - \delta$$

where the NPV of capital allowances comprises the NPV of the immediate deduction of R&D expenses as well as the recapture of these expenses upon election of the Innovation Box regime.

$$A_{R\&D,IB} = \underbrace{\varphi_0 \tau}_{immediate\ deduction} - \underbrace{\frac{\varphi_0 \tau}{1+\rho}}_{Recapture} + \underbrace{\varphi \tau_{IB} \{\frac{1}{1+\rho}^{1} + \cdots + \frac{1}{1+\rho}^{10}\}}_{\text{Periodical depreciation}}$$

$$A_{R\&D,IB} = 1 * 0.25 - \frac{1*0.25}{1+0.071} + 0.1 * 0.05 * \{\frac{1}{1.071}^{1} + \cdots + \frac{1}{1.071}^{10}\}$$

$$A_{R\&D,IB} = 25\% - 23.3\% + 3.5\% \approx 5.15\%$$

$$\tilde{p}^{E}_{R\&D,IB} = \frac{(1 - 0.0515) * (0.071 + 0.1535 * 1.02 - 0.02)}{1.02 * (1 - 0.05)} - 0.1535 \approx 5\%$$

Interest expenses relating to intangibles that are taxed under the Innovation Box have to be apportioned to the income which is taxed under the Innovation Box regime.

$$\tilde{p}^{D}_{R\&D,IB} = \tilde{p}^{E}_{R\&D,IB} - \frac{(1 - \tau\varphi_0)(\rho - i(1 - ß\tau_{IB}))}{(1+\pi)(1-\tau_{IB})}$$

$$\tilde{p}^{D}_{R\&D,IB} = \tilde{p}^{RE}_{R\&D,IB} - \frac{(1-0.25)*(0.071-0.071*(1-1*0.05)}{(1+0.02)*(1-0.05)}) \approx 4.7\%$$

R&D Deduction and Innovation Box applying simultaneously

The R&D deduction and the Innovation Box may be applied simultaneously. Consequentially, the NPV of capital allowances mounts to

$$A_{Intangible} = A_{IB} + A_{RD\ Deduction} \approx 0.0515 + 0.1 = 15.2\%$$

Consequentially, the Cost of Capital amount to

$$\tilde{p}^{E}_{R\&D} = \frac{(1-0.1515)*(0.071+0.1535*1.02-0.02)}{1.02*(1-0.05)} - 0.1535 \approx 2.8\%$$

As interest expenses are nevertheless deductible at the regular corporate tax rate of 25%, the cost of capital of a debt-financed investment in a self-developed intangible asset that qualifies for the R&D deduction as well as the Innovation Box amount to

$$\tilde{p}^{D}_{R\&D} = \tilde{p}^{E}_{R\&D} - \frac{(1-\tau\varphi_0)(\rho - i(1-ß\tau_{IB}))}{(1+\pi)(1-\tau_{IB})}$$

$$\tilde{p}^{D}_{R\&D} = \tilde{p}^{E}_{R\&D} - \frac{(1-0.25)*(0.071-0.071*(1-1*0.05))}{(1+0.02)*(1-0.05)} \approx 2.6\%$$

D.2.4 Taxation of IP activities

In case of an acquired intangible asset, the cost of capital amount to

$$\tilde{p}^{E}_{IP} = \frac{(1-A)(\rho+\delta(1+\pi)-\pi)}{(1+\pi)(1-\tau)} - \delta$$

$$\tilde{p}^{E}_{IP} = \frac{(1-0.1748)*(0.071+0.1535*(1+0.02)-0.02)}{(1+0.02)*(1-0.25)} - 0.1535 \approx 7\%$$

$$\tilde{p}^{D}_{IP} = \tilde{p}^{E}_{IP} - \frac{0.071-0.071*(1-1*0.25)}{(1+0.02)*(1-0.25)} \approx 4.7\%$$

D.3 Effective marginal tax rates (EMTR) – only corporate taxes

D.3.1 Holding activities – taxation of dividend income

$$EMTR^{E}_{Holding} = \frac{0.0651 - 0.05}{0.0651} \approx 23.2\%$$

$$EMTR^{D}_{Holding} = \frac{0.0424 - 0.05}{0.0424} \approx -17.8\%$$

D.3.2 Group financing and treasury services – taxation of interest income

$$EMTR^{E}_{Financing} = \frac{0.0667 - 0.05}{0.0667} \approx 25.1\%$$

$$EMTR^{D}_{Financing} = \frac{0.0441 - 0.05}{0.0441} = -13.4\%$$

D.3.3 Research and development activities (self-developed intangibles)

$$EMTR^{E}_{R\&D} = \frac{0.05 - 0.05}{0.05} = 0\%$$

$$EMTR^{D}_{R\&D} = \frac{0.0326 - 0.05}{0.0236} \approx -53.4\%$$

R&D Deduction

In case the R&D Deduction applies in isolation

$$EMTR^{E}_{R\&D} = \frac{0.0229 - 0.05}{0.0229} \approx -118.7\%$$

$$EMTR^{D}_{R\&D} = \frac{0.0078 - 0.05}{0.0078} \approx -542.3\%$$

Innovation Box

In case the Innovation Box applies in isolation

$$EMTR^{E}_{R\&D} = \frac{0.0497 - 0.05}{0.0497} \approx -0.7\%$$

$$EMTR^{D}_{R\&D,} = \frac{0.0544 - 0.05}{0.0544} \approx -6.6\%$$

R&D Deduction and Innovation Box applying simultaneously

$$EMTR^{E}_{R\&D} = \frac{0.0357 - 0.05}{0.0357} \approx -77\%$$

$$EMTR^{D}_{R\&D} = \frac{0.033 - 0.05}{0.033} \approx -96.1\%$$

D.3.4 Exploitation of intellectual property (acquired intangibles)

$$EMTR^{E}_{IP} = \frac{0.0704 - 0.05}{0.0704} \approx 29\%$$

$$EMTR^{D}_{IP} = \frac{0.0472 - 0.05}{0.0472} \approx -5.9\%$$

D.4 Effective average tax rates (EATR) – only corporate taxes

D.4.1 Holding activities – taxation of dividend income

$$R^{E}_{Holding} = \frac{1}{(1+\rho)}\{p(1+\pi)(1-\tau_{EU-27}) - v\tau_{EU-27}\pi - \rho + \pi\}$$

$$R^{E}_{Holding} = \frac{1}{1.071}\{0.2 * 1.02 * 0.768 - 0 * 0.232 * 0.02 - 0.071 + 0.02\}$$

$$R^{E}_{Holding} \approx 9.9\%$$

$$R^{D}_{Holding} = R^{RE}_{Holding} + F^{D}_{Holding}$$

where,

$$F^{D}_{Holding} = \frac{\left(\rho - i\left(1 - ß\tau_{Regular}\right)\right)}{(1+\rho)} = \frac{\left(0.071 - 0.0071 * (1 - 1 * 0.25)\right)}{(1 + 0.071)}$$

$$F^{D}_{Holding} \approx 0.0166$$

$$R^{D}_{Holding} = 0.0987 + 0.0166 \approx 11.5\%$$

Resulting in

$$EATR^{RE/NE}_{Holding} == \frac{0.1429 - 0.0987}{0.1905} \approx 23.2\%$$

$$EATR^{D}_{Holding} = \frac{0.1429 - 0.1152}{0.1905} \approx 14.5\%$$

D.4.2 Group financing and treasury services – taxation of interest income

N.a.

D.4.3 Research and development activities (self-developed intangibles)

$$R^{E}_{R\&D} = \frac{1}{1.071}\{(0.2 + 0.1535) * 1.02 * 0.75 - (0.071 + 0.1535 * 1.02 - 0.02) * (1 - 0.25)\}$$

$$R^{E}_{R\&D} \approx 10.71\%$$

$$R^{D}_{R\&D} = R^{E}_{R\&D} + F^{D}_{R\&D}$$

where

$$F^{D}_{R\&D} = \frac{(1 - \varphi_o \tau)\left(\rho - i\left(1 - ß\tau_{Regular}\right)\right)}{(1+\rho)}$$

$$F_{R\&D}^{D} = \frac{(1-0.25)*\left(0.071-0.071*(1-1*0.25)\right)}{(1+0.071)} \approx 0.0124$$

$$R_{R\&D}^{D} = 0.1071 + 0.0124 \approx 12\%$$

$$EATR_{R\&D}^{R} = \frac{0.1429-0.1071}{0.1905} \approx 18.8\%$$

$$EATR_{R\&D}^{D} = \frac{0.1429-0.1196}{0.1905} \approx 12.2\%$$

R&D Deduction

The application of the R&D Deduction results in a higher NPV of capital allowances of $A = A_{RD\ Deduction} + \varphi_0\tau = 0.4*0.25 + 1*0.25 \approx 35\%$

Consequentially,

$$R_{R\&D}^{E} = \frac{1}{1.071}\{(0.2+0.1535)*1.02*0.75 - (0.071+0.1535*1.02-0.02)*(1-0.35)\}$$

$$R_{R\&D}^{E} \approx 12.7\%$$

$$F_{R\&D}^{D} = \frac{(1-\varphi_o\tau)\left(\rho - i\left(1-ß\tau_{Regular}\right)\right)}{(1+\rho)}$$

$$F_{R\&D}^{D} = \frac{(1-0.35)*\left(0.071-0.071*(1-1*0.25)\right)}{(1+0.071)} \approx 0.0108$$

$$R_{R\&D}^{D} = 0.1265 + 0.0108 \approx 13.7\%$$

$$EATR_{R\&D}^{E} = \frac{0.1429-0.1265}{0.1905} \approx 8.6\%$$

$$EATR^{D}_{R\&D} = \frac{0.1429 - 0.1373}{0.1905} \approx 2.9\%$$

Innovation Box

$$R_{R\&D,IB} = \frac{\gamma}{(1+\rho)}\{(p+\delta)(1+\pi)(1-\tau_{IB}) - [\rho + \delta(1+\pi) - \pi](1-A_{IB})\}$$+F

where $A_{R\&D,IB} \approx 5.2\%$

$$R^{E}_{R\&D,IB} = \frac{1}{1.071}\{(0.2 + 0.1535) * 1.02 * 0.95 - (0.071 + 0.1535 * 1.02 - 0.02) * (1 - 0.0515\}$$

$$R^{E}_{R\&D,IB} \approx 13.6\%$$

$$F^{D}_{R\&D,IB} = \frac{(1-\varphi_o\tau)\big(\rho - i(1-ß\tau_{IB})\big)}{(1+\rho)} = 0.25\%$$

$$F^{D}_{R\&D,IB} = \frac{(1-0.25) * \big(0.071 - 0.071 * (1 - 1 * 0.05)\big)}{(1+0.071)} \approx 0.25\%$$

$$R^{D}_{R\&D,IB} = 0.1360 + 0.0025 \approx 13.8\%$$

$$EATR^{E}_{R\&D,IB} = \frac{0.1429 - 0.1360}{0.1905} \approx 3.6\%$$

$$EATR^{D}_{R\&D,IB} = \frac{0.1429 - 0.1385}{0.1905} \approx 2.3\%$$

R&D Deduction and Innovation Box applying simultaneously

In case the R&D Deduction and the Innovation Box are applied simultaneously, the NPV of capital allowances rises to approx. 15.15 %. Consequentially,

$$R^{E}_{R\&D} = \frac{1}{1.071}\{(0.2 + 0.1535) * 1.02 * 0.95 - (0.071 + 0.1535 * 1.02 - 0.02) * (1 - 0.1515)\}$$

$$R^{E}_{R\&D} \approx 15.5\%$$

$$F^{D}_{R\&D} = \frac{(1-\varphi_o\tau)\left(\rho - i(1-ß\tau_{IB})\right)}{(1+\rho)} = 0.25\%$$

$$R^{D}_{R\&D} = 0.1554 + 0.0025 \approx 15.8\%$$

$$EATR^{E}_{R\&D} = \frac{0.1429 - 0.1554}{0.1905} \approx -6.6\%$$

$$EATR^{D}_{R\&D} = \frac{0.1429 - 0.1579}{0.1905} \approx -7.9\%$$

D.4.4 Exploitation of intellectual property (acquired intangibles)

$$R^{E}_{IP} = \frac{1}{(1+\rho)}\{(p+\delta)(1+\pi)(1-\tau) - [\rho + \delta(1+\pi) - \pi](1-A)\}$$

$$R^{E}_{IP} = \frac{1}{1.071}\{(0.2 + 0.1535) * 1.02 * 0.75 - (0.071 + 0.1535 * 1.02 - 0.02) * (1 - 0.1748)\} \approx 9.3\%$$

$$R^{D}_{IP} = R^{E}_{IP} + F^{D}_{IP}$$

$$F^{D}_{IP} = \frac{\left(\rho - i\left(1 - ß\tau_{Regular}\right)\right)}{(1+\rho)} = \frac{\left(0.071 - 0.071 * (1 - 1 * 0.25)\right)}{(1 + 0.071)} \approx 0.0166$$

$$R^{D}_{IP} = 0.0926 + 0.0166 \approx 10.9\%$$

$$EATR^{RE}_{IP} = EATR^{NE}_{IP} = \frac{0.1429 - 0.0926}{0.1905} \approx 26.4\%$$

$$EATR^{D}_{IP} = \frac{0.1429 - 0.1091}{0.1905} \approx 17.7\%$$