

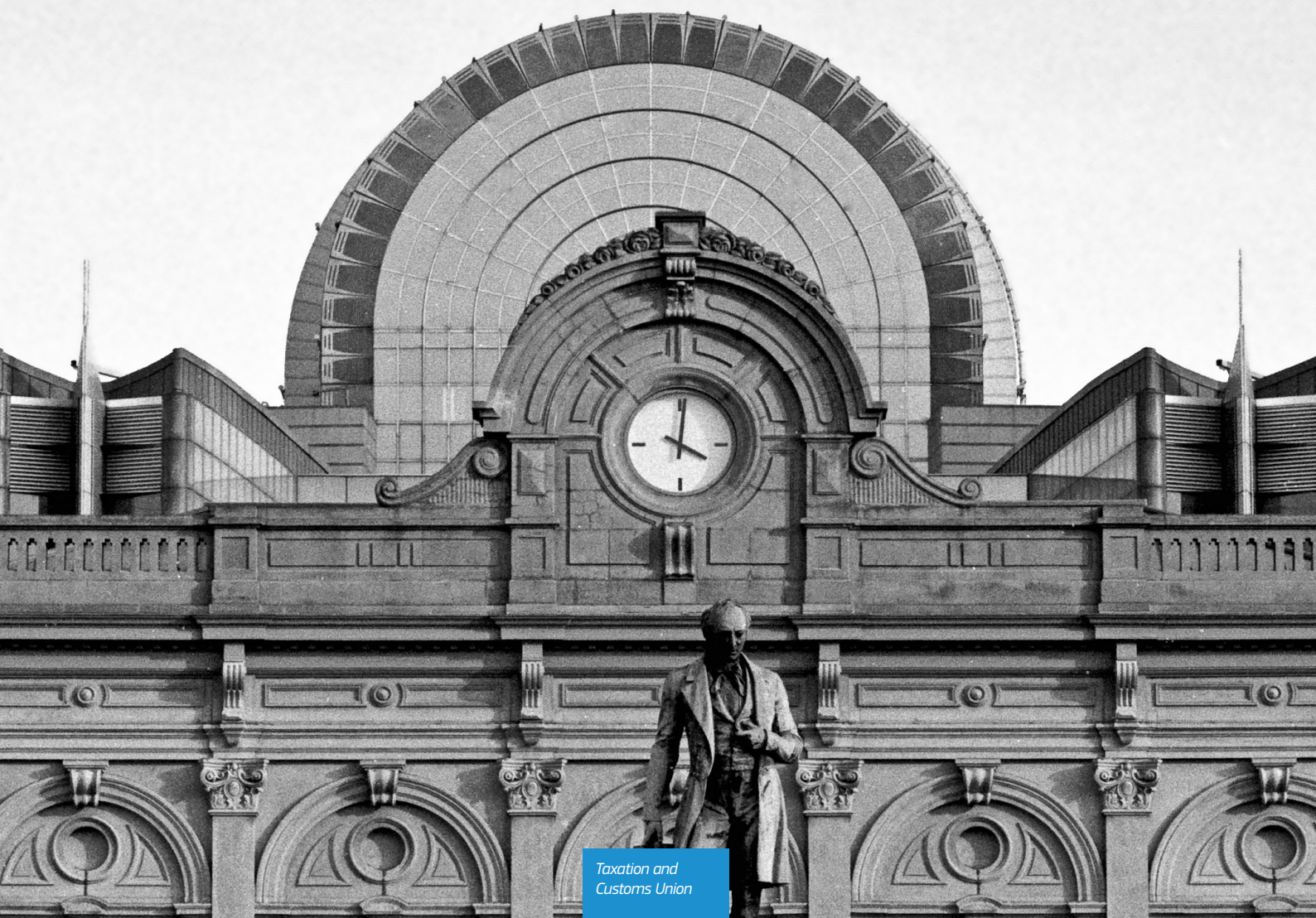


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WORKING PAPER N. 65 - 2016

**CENTRE FOR EUROPEAN
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The Effects of Tax Reforms to Address the Debt-Equity Bias on the Cost of Capital and on Effective Tax Rates



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Cataloguing data can be found at the end of this publication.

Luxembourg: Publications Office of the European Union, 2016

doi:10.2778/919188 (printed)
ISBN 978-92-79-62603-6 (printed)

doi:10.2778/577384 (PDF)
ISBN 978-92-79-62604-3 (PDF)

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PRINTED ON WHITE CHLORINE-FREE PAPER



FINAL REPORT

THE EFFECTS OF TAX REFORMS TO ADDRESS THE DEBT-EQUITY BIAS ON THE COST OF CAPITAL AND ON EFFECTIVE TAX RATES

ON-DEMAND ECONOMIC ANALYSIS UNDER FRAMEWORK CONTRACT
TAXUD/2013/CC/120

FRAMEWORK CONTRACT FOR THE PROVISION OF EFFECTIVE TAX RATES
IN THE CONTEXT OF AN ENLARGED EUROPEAN UNION AND
RELATED SUPPORTING SERVICES

**SUBMISSION BY THE
CENTRE FOR EUROPEAN ECONOMIC RESEARCH (ZEW) GMBH**

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Table of Contents

Executive Summary	5
1. Introduction: structure of the final report	11
2. Motivation	11
3. Study design and requested tasks	12
4. Methodology: the Devereux/Griffith model	15
4.1 General framework	15
4.2 Analysing interest deduction limitation rules and fundamental tax reforms with the Devereux/Griffith model.....	17
5. Status Quo – current debt bias in corporate tax systems in the EU28 Member States	21
5.1 Corporate level	21
5.2 Shareholder level	23
6. Interest deduction limitation rules.....	26
6.1 Qualitative analysis	26
6.2 Quantitative analysis	29
6.2.1 Corporate Level	30
6.2.2 Shareholder level	34
7. Impact of fundamental tax reforms	36
7.1 Overview of fundamental tax reforms	36
7.1.1 Comprehensive Business Income Tax (CBIT)	36
7.1.2 Allowance for Corporate Equity (ACE)	37
7.1.3 Allowance for Corporate Capital (ACC)	37
7.1.4 Cost of Capital Allowance (COCA)	38
7.2 Corporate level	38
7.2.1 Overall impact of fundamental tax reforms.....	38
7.2.2 Marginal investments (cost of capital)	42
7.2.3 Profitable investments (EATR).....	45
7.2.4 Interim findings	47
7.3 Shareholder level	47
7.3.1 Overall impact of fundamental tax reforms.....	48
7.3.2 Marginal investments (cost of capital)	51
7.3.3 Profitable investments (EATR).....	55
7.3.4 Interim findings	58
7.4 Revenue neutral implementation of fundamental tax reforms.....	58
7.4.1 Corporate level	60
7.4.2 Shareholder level	63

7.5	Resulting cost of capital following a revenue neutral implementation of fundamental tax reforms	66
7.5.1	Corporate level	66
7.5.2	Shareholder level	68
7.6	Sensitivity analysis	70
7.6.1	Impact of profitability on the EATRs for fundamental tax reforms	70
7.6.2	Required adjustments of income tax rates for a revenue neutral implementation of fundamental tax reforms	73
7.6.3	Cost of capital under revenue neutral income tax rates	75
8.	Conclusions	77
	References.....	80
	Appendix	83
A1.	Adaption of the formulas of the Devereux/Griffith model	83
A1.1	The basic formulas	83
A1.2	General remarks concerning the implementation of interest deduction limitation rules and fundamental tax reforms	84
A1.3	Interest deduction limitation rules/ Comprehensive business income tax (CBIT)	85
A1.3.1	Modification of financing terms.....	86
A1.3.2	Modification of shareholder taxes	86
A1.4	Allowance for corporate equity (ACE)	86
A1.4.1	Modification of financing terms.....	87
A1.4.2	Modification of shareholder taxes	87
A1.5	Allowance for corporate capital (ACC)	87
A1.5.1	Modification of financing terms.....	88
A1.5.2	Modification of shareholder taxes	89
A1.6	Cost of capital allowance (COCA).....	89
A1.6.1	Modification of financing terms.....	90
A1.6.2	Modification of shareholder taxes	90
A2.	Additional information for interest deduction limitation rules.....	93
A2.1	Detailed qualitative description of the interest deduction limitation rules for each EU28 Member State	93

Executive Summary

1. Main objectives

Corporate income tax systems usually discriminate between the different sources of finance: They favour debt over equity financing since interest costs are deductible for tax purposes whereas there is no equivalent relief for equity-financed investments. This unequal treatment might cause economic problems such as excessive leverage in the corporate sector and an associated increased vulnerability to economic crises, disadvantages for firms with restricted access to external funds and profit shifting incentives.

To achieve an equal treatment of debt and equity financing, either an additional deduction for equity financing could be granted or the current deduction for interest expenses could be disallowed. A disallowance of interest expenses could be achieved by the interest deduction limitation rules which are already employed in several Member States. Other far-reaching, fundamental tax reforms to address the current debt bias are represented by the Comprehensive Business Income Tax (CBIT), Allowance for Corporate Equity (ACE), Allowance for Corporate Capital (ACC) and Cost of Capital Allowance (COCA). The present study provides an in-depth analysis of the effects of these different reform options on effective tax burdens in the EU28 Member States. Moreover, the study gives guidance to which extent current income tax rates at corporate and personal level would have to be adjusted for a revenue neutral implementation of fundamental tax reforms. On the basis of stylised model computations, this study informs about whether different fundamental tax reforms could, in principle, manage to address the debt bias and promote investment, possibly in a revenue neutral way.

The main objectives of the study can be summarised as follows:

- Analyse current interest deduction limitation rules in the EU28 Member States and assess the effect of interest deduction limitation rules on effective tax rates;
- Provide insights on the effects of the fundamental tax reform options on current tax systems;
- Consider a revenue-neutral implementation of the reforms and possible consequences for the level of investment in the EU28 Member States.

2. Methodology and study design

The study relies on the general framework of the Devereux/Griffith model which considers two types of investments, i.e. profitable and marginal investments. For marginal investments, the model provides the cost of capital and the effective marginal tax rate (EMTR) as a measure for effective taxation. The cost of capital represents the minimum pre-tax rate of return required for the investment to be worthwhile for the investor and should, from a theoretical point of view, impact on the scale of investments. For profitable investments, the effective average tax rate (EATR) can be calculated: The EATR measures the effective tax rate levied on investments that generate economic rents and is used to identify the effect of taxation on discrete location choices in particular. The implementation of the fundamental tax reforms into the Devereux/Griffith framework requires certain adaptations to the model with respect to the tax treatment of the different sources of finance or adjustments to shareholder taxation. To gain insights on the effect of interest deduction limitation rules and fundamental tax reforms on effective tax rates, the cost of capital and the EATR of the reform scenario are compared to the pre-reform scenario (status quo).

The study is divided into two main tasks:

- 1) Task 1 deals with the calculation of effective tax rates for Member States with interest deduction limitation rules and assumes binding limits to the deductibility of interest costs.
- 2) Task 2 is dedicated to the analysis of a revenue neutral introduction of the CBIT, ACE, ACC and COCA, respectively.

The analysis for Task 2 is conducted in four subsequent steps: First, the implementation of the four reform options in the prevailing tax system of each Member State and the computation of the reform implications for effective company taxation at corporate and shareholder level are carried out for marginal and profitable investments (cost of capital and EATR). Second, the analysis takes into account that Member States' tax revenues would be affected by a fundamental tax reform. Therefore, calculations reflecting a possible revenue neutral implementation of fundamental tax reforms are presented. For the purpose of this study, revenue neutrality is assumed to be given if the EATR of the post-reform scenario (i.e. with fundamental tax reform) corresponds to the EATR of the pre-reform scenario. Depending on the considered level of taxation (corporate or shareholder level), either the statutory corporate income tax rate or the personal income tax rate on dividend income is adjusted. Third, changes to the effective tax parameters that follow from the revenue neutral implementation of the fundamental tax reforms are assessed with regard to the resulting cost of capital and thus, with regard to their potentially positive and negative impact on the scale of investment. Fourth, a sensitivity analysis regarding the economic assumptions underlying the model calculations in the previous steps is conducted.

3. Main results

The analysis of effective tax measures given the current tax codes as of 2015 provides the following insights:

- The debt bias can be observed in existing corporate tax systems of EU Member States. It materialises in lower cost of capital and EATR for debt-financed investments compared to investments financed with retained earnings or new equity. The debt bias stems from the tax deductibility of interest expenses which shields the marginal return of debt-financed investments from taxation whereas there is no equivalent relief for equity-financed investments.
- The debt bias is also prevalent at the shareholder level since no corresponding relief exists on returns from equity financing. The costs of capital and EATRs for debt-financed investments are therefore also lower compared to investments financed with retained earnings and new equity.

With regard to the impact of interest deduction limitation rules (Task 1), the main results of this study are:

- Member States use different approaches to limit the deductibility of interest such as the arm's length approach, fixed ratio approach as well as earnings stripping rules. A comparison with regard to the severity of the different rules cannot be made as they depend on several characteristics.
- Binding interest deduction limitation rules ensure financing neutrality between equity and debt. However, since the cost of capital and EATR increase as a consequence, binding interest deduction limitation rules might affect both the scale of investment and discrete location choices negatively.

The main findings from the implementation of the fundamental tax reform options and the calculation of effective tax levels (Task 2, subtask 1) are as follows:

- The CBIT disallows the deductibility of interest at the corporate level. Furthermore, any capital income is exempt from taxes at the level of the provider of the capital (equity or debt).
 - At the corporate level, both the cost of capital and EATR for debt-financed investments increase and “levelled up” to the effective tax levels on equity financing. Although financing neutrality is established, the CBIT thus potentially has negative effects on the scale of investments as well as on the attractiveness of the EU28 Member States as a location for profitable investment.
 - At the shareholder level, the complete suspension of personal income taxation aligns the effective tax levels to those at the corporate level. Financing neutrality is therefore also extended to the shareholder level in most Member States. The costs of capital of equity-financed investments are predominantly increasing whereas the EATRs are decreasing for most Member States as the excess return of a profitable investment is not taxed anymore.
- The ACE provides for a deduction of a notional return on equity at the corporate level. Shareholder taxation remains unaffected.
 - At the corporate level, effective tax levels of equity-financed investments are “levelled down” to those under debt financing. Nevertheless, financing neutrality depends on the chosen notional interest rate. Since the ACE leads to lower levels of effective taxation at the corporate level, its introduction is assumed to have a positive impact on the scale of investments and location choices in the EU28 Member States.
 - At the shareholder level, the ACE leads to lower levels of cost of capital and EATR. Financing neutrality, however, can only be achieved to a limited extent in some Member States if additional conditions are fulfilled.
- The ACC allows the deductibility of a notional return on all the capital (debt and equity) at the corporate level. Shareholder taxation remains unaffected.
 - At the corporate level, effective tax levels for debt and equity financing are always the same independent of the level of the notional interest rate. In consequence, a “levelling” is achieved in any case and the debt bias can thus be mitigated. Still, the impact of an ACC on the scale of investments and location choices for profitable investments depends on the underlying notional interest rate.
 - At the shareholder level, effects are similar to those of an ACE. However, financing neutrality is not restricted to systems where the notional interest rate is equal to the nominal interest rate.
- The COCA allows for a notional deduction on all the capital (debt and equity) at the corporate level as in the ACC case. At the same time, the tax base at the shareholder level corresponds to the notional return deducted at the corporate level. The actual dividend received at the shareholder level is not taxed anymore.
 - At the corporate level, the COCA yields the same effects as the ACC.
 - At the shareholder level, financing neutrality can be established since all returns to the shareholder are taxed on the same rate based on a notional amount. The EATRs for all three financing sources are decreasing to a large extent as only a notional amount and not the actual dividend received is taxed.

The main findings on a revenue neutral implementation of the fundamental tax reforms (Task 2, subtask 2) are:

- Due to the non-deductibility of interest expense, the corporate income tax base is broader under the CBIT than at status quo which allows reducing statutory corporate income tax rates. For the ACE, in contrast, the additional notional interest deduction for equity-financed investments narrows the corporate tax base and demands an upward adjustment of the statutory corporate income tax rates in order to maintain revenue neutrality. The required adjustment for the ACC/COCA depends on the underlying notional interest rate.
- Since shareholder taxation is completely eliminated under a CBIT system, it is again the corporate income tax rate that needs to be adjusted to maintain revenue neutrality at the shareholder level. In contrast to the previous findings, the statutory corporate income tax rate then needs to be increased. For the ACE, the dividend tax rate needs to be increased in all cases. Revenue neutrality for the ACC at the shareholder level could in fact also require a decrease in dividend tax rates if a low notional interest rate is chosen. The study at hand disregards a revenue neutral implementation of a COCA at the shareholder level since the tax base in the form of a notional return might lag significantly behind the actual profit such that tax rates on the notional return would be extremely high.

With regard to the changes in the cost of capital that result from a revenue neutral implementation of the fundamental tax reforms and their impact on the level of investment (Task 2, subtask 3), the main results are:

- Neither the decrease (CBIT) nor the increase (ACE, ACC/COCA) in the corporate income tax rate required for a revenue neutral implementation at the corporate level unfolds a significant effect for the resulting cost of capital. The marginal return of an investment is always shielded from corporate taxation in the ACE and ACC/COCA scenario and thus, changes in corporate income tax rates are of minor importance. The scale of investment is therefore only marginally affected if a fundamental tax reform is introduced under current or adjusted (revenue neutral) corporate income tax rates.
- The increase in corporate income tax rates to achieve revenue neutrality at the shareholder level for the CBIT leads to higher costs of capital. For ACE and ACC, the increase in dividend tax rates at the shareholder level to achieve revenue neutrality harms marginal investments financed with new equity. Investments financed with retained earnings and debt are not affected by the adjustment of the dividend tax rate.

The sensitivity analysis (Task 2, subtask 4) for different pre-tax rates of profitability provides the following additional insights:

- The conclusions from the baseline calculations do not change for varying pre-tax rates of return. At the corporate level, the CBIT leads to a “levelling up”, the ACE to a “levelling down” and ACC/COCA to a “levelling”. Financing neutrality can again be achieved for all fundamental tax reforms. The debt bias at the shareholder level can only be mitigated by the introduction of a CBIT or COCA.
- The required adjustments of income tax rates for a revenue neutral implementation are especially sensitive for low pre-tax returns. The additional deduction granted in the ACE and ACC/COCA scenario reduces the tax base at the corporate level to a greater extent for a low profitability. As a result, the corporate income tax rate has to be increased remarkably. The same conclusions can be made for the shareholder level for ACE and ACC. Depending on the profitability, the CBIT could also lead to a decrease in corporate income tax rates.

- Given the different adjustments of income tax rates depending on the pre-tax profitability, the effects for the resulting cost of capital remain largely unchanged. At the corporate level, the costs of capital are constant whereas at the shareholder level, investments financed with new equity are harmed in the ACE and ACC scenario.

4. Overall conclusions

The current debt bias found in most tax systems in the EU28 Member States could be addressed in different ways. Interest deduction limitation rules might be useful to prevent an excessive use of debt financing. However, the debt bias could be completely overcome only by some type of fundamental tax reform. It should be noted that the implementation of interest deduction limitation rules or a far-reaching fundamental tax reform might cause new problems in existing tax systems as an increasing risk of double taxation (CBIT, ACC and COCA). These problems are beyond the scope of this study and are therefore not discussed in detail. The main goal of financing neutrality at the corporate level can be achieved under all fundamental tax reform options (CBIT, ACE, ACC, COCA) discussed in the study whereas at the shareholder level, only the CBIT and the COCA ensure financing neutrality.

The fundamental tax reforms might have a different impact on the investment behaviour of corporations. While the CBIT leads to a “levelling up” of effective tax levels (cost of capital and EATR) at the corporate level, the introduction of an ACE decreases the cost of capital and EATR (“levelling down”). ACC and COCA lead to a “levelling” and the overall impact depends on the underlying chosen notional interest rate. From a theoretical perspective, the introduction of a CBIT might thus negatively impact on the scale of investment and on the tax attractiveness of the EU28 Member States whereas the ACE rather promotes the level of investment and the tax attractiveness of the EU28 Member States. For the ACC and COCA, the overall effect cannot be determined a priori. At the shareholder level, the same conclusions for ACE and ACC as at the corporate level can be made: The ACE has an overall positive effect on the scale of investments and the tax attractiveness of the Member States. The effect of ACC depends on the notional interest rate. For the COCA, both the scale of investment and the tax attractiveness increase due to the largely decreasing tax burden at shareholder level. The CBIT unfolds a negative impact on the level of investment at the shareholder level but lowers the EATR and might thus positively impact discrete location decisions.

A revenue neutral implementation of fundamental tax reforms requires a decrease of the corporate income tax rate for the CBIT and rather an increase if ACE or ACC/COCA are considered. The CBIT broadens the tax base whereas the additional deduction granted for the other fundamental tax reform narrows the tax base. To achieve the same effective tax level as in the pre-reform scenario, the tax rates have to be adjusted accordingly.

The revenue neutral implementation of fundamental tax reforms has only minor effects on the resulting cost of capital. At the margin, adjustments of tax rates are less important compared to the changes in the tax base determination caused by fundamental tax reforms. In the ACE and ACC/COCA scenario, the marginal return is always shielded from corporate taxation. Thus, corporate tax rate adjustments are not relevant. At the shareholder level, the increase in the tax rate on dividend income is especially harmful for investments financed with new equity.

Overall, the study provides evidence that fundamental tax reforms can address the current debt bias in tax systems in the EU28 Member States and allow for a revenue neutral implementation not reducing the level of investment at the same time. This is especially true for the ACE and ACC. From a theoretical perspective, the CBIT impacts on the level of investment negatively independent of a revenue neutral implementa-

tion. If a COCA is introduced, the debt bias can be completely overcome. Yet, a revenue neutral implementation of a COCA at the shareholder level faces several difficulties.

1. Introduction: structure of the final report

The final report to the study “The Effects of Tax Reforms to Address the Debt-Equity Bias on the Cost of Capital and on Effective Tax Rates” under framework contract TAXUD/2013/CC120 is structured as follows.

In Section 2, the motivation for the study and possible problems arising from the current debt bias in corporate tax systems in the EU are briefly summarised.

Section 3 explains the general design of the study and the tasks that have to be dealt with in this study for analysing interest deduction limitation rules, fundamental tax reforms and a possible revenue neutral implementation of fundamental tax reforms.

Section 4 outlines the Devereux/Griffith model applied in this study and describes the underlying economic assumptions of this model. The model computes forward-looking effective tax rates. The focus of this study is on the cost of capital, the EMTR and the EATR.

Section 5 discusses the current extent of the corporate debt bias in the tax systems of the EU28 Member States. Therefore, the EATR and cost of capital for the year 2015 at corporate and shareholder level are presented.

In Section 6, a qualitative overview of interest deduction limitation rules will be provided. The Devereux/Griffith model will be used to analyse the effect of interest deduction limitation rules quantitatively.

Section 7 starts with a detailed description for each fundamental tax reform considered in the study. In the following, the effect of the different fundamental tax reforms on the EATR and cost of capital will be analysed by using the Devereux/Griffith model. It will be assessed to what extent the fundamental tax reforms overcome the current corporate debt bias in the EU and how they impact on effective company taxation. In the following, the required adjustments of corporate and personal income tax rates for a revenue neutral implementation of fundamental tax reforms will be discussed. The adjusted corporate and personal income tax rates will be used to recalculate the resulting cost of capital at corporate and shareholder level.

Section 8 concludes and summarises the findings of the study.

The appendix is divided in three sections. Section A1 contains the detailed formulas of the Devereux/Griffith model and the implementation of the fundamental tax reforms. For the interest deduction limitation rules, Section A2 provides a detailed qualitative description for each Member State and the results for the calculation with the Devereux/Griffith model. In Section A3, the detailed results for the different fundamental tax reforms, the required adjustments of corporate and personal income tax rates for a revenue neutral implementation and the resulting cost of capital following a revenue neutral implementation are presented.

2. Motivation

Corporate tax systems in the EU usually discriminate between different sources of financing. Interest costs for debt-financed investments are deductible for tax purposes whereas there is no equivalent treatment for equity-financed investments. The origin for the differing qualification can be found in accounting principles where interest expenses are seen as costs and equity returns rather as a reward for the owner.¹ There is ample empirical evidence that the financing decisions of corporations are actually

¹ See Schön (2012); European Commission (2015c).

influenced by this unequal treatment.² The preference for debt financing in the corporate sector creates different economic problems which will be shortly reviewed in the following.

First, the preferential treatment of debt financing might lead to an excessive leverage in the corporate sector. Especially after the financial crisis in 2008, it has been argued that the corporate debt bias intensified the effects of the financial crisis and increased the macroeconomic damages.³ Only a few empirical studies have tried to estimate the economic welfare cost of the debt bias.⁴ With regard to the financial sector, the corporate debt bias might also contribute to the systemic risk.

Second, young and innovative firms have only limited access to external funds because they lack reputation and collateral.⁵ Moreover, information asymmetries between investors and the corporation are high for technology-intensive investments. The restricted access to debt combined with the preferential qualification of debt for tax purposes can disadvantage young and innovative firms.⁶

Third, the particular tax treatment of debt financing can be used by multinationals for international profit allocation (debt shifting). Several empirical studies have shown that subsidiaries in countries with high statutory tax rates bear a higher debt ratio in general (external and internal debt).⁷ Other studies specifically discussed the impact of internal debt financing on profit shifting of multinationals and found similar results.⁸ The elimination of the current preferential treatment of debt financing could contribute to less profit shifting activities.

For the above reasons, the importance of addressing the current debt bias has been emphasised by the European Commission⁹ and other international organisations¹⁰. The study at hand is intended to provide insights how different options for addressing the current debt bias in the EU28 Member States would affect effective tax rates. Basically, an equal treatment of debt and equity could be achieved by allowing an additional deduction for equity financing or by disallowing the current deduction for interest expenses. The different options will change the tax burden levied on corporate investments and, depending on the direction of this change, foster or discourage investments.

3. Study design and requested tasks

The study focuses on corporations and their shareholders located in any of the EU28 Member States. It is assumed that corporations and shareholders are located in the same country (we call this the domestic case). For the study, the Devereux/Griffith model will be used which provides the cost of capital, the effective marginal tax rate (EMTR) and effective average tax rate (EATR) as measures for effective taxation.¹¹ The model allows the consideration of five types of assets, three sources of finance at

² See the meta-studies by De Mooij (2011) and Feld et al. (2013).

³ See IMF (2009); European Commission (2012).

⁴ See Weichenrieder/Klautke (2008); Gordon (2010). It has been argued that these studies probably underestimate the actual welfare costs. See De Mooij (2011); Fatica et al. (2012).

⁵ See Cohen (2010) for a literature review.

⁶ See Henrekson/Sanandaji (2011).

⁷ See e.g. Desai et al. (2004); Huizinga/Laeven (2008).

⁸ See e.g. Hebous/Weichenrieder (2010). For a meta-study see Heckemeyer/Overesch (2012).

⁹ See European Commission (2012); European Commission (2015a); European Commission (2015b).

¹⁰ See e.g. IMF (2009).

¹¹ See Devereux/Griffith (1998); Devereux/Griffith (1999).

corporate and shareholder level. This methodology has also been applied for the calculation of effective tax rates in the EU and other countries on a yearly basis since 1998.¹² The results for the year 2015 are used as the status quo scenario for the purpose of this study.

The Devereux/Griffith model will be used to analyse, the effect of interest deduction limitation rules and fundamental tax reforms on the cost of capital, EMTR and EATR of domestic investments in EU member states. All fundamental tax reforms are intended to reduce the existing corporate debt bias in the tax systems of the EU28 Member States. The study provides insights how the introduction of those fundamental reforms impacts current tax systems. As Member States might be reluctant to introduce such fundamental reforms due to the associated loss of tax revenue a revenue neutral implementation will be taken into account for each Member State as well.

Given the aims of the study, two main tasks can be identified:

Task 1: Calculation of effective tax rates using the Devereux/Griffith model for Member States with interest deduction limitation rules and assuming binding limits to the deductibility of interest costs

Thin capitalization or earnings stripping rules limit the deductibility of interest costs in case of debt financing and can be found in more and more Member States. The Devereux/Griffith model does not allow a detailed implementation of interest deduction limitation rules. In previous reports on effective taxation in the European Union, it has always been assumed that interest costs were deductible irrespective of the existence of limitation rules. For the purpose of this study, it is assumed that the limitations with regard to interest costs are applicable. In Member States with interest deduction limitation rules, this will result in a complete non-deductibility of interest costs at the corporate level.

The chosen approach (applicable vs. non-applicable) will neglect substantial differences in the existing interest limitation deduction rules of the Member States at the corporate level, like a possible carry-forward of non-deductible interest. Therefore, the report will interpret the results cautiously. The differences between the country-specific interest deduction limitation rules will be made more transparent by providing detailed descriptions and comparisons of the existing rules in the Member States.

Task 2: Analysis of revenue neutral CBIT, ACE, ACC and COCA using the Devereux/Griffith model

The current corporate debt bias in the tax systems of the EU28 Member States can be addressed by different fundamental tax reforms. The study will consider the consequences of four different fundamental reform options (CBIT, ACE, ACC, COCA) on the effective levels of taxation (cost of capital, EMTR, EATR). The analysis will be conducted in four subsequent steps (a-d) which are described in the following.

a) Implementing the four reform options for each Member State and computation of EATR at corporate and shareholder level

In a first step, the four fundamental tax reforms which try to address the corporate debt bias differently will be implemented in the framework (i.e. the formulas) of the Devereux/Griffith model. The following four fundamental tax reforms will be considered:

¹² See Spengel et al. (2015).

- **Comprehensive Business Income Tax (CBIT)** with a complete non-deductibility for interest expenses at the corporate level. At the level of the provider of the capital (equity or debt), the income will be exempt from taxes.
- **Allowance for Corporate Equity (ACE)** which allows the deductibility of a notional return on equity at the corporate level. The computations of the tax base at the shareholder level remain unaffected.
- **Allowance for Corporate Capital (ACC)** which allows the deductibility of a notional return on all the capital, namely debt and equity at the corporate level. The computations of the tax base at the shareholder level remain unaffected.
- **Cost of Capital Allowance (COCA)** which allows the deductibility of a notional return on all the capital, namely debt and equity like in the ACC case. Moreover, the tax base at the shareholder level corresponds to the notional return deducted at the corporate level.

The results obtained in step a) display the effect of the four different fundamental reforms on the cost of capital, EMTR and EATR in each Member State at both the corporate and the shareholder level.

b) Modelling of revenue neutrality (e.g. keeping EATR constant by adjusting the corporation tax rate at the corporate level or the personal income tax rate at the shareholder level)

The fundamental reform options will impact the tax bases at corporate and shareholder level differently and, therefore, will affect Member States tax revenues. Member States might be reluctant to suffer revenue losses or increase their statutory tax rates as this is associated with lower investment rates and growth in the general public. The report will provide options for a revenue neutral introduction of the fundamental tax reforms.

c) Computation of the change of the cost of capital (CoC) and effective marginal tax rates (EMTR) following the revenue neutral implementation of the fundamental tax reforms

The adjusted statutory tax rates for a revenue neutral implementation of fundamental tax reforms will impact the CoC and EMTR in each Member State. For this purpose, CoC and EMTR will be recalculated taking into account fundamental tax reforms and the adjusted revenue neutral statutory tax rates. The distinction of revenue neutrality at the corporate level and the shareholder level will be taken into account.

This step will especially address the misunderstanding of tax rates in the general public as the level of investment is mainly driven by the CoC and the EMTR respectively. The report will give guidance whether different fundamental tax reforms manage to address the debt bias and promote investment in a revenue neutral way at the same time.

d) Sensitivity analysis considering different pre-tax rates of profitability

The computations of EATRs in step a)-c) will be based on a pre-tax rate of profitability of 20% which corresponds to the standard economic assumption (see section 2). The effect of the revenue neutral fundamental tax reforms on the CoC and the EMTR might differ if the pre-tax rate of profitability is changed. Therefore, a sensitivity analysis with pre-tax rates of profitability below and above the base case assumption of 20% will be conducted. This requires a complete repetition of steps a)-c) for different levels of pre-tax rate of profitability.

For all tasks, the tax law provisions of 1 July 2015 will be taken into account.

4. Methodology: the Devereux/Griffith model

4.1 General framework

The study on the impact of fundamental tax reforms on forward-looking effective tax rates relies on the general framework of the Devereux/Griffith model, developed by Devereux and Griffith.¹³ The model has already been used in several earlier studies on behalf of the European Commission such as the annual report on effective tax levels in the EU undertaken by the Centre for European Economic Research (ZEW).

The basic approach proposed by Devereux and Griffith is to consider a hypothetical incremental investment located in a specific country undertaken by a company resident possibly in the same country, but also possibly in another country.¹⁴ The hypothetical investment takes place in one period and generates a return in the next period. Tax rules such as corporate and personal income tax rates, depreciation rules and the treatment of different financing sources are implemented to analyse the effect of taxes on the return of the investment. A detailed description of the basic formulas is provided in Section A1.1 in the appendix.

The methodology of Devereux and Griffith allows the consideration of two types of investment projects, namely profitable and marginal investments. For marginal investments, the cost of capital and the effective marginal tax rate (EMTR) can be calculated. For profitable investments, the effective average tax rate (EATR) can be used.

A marginal investment is one whose expected rate of return is just sufficient to convince the investors that the project is worthwhile and has a net present value (NPV) of zero before taxes. Given a post-tax real rate of return required by the company's shareholder, it is possible to use the tax code to compute the implicitly required pre-tax real rate of return of the hypothetical investment. This pre-tax real rate of return is then needed to achieve the post-tax real rate of return. The required pre-tax real rate of return is known as the cost of capital. The proportionate difference between the cost of capital and the required post-tax real rate of return is known as the effective marginal tax rate (EMTR) and can be written as:

$$EMTR = \frac{\tilde{p} - s}{\tilde{p}} \quad (1)$$

where $\tilde{p}$ denotes the cost of capital and s the required post-tax real rate of return. At the corporate level, s equals the real market interest r .

The model, in line with neoclassical investment theory, assumes that companies will undertake all investment projects which earn at least the required rate of return. Tax rules that lead to an increase in the cost of capital will therefore reduce the likelihood that investment projects are undertaken and vice versa. The cost of capital can be used to determine the optimal scale of investment. In comparing such investments in alternative locations, the underlying economic model would predict that locations with a higher cost of capital or EMTR would have less investment. Furthermore, as the cost of capital can be determined for single assets and financing sources, conclusions about the investment neutrality and financing neutrality of a tax system can be made.

Profitable investments are characterized by a higher real rate of return than the marginal investment and have a positive NPV. Given a predefined pre-tax rate of return,

¹³ See Devereux/Griffith (1999).

¹⁴ See Devereux/Griffith (1999); Devereux/Griffith (2003).

the effective average tax rate (EATR) is determined to analyse the impact of tax systems on profitable investments. The EATR is computed as the difference of the NPV before and after taxes (denoted by R^* and R), divided by the discounted pre-tax rate of return p :

$$EATR = \frac{R^* - R}{p / (1+r)} \quad (2)$$

The rationale behind the EATR is that a company has decided to undertake a specific profitable investment but has to choose between two or more mutually exclusive locations. Examples include discrete location decisions of multinational corporations. The EATR provides additional insights into the impact of tax rules on investment decisions for profitable investments. Additionally, the financing neutrality of a tax system for profitable investments can be assessed.

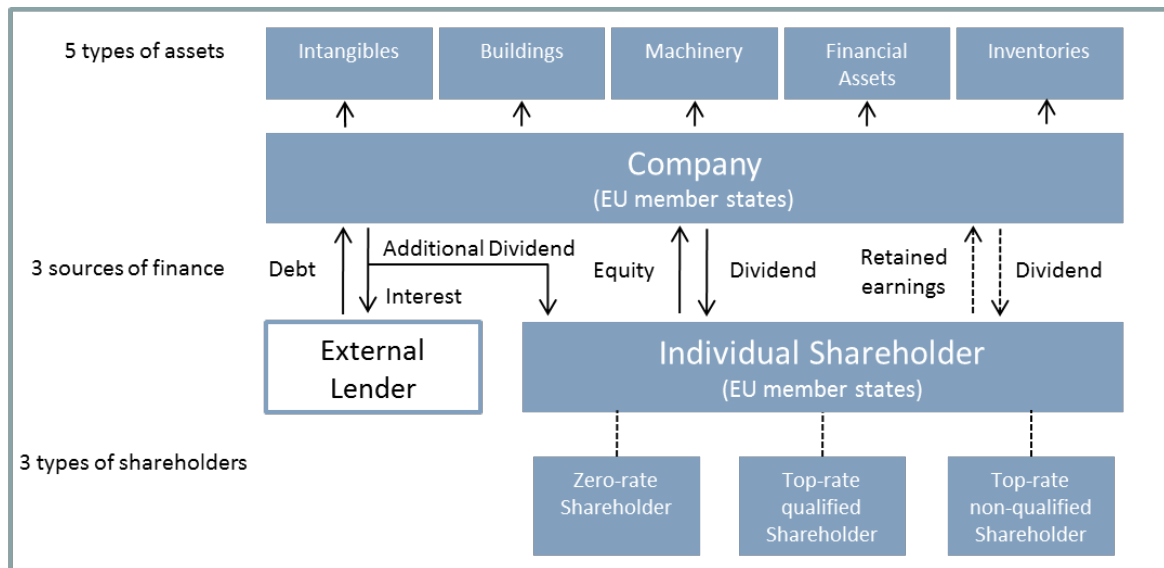
The Devereux/Griffith model provides effective measures for marginal and profitable investments. For the corporate level, a relation between EATR and EMTR can be established which shows how both measures are mainly influenced:¹⁵

$$EATR = \frac{\tilde{p}}{p} * EMTR + \frac{p - \tilde{p}}{p} * \tau \quad (3)$$

If the cost of capital $\tilde{p}$ equals the pre-tax rate of return p , EATR and EMTR are the same. With an increasing pre-tax rate of return p , the EATR approaches the corporate income tax rate τ . Therefore, the EATR is largely influenced by the corporate income tax rate. For marginal investments with a net present value of zero, the tax base as defined by depreciation allowances and the deduction of interest expenses is much more important.

In a domestic context, the Devereux/Griffith model considers a domestic company with domestic shareholders. The company can invest in different types of assets and can choose between different financing sources. The considered types of assets and the sources of finance of the company are illustrated in Figure 1. The company can choose between five types of assets (intangibles, buildings, machinery, financial asset, inventory) and three sources of finance (retained earnings, new equity, debt). Moreover, three types of shareholders are considered: First, a zero-rate shareholder paying no taxes because his income is below any relevant tax exemption limits. Second, a top-rate shareholder holding a non-qualified share in the company's capital and taxed at the top marginal tax rate. Third, a shareholder holding a qualified (i.e. a substantial) share in the company's capital taxed at the top marginal tax rate.

¹⁵ See Schreiber et al. (2002, p. 14). A similar expression between EMTR and EATR can also be derived for the shareholder level under certain circumstances.

Figure 1: Structure of investment: types of assets, sources of finance and shareholders

This study focuses on domestic investments by incorporated companies. Transparent entities such as partnerships as well as cross-border investments will not be taken into account.

To define the hypothetical investment project analysed in this study as well as the underlying economic conditions we assume the following:

- The pre-tax rate of return on profitable investment projects (for the calculation of the EATR) is assumed to amount to 20%;
- The alternative form of investment is assumed to be lending and the alternative investments earns a real interest rate of 5%;
- The inflation rate is assumed to be 2% in all countries;
- Investments in five different assets (intangibles, industrial buildings, machinery, financial assets and inventories) are considered;
- The depreciation rates are 15.35% for intangibles, 3.1% for industrial buildings and 17.5% for machinery. Financial assets and inventories are not depreciated.
- There are three possible ways of financing the investment: retained earnings, new equity and debt;
- For representing averages over different forms of investment, we use equal weights for each asset type (20%). For the financing of the company we apply the following weights: 55% retained earnings, 10% new equity and 35% debt financing. This is in line with earlier studies.

Since the EATR is sensitive to the pre-tax rate of return, the latter will be varied in sensitivity analysis.

4.2 Analysing interest deduction limitation rules and fundamental tax reforms with the Devereux/Griffith model

The focus of the study at hand is the analysis of the effects of interest deduction limitation rules and fundamental tax reforms on the effective tax burden of companies. The effective tax rate levied on the return from corporate investment is supposed to influence both the location and the scale of investment. Moreover, effective tax rates vary with the source of funds used to finance the investment. They thus reflect the incentive created by the tax system to prefer some way of financing over the other.

Currently the tax systems of the EU28 Member States (and, of course, other countries around the world) encourage the use of debt rather than equity financing as interest payments are deductible for the corporate income tax while equity returns are not. This is called debt bias. Interest deduction limitation rules should prevent an excessive use of debt financing. Fundamental tax reforms are intended to overcome this bias and achieve financing neutrality, i.e. an equal tax treatment of different financing sources. The Devereux/Griffith model provides different indicators of the effective tax burden levied on corporate investment (cost of capital, EMTR, EATR).

The cost of capital, i.e. the minimum pre-tax rate of return required for the investment to be worthwhile for the investor, and the EMTR, that is the proportionate difference between the cost of capital and the required post-tax real rate of return, reflect the effect that tax systems exert on investment at the margin of decision. Presuming that firms undertake all investment projects which earn at least the required rate of return, the scale of investment should depend on these tax factors. Marginal investments just break even and are thus less profitable than infra-marginal investment projects with earnings exceeding expenses only by little. Consequently, the definition of the tax base, e.g. a limitation of interest deduction, is more strongly reflected in the cost of capital and the EMTR than in the EATR which is more driven by the statutory profit tax rate. Depending on their characteristics, fundamental tax reforms can decrease or increase the cost of capital and EMTR, i.e. the optimal scale of investment could be extended or alternatively reduced.

The EATR measures the effective tax rate levied on investment which is infra-marginal, i.e. generating an economic rent. It can be interpreted as the proportion of total investment income taken away by tax. Thus, the EATR can be used to identify the effect of taxation on discrete choices for investment, in particular the discrete choice between two or more mutually exclusive investment locations. Fundamental tax reforms can both increase and decrease the EATR. If, for example in the case of an investment financed with debt, the deduction of interest expenses is limited by the reform, the EATR on that investment will increase. Similarly, such increase can result from interest deduction limitation rules. On the other hand, a lower EATR results if, all other things held constant, fundamental tax reforms grant additional deductions for tax purposes.

The analysis in this report is based on the assumption that companies act in the interests of their owners, the shareholders, to maximise the shareholders' wealth. To do this, the company should in principle take into account any personal tax payable by the shareholders. Three forms of personal taxes are relevant here: personal taxes on dividends (including any tax credit associated with dividend payments), capital gains tax on the realised increase in the value of the shares, and tax on alternative forms of investment, taken here to be on the interest received from lending.

However, a significant difficulty arises in seeking to take account of personal taxes: especially large corporations may have many (internationally diversified) shareholders, who face different tax rates of tax provisions. Which set of personal tax rates should a company take account of in these circumstances? Economic theory suggests an answer: the market value of shares should reflect a weighted average of all investors in that company, where the weights reflect the overall wealth of investors. Unfortunately, this does not provide clear guidance in practice, since it is virtually impossible to identify such a weighted average. In particular, many shareholders are likely to be non-residents or tax exempt institutions (e.g. pension funds); if they are taxed at all on such income it is likely to be in their own country of residence.

Hence the central case examined accounts only for taxes paid by the corporation. But we also examine the case including personal taxes, which is particularly relevant when

considering the position of small and medium-sized enterprises. These are often dominated by a domestic shareholder and/or only have a limited number of shareholders.¹⁶

Interest deduction limitation rules are primarily intended to prevent profit shifting of multinational corporations through excessive debt financing and for those companies shareholder taxes should not be relevant. But depending on the characteristics of an interest deduction limitation rule, at least medium-sized corporations could also be affected – especially during an economic crisis.¹⁷ For this scenario, effective interest deduction limitation rules could impact the investment behaviour of domestic shareholders.

An implementation of fundamental tax reforms might especially be beneficial for young and innovative corporations that have only limited access to external sources of finance because of a limited external reputation, few collateral and high information asymmetries. Young and innovative corporations are often founded by a private person resident in the same country with a limited number of shareholders in total.

The Devereux/Griffith model allows the consideration of marginal and profitable investments for different financing sources taking into account the taxes borne at the corporate level and the level of the shareholders. It is possible to distinguish the corporate and the shareholder level. Therefore, it is very valuable for the purposes of the study as the effect of interest deduction limitation rules and fundamental tax reforms on the cost of capital, EMTR and EATR can be evaluated in great detail. It can be especially assessed whether an equal taxation for all financing sources at both levels (corporate and shareholder level) can be achieved. The consideration of marginal investments will explicitly show how tax base modifications (e.g. limits for interest deduction) impact the cost of capital and EMTR as these measures are more influenced by tax base modifications than profitable investments.

The implementation of interest deduction limitation rules and fundamental tax reforms¹⁸ requires adaptations of the baseline formulas of the Devereux/Griffith model. Four fundamental tax reforms will be taken into consideration: Comprehensive Business Income Tax (CBIT), Allowance for Corporate Equity (ACE), Allowance for Corporate Capital (ACC), and Cost for Capital Allowance (COCA). The adapted formulas can be found in Section A1 in the appendix. Apart from modifications with respect to the tax treatment of different sources of financing, the implementation of fundamental reforms requires adjustments of shareholder taxation.

Table 1 provides an overview of the necessary modifications of the Devereux/Griffith model.

¹⁶ See e.g. Overesch/Voeller (2010) for an empirical analysis confirming the theoretical predictions on the relevance of shareholder taxes.

¹⁷ In Germany, the exemption level for the interest deduction limitation rule has been increased to mitigate possible effects during the economic crisis 2008. See Knauer/Sommer (2012, p. 211) for a description.

¹⁸ See Section 3 for a short description of each fundamental tax reform.

Table 1: Required modifications of the Devereux/Griffith model for interest deduction limitation rules and fundamental tax reforms

	Source of Finance			Shareholder Taxation
	RE	NE	D	
Interest Deduction Limitation	no	no	yes	no
CBIT	no	no	yes	yes
ACE	yes	yes	No	no
ACC	yes	yes	yes	no
COCA	yes	yes	yes	yes

RE= Retained Earnings; NE = New Equity; D = Debt

As noted in Section 4.1, the overall measures of effective taxation (e.g. EATR) are based on an equal weight for each of the five asset types (20%) and financing weights of 55% retained earnings, 10% new equity and 35% debt financing. The weighted EATR in country j with respect to the different financing possibilities (corporate and shareholder level) can be written as:¹⁹

$$EATR^j = 0.55 * EATR^{RE} + 0.1 * EATR^{NE} + 0.35 * EATR^{DE} \quad (4)$$

The interest deduction limitation rules and the fundamental tax reforms will impact the $EATR^j$ differently.

Obviously, the implementation of interest deduction limitation rules and fundamental tax reforms will only affect the corporate income tax and additional surcharges or local taxes that rely on the corporate income tax base. Some Member States levy taxes which are calculated on a separately defined tax base. Such types of taxes are levied in France, Hungary, Italy and Spain. Those taxes will not be affected by the implementation of interest deduction limitation rules and fundamental tax reforms for corporate income tax purposes. In Germany, the local business tax relies on the same tax base as the corporate income tax, but is modified in different ways. One modification is the add-back of 25% of interest costs. Since, as a result, only 75% of the interest can be effectively deducted, the impact of fundamental tax reforms is limited. If the German interest deduction limitation rule applies, the tax base of the local business tax is affected in the same way as the tax base of the corporate income tax. Moreover, for the analysis of fundamental tax reforms, the tax codes of Belgium and Italy will be modified. Both Member States have already implemented one type of fundamental tax reform: the Allowance for Corporate Equity. For the analysis of the other hypothetical fundamental tax reforms, it is consistent to assume that no other fundamental tax reform is concurrently in place. Otherwise, the effects of two fundamental tax reforms (e.g. CBIT and ACE) would overlap and might even contradict and compensate each other.

In the following sections, the EATR and the cost of capital both at the corporate and at the shareholder level will be discussed.²⁰ The detailed calculation results for the EATR, the cost of capital and also the EMTR are presented in the appendix for each Member

¹⁹ The weighted cost of capital is calculated in the same way. The EMTR has to be derived from the weighted cost of capital.

²⁰ The EMTR is a transformation of the cost of capital. At the corporate level, the EMTR is even a monotonous transformation of the cost of capital and thus provides identical information content.

State. With respect to effective tax rates at the shareholder level, only the results for the top-rate qualified shareholder are presented and discussed in the main text.²¹

5. Status Quo – current debt bias in corporate tax systems in the EU28 Member States

The study is intended to discuss different reform options to overcome the current debt bias in corporate tax systems in the EU28 Member States. Before analysing the effects of interest deduction limitation rules and fundamental reform options on effective tax rates, the extent of the current corporate debt bias should be discussed.

Generally, the debt bias occurs if investments are taxed differently depending on whether they are financed with equity or debt. In most corporate tax systems, interest expenses from debt-financed investments are a tax-deductible business expense. Thus, interest expenses reduce taxable income and, eventually, the tax due. In the case of equity-financed investment, dividends are paid out of taxed profits, i.e. there is no tax deduction of equity payouts. As a consequence, the return on debt-financed investments is shielded from taxation whereas the return on equity-financed investments is not. This unequal tax treatment of equity and debt payouts does lead to differences in the EATR and costs of capital of debt vs. equity financed investments and can provide incentives to finance investment with debt rather than equity. This debt bias may persist even if shareholder taxation is taken into account.

In the following, the cost of capital and the EATR for each of the EU28 Member States at the corporate and the shareholder level are presented. The results are based on the tax codes in 2015 and are also reported in the regular annual update of effective tax rates under Framework Contract TAXUD/2013/CC/120.²²

5.1 Corporate level

Table 2 presents the cost of capital and the EATR at the corporate level (i.e. shareholder taxation is ignored here) in the EU28 Member States in 2015. For each Member State, the mean across all five assets (buildings, machinery, intangible, financial asset, inventory) for each financing source (RE = retained earnings, NE = new equity, D = debt) is displayed. Additionally, the overall weighted mean across the three different financing sources (55% RE; 10% NE; 35% D) as well as the differences of debt and new equity in terms of both cost of capital and EATR are presented.

In all Member States, the overall mean of the cost of capital is higher than the assumed post-tax real rate of return (5%) of the alternative investment and ranges from 5.2% in Italy to 8.1% in Spain. The current corporate tax systems in the EU28 Member States increase the required pre-tax rate of return to achieve the assumed post-tax real rate of return of 5% and might in general lead to an underinvestment.

²¹ The results for the top-rate non-qualified shareholder and the zero-taxed shareholder can be found in the appendix.

²² See Spengel et al. (2015).

Table 2: Cost of capital and EATR for different financing sources (corporate level, 2015)

	Cost of Capital in %					EATR in %				
	RE	NE	D	Mean	D-NE	RE	NE	D	Mean	D-NE
AT	6.9	6.9	4.6	6.1	-2.3	26.0	26.0	17.3	23.0	-8.7
BE	6.7	6.7	3.9	5.7	-2.8	31.0	31.0	21.9	27.8	-9.1
BG	5.6	5.6	4.8	5.3	-0.8	10.2	10.2	6.7	9.0	-3.5
CY	6.3	6.3	4.9	5.8	-1.4	17.2	17.2	11.6	15.2	-5.6
CZ	6.2	6.2	4.5	5.6	-1.6	19.0	19.0	12.4	16.7	-6.6
DE	7.4	7.4	4.7	6.5	-2.7	31.5	31.5	22.1	28.2	-9.5
DK	6.7	6.7	4.6	6.0	-2.1	24.2	24.2	16.0	21.3	-8.2
EE	5.0	6.7	5.0	5.2	-1.7	15.0	22.0	15.0	15.7	-7.0
EL	7.5	7.5	4.7	6.5	-2.8	30.6	30.6	20.5	27.1	-10.1
ES	9.3	9.3	6.1	8.1	-3.2	36.3	36.3	26.5	32.9	-9.8
FI	6.5	6.5	4.8	5.9	-1.7	20.9	20.9	14.2	18.6	-6.8
FR	8.9	9.5	4.5	7.4	-4.9	42.6	44.3	29.9	38.3	-14.4
HR	6.0	6.0	4.2	5.4	-1.7	18.9	18.9	11.9	16.5	-7.0
HU	6.6	6.6	4.9	6.0	-1.7	21.6	21.6	15.0	19.3	-6.6
IE	6.1	6.1	4.9	5.7	-1.3	15.9	15.9	10.7	14.1	-5.2
IT	5.6	5.6	4.6	5.2	-1.0	25.0	25.0	21.4	23.7	-3.6
LT	6.0	6.0	4.8	5.6	-1.2	15.5	15.5	10.2	13.6	-5.2
LU	7.0	7.0	4.1	6.0	-2.9	29.1	29.1	18.9	25.5	-10.2
LV	6.1	6.1	4.9	5.7	-1.2	16.1	16.1	10.9	14.3	-5.2
MT	8.2	8.2	4.4	6.8	-3.7	36.5	36.5	24.3	32.2	-12.2
NL	6.8	6.8	4.5	6.0	-2.3	25.6	25.6	16.9	22.5	-8.7
PL	6.4	6.4	4.7	5.8	-1.6	19.8	19.8	13.2	17.5	-6.6
PT	7.3	7.3	4.4	6.3	-2.9	30.2	30.2	20.0	26.6	-10.3
RO	6.1	6.1	4.8	5.7	-1.3	16.8	16.8	11.2	14.8	-5.6
SE	6.5	6.5	4.6	5.8	-1.9	22.0	22.0	14.6	19.4	-7.5
SI	6.2	6.2	4.7	5.7	-1.4	17.5	17.5	11.6	15.5	-5.9
SK	6.5	6.5	4.5	5.8	-2.0	22.3	22.3	14.6	19.6	-7.7
UK	7.2	7.2	5.5	6.6	-1.7	24.0	24.0	17.0	21.5	-7.0
EU28	6.7	6.8	4.7	6.0	-2.1	23.6	23.9	16.3	21.1	-7.6

RE= Retained Earnings; NE = New Equity; D = Debt; Mean = weighted mean over RE, NE, D
D-NE displays the difference of debt and new equity expressed in percentage points

Table 2 provides evidence for the debt bias in current corporate tax systems in the EU: Comparing the different financing sources, the costs of capital for debt-financed investment are much lower than for equity-financed investments. On average, the difference between the cost of capital between equity financed (here; new equity) and debt-financed investments amounts to 2.1 percentage points. This indicates that equity-financed investments on average need to earn 2.1 percentage points more than debt-financed investments to be worthwhile.

In all Member States, the costs of capital for debt financing are lower than the costs of capital for equity financing (retained earnings or new equity) as all Member States allow to deduct interest payments for tax purposes. An equivalent allowance for (notional) equity financing expenses can only be found in two Member States for 2015 specifically Belgium and Italy. In both Member States an allowance for corporate equity (ACE) is currently in place. The notional interest rate which determines the deduc-

tion for tax purposes is 1.63% in Belgium and 4.5% in Italy as of 2015. The model calculations assume a nominal capital market interest rate of 7.1%.²³ As the notional interest rates are below the assumed nominal market interest rate of 7.1%, the results do not reflect tax neutrality between equity and debt financing under the ACE systems as currently implemented in both Belgium and Italy. The only tax neutrality between debt and equity financing is found in Estonia for the case of financing by retained earnings. Estonia does generally not tax profits that are retained within the company but it only taxes profits upon distribution at a rate of 20%. The tax base is therefore solely determined by the amount of distributed profits. Tax deduction rules such as depreciation allowances are not relevant in Estonia. As the tax rate on retained earnings amounts to zero, the value of the incremental investment does not increase if interest expenses are deducted. Thus, the costs of capital for financing with retained earnings and debt are equal.

Whereas the difference between the costs of capital for the case of debt financing and for the case of equity financing is very high in almost all Member States, it is much less important whether the equity used for financing is from retained earnings or new share issues: The cost of capital of an investment financed with retained earnings is equal to the cost of capital of an investment financed with new equity in nearly all Member States. The different costs of capital for retained earnings and new equity in Estonia and France can be explained by the unequal treatment of retained and distributed earnings for tax purposes.²⁴ As noted, Estonia taxes retained earnings at 0% whereas distributed profits are taxed at 20%. France levies an additional tax of 3% on distributed profits which leads to higher costs of capital for new equity financing.

If the marginal investment is financed with debt and interest expenses are deductible, the profit of the marginal investment is completely absorbed by the interest expenses and the corporate tax base amounts to zero. If depreciation allowances are available, the deduction of depreciation expenses creates additional tax savings. The cost of capital is equal to the post-tax real rate of return if no depreciation allowances are granted. This is the case in Estonia. For nearly all other Member States, the full deductibility of interest expenses and the availability of depreciation allowances for buildings, machinery and intangibles lead to a cost of capital below the post-tax real rate of return.²⁵ The mean for all EU28 Member States amounts to 4.7% and is below the post-tax real rate of return of the alternative investment.

The same results as for the cost of capital can also be found for the EATR. Generally, the EATR in the EU28 Member States varies considerably. In 2015, the overall EATR ranges from 9.0% in Bulgaria to 38.3% in France. These differences can be explained by different corporate tax rates, additional surcharges and non-profit taxes as well as different depreciation rules for depreciable assets.²⁶ The mean EATR for the EU28 amounts to 21.1%.

5.2 Shareholder level

In Table 3, the cost of capital and EATR for the top-rate qualified shareholder are presented in the same logic as for the corporate level. In addition to the overall EATR for 2015, the EATR and cost of capital for each source of financing are displayed.

²³ See Section 4.1.

²⁴ See Spengel et al. (2015, p. B-25).

²⁵ Only in Spain and the United Kingdom, the cost of capital for debt-financed investments is above 5%. In Spain, the local profit tax does not allow the deductibility of interest expenses and in the UK, a rather high real estate tax for buildings has to be paid.

²⁶ See Spengel et al. (2015, section A) for a qualitative overview.

Table 3: Cost of capital and EATR for different financing sources (top-rate qualified shareholder, 2015)

	Cost of Capital in %				EATR in %			
	RE	NE	D	Mean	RE	NE	D	Mean
AT	6.0	7.0	4.6	5.6	35.3	38.1	31.5	34.3
BE	5.2	8.2	4.0	5.1	38.0	45.5	35.1	37.7
BG	5.4	5.4	4.8	5.2	12.7	12.3	10.1	11.7
CY	3.9	5.1	5.0	4.4	17.4	21.7	21.6	19.3
CZ	4.9	6.2	4.6	4.9	22.6	27.1	21.4	22.6
DE	6.5	7.4	4.7	6.0	40.4	42.9	35.9	39.1
DK	5.2	6.8	4.7	5.2	41.8	45.4	40.6	41.7
EE	5.9	6.7	5.0	5.7	19.2	22.4	15.5	18.2
EL	6.6	6.9	4.7	5.9	35.7	36.7	30.1	33.8
ES	8.5	9.2	6.1	7.7	43.7	45.4	38.0	41.9
FI	5.3	5.9	4.8	5.2	32.4	34.1	30.9	32.1
FR	4.0	6.0	5.0	4.5	47.7	51.1	49.4	48.7
HR	4.8	6.1	4.3	4.8	22.4	26.6	20.6	22.2
HU	6.6	8.3	4.9	6.2	30.2	35.8	24.6	28.8
IE	5.0	7.8	4.9	5.2	43.3	49.3	43.2	43.9
IT	4.4	5.3	4.6	4.6	33.0	35.5	33.7	33.5
LT	6.7	7.4	4.7	6.1	27.4	29.8	20.1	25.1
LU	7.3	8.5	4.1	6.3	40.2	43.3	31.3	37.4
LV	6.1	6.1	4.9	5.7	21.7	22.0	17.3	20.2
MT	6.7	4.5	4.5	5.7	31.2	24.0	24.0	28.0
NL	6.7	7.8	4.5	6.0	37.6	40.7	31.4	35.7
PL	5.7	6.4	4.7	5.4	27.9	30.1	24.7	27.0
PT	6.2	7.3	4.4	5.7	39.4	42.2	34.9	38.1
RO	5.6	6.2	4.8	5.4	24.0	25.9	21.2	23.2
SE	5.4	6.6	4.6	5.3	34.7	37.7	32.5	34.2
SI	4.1	6.2	4.8	4.5	24.6	31.3	26.8	26.1
SK	6.2	4.8	4.5	5.4	20.9	15.5	14.5	18.1
UK	4.5	5.4	5.5	5.0	31.1	33.7	33.9	32.4
EU28	5.7	6.6	4.7	5.5	31.3	33.8	28.4	30.5

RE= Retained Earnings; NE = New Equity; D = Debt; Mean = weighted mean over RE, NE, D

With regard to the cost of capital at the shareholder level, some general remarks have to be made. The model considers three types of capital income taxation at the shareholder level: dividend taxation, taxation of interest income of an alternative investment which is assumed to be lending and capital gains taxation.

Comparing the costs of capital at the corporate and the shareholder level, it seems striking that the costs of capital for retained earnings and new equity are mostly lower at the shareholder level. This can be explained by the high impact of the personal tax on interest income. The post-tax real rate of return required by the shareholders is determined by the post-tax rate of return of the alternative investment which is lending. Any tax levied on the alternative investment reduces the required post-tax real rate of return and thereby the cost of capital. The taxation of dividends affects only investments that are financed with new equity. For debt-financed marginal investments, the return of the marginal investment has to be paid to the provider of the debt capital in the form of interest. For investments financed with retained earnings,

dividend taxes affect the net cost of the investment in exactly the same way as the net return of the investment.²⁷ Capital gains taxation is especially important for investments financed with retained earnings as the retention increases the value of the shares.

The costs of capital at the shareholder level vary between 4.4% in Cyprus and 7.7% in Spain. Cyprus levies a high personal income tax rate (30%) on interest income compared to dividend income (17%) and capital gains (0%). This decreases the required after-tax rate of return of the alternative investment at the shareholder level and the cost of capital for investments financed with retained earnings and new equity. For investments financed with new equity, the dividend tax rate increases the cost of capital compared to an investment financed with retained earnings. This pattern (lower cost of capital for retained earnings compared to new equity) can be found in nearly all Member States with the exception of Bulgaria, Latvia and the Slovak Republic. In those three Member States, a low dividend tax rate is combined with a high capital gains tax which penalises investments financed with retained earnings.

In summary, Table 3 shows that the common debt bias at the corporate level is also prevalent at the shareholder level as debt-financed investments have the lowest costs of capital in all Member States except for the United Kingdom.²⁸ The overall mean for the EU28 average amounts to 4.7% and equals the mean for the corporate level (4.7%). Debt-financed marginal investments are generally not affected by the taxation of dividends at the shareholder level as the shareholder does not receive any dividend from the investment. Capital gains taxation and the tax on the interest income of the alternative investment have only a very minor impact on the cost of capital of debt-financed investments at the shareholder level. Small differences as in France can occur if interest expenses are not completely deductible at the corporate level.

As for the corporate level, the EATRs in the EU28 Member States vary significantly. The EATR of 11.7% in Bulgaria results from a combination of low statutory tax rates at corporate and personal level. Other countries as Ireland employ a very low corporate income tax rate (12.5%) in combination with a high personal income tax rate on capital income (e.g. 51% on dividends). In two Member States (Malta and Slovakia), the EATRs at the shareholder level are even lower than the EATRs at the corporate level. Malta has a full credit imputation system in place and Slovakia does not levy any tax on dividend income. The dividend from the profitable investment is not taxed at the shareholder level. As both Member States levy taxes on the alternative form of investing, i.e. lending, the discount rate of the shareholder is decreasing which increases the net present value of the incremental investment. This results in a lower EATR.

Table 3 also shows that the common debt bias persists at the shareholder level. In all Member States except for the United Kingdom, financing investments with debt is preferred over equity financing from a shareholder's perspective.²⁹ Only in Malta financing neutrality between new equity and debt financing is achieved because of the full imputation credit. In contrast to the corporate level, the EATRs for retained earnings and new equity are different in all Member States. The financing with retained earnings is generally preferred to new equity. Only in Bulgaria, Malta and Slovakia, the EATRs for new equity are lower than the EATRs for retained

²⁷ See e.g. European Commission (2001, pp. 82-84); IMF (2009, pp. 7, 34) for similar explanations.

²⁸ In the United Kingdom, the cost of capital for a debt-financed investment is higher compared to equity financing (retained earnings and new equity). This is related to the very high personal income tax rate on interest income (45%) which decreases the cost of capital for an equity-financed investment significantly.

²⁹ See the explanation above for details concerning the effect in the United Kingdom.

6. Interest deduction limitation rules

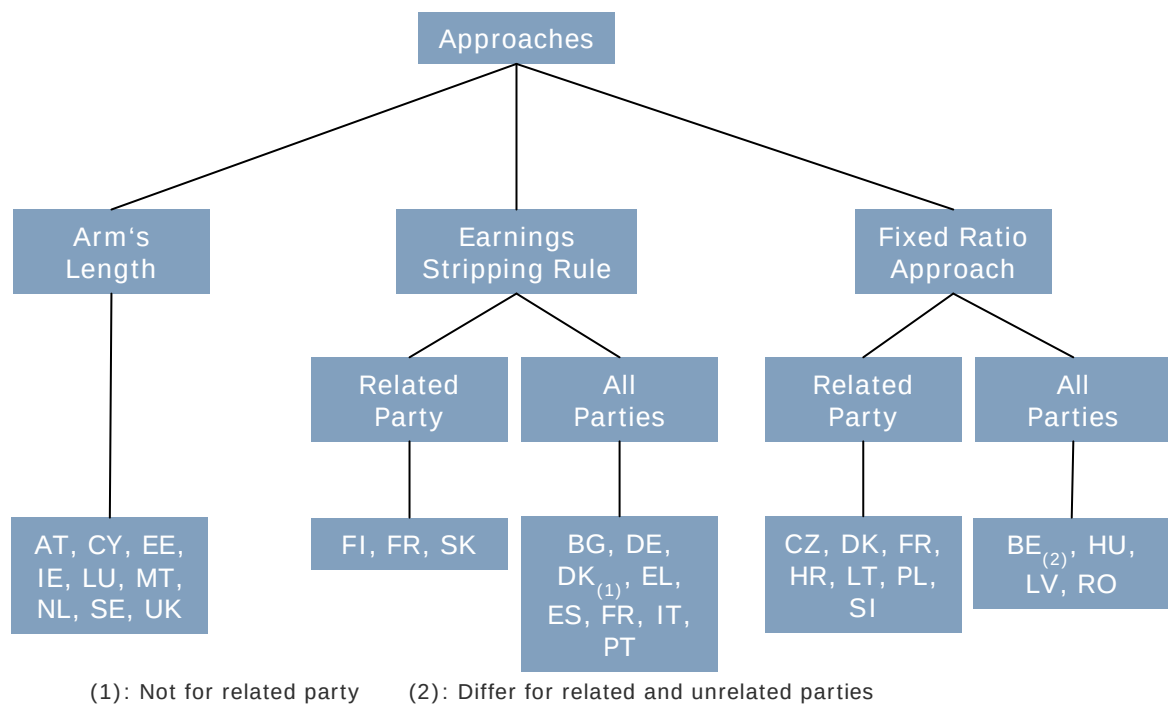
6.1 Qualitative analysis

Interest deduction limitation rules are generally intended to prohibit an excessive use of debt financing. The tax deductibility of interest expenses reduces the tax liability of a corporation and makes debt financing preferable to equity financing (see Section 5). Moreover, international corporate tax rate differentials provide an incentive for multinational company groups to allocate debt in high-tax subsidiaries through intra-company lending, and have the interest income taxed at the level of low-tax affiliates. The effectiveness of interest deduction limitation rules to mitigate the use of internal debt has been proven in several empirical studies.³⁰ But it has also been shown that corporations tend to substitute internal with external debt if interest deduction limitation rules are only targeted at internal debt.³¹ Therefore, more and more Member States introduced interest deduction limitation rules in recent years that are targeted at external and internal debt financing.

This section intends to provide a qualitative analysis of the interest deduction limitation rules currently employed in the EU28 Member States in 2015. As interest deduction limitation rules differ with regard to several dimensions, only the most important characteristics are presented. A detailed description of the rules in each Member State is provided in Section A2 in the appendix.

Currently, all Member States have some kind of interest deduction limitation rules in place. The different rules can be categorised in three approaches which are presented in Figure 2: the arm's length approach, the earnings stripping rule and the fixed ratio approach.

Figure 2: Approaches for interest deduction limitation rules in the EU28 Member States in 2015



³⁰ See e.g. Overesch/Wamser (2010); Blouin et al. (2014).

³¹ See e.g. Buettner et al. (2012); Wamser (2014).

Under the arm's length approach, Member States do not apply specific interest deduction limitation rules. They rather follow the arm's length principle in order to assess if interest to be deducted turns out to be excessive for tax purposes. Among the EU28 Member States, nine Member States generally follow this approach for interest paid to both third and related parties (Austria, Cyprus, Estonia, Ireland, Luxembourg, Malta, Netherlands, Sweden, United Kingdom). In case interest paid is judged to be excessive, the deduction of the excessive part is disallowed or the whole amount of interest becomes non-deductible for corporate tax purposes. Some Member States, as Ireland and Luxembourg characterize the excess interest expense as a dividend (hidden profit distribution) which are taxed in the hands of the recipient.

The second group of Member States applies so-called earnings stripping rules which restrict the deductibility of interest expenses in relation to a key earnings measure (i.e. EBIT). In its pure form, it applies to both third and related party loans and in most Member States, net interest expenses (interest expenses less interest income) are deductible up to a certain threshold without restriction. The threshold works as a tax allowance. If net interest expenses are below this threshold, the interest deduction limitation rule is not applicable. In case net interest expenses are above the threshold, the rule is applied on the total amount of net interest expenses. Depending on the allowed threshold amount, rather small corporations are therefore not affected by interest deduction limitation rules. The thresholds range from EUR 1 million in Portugal and Spain to EUR 3 million in Germany and to EUR 5 million in Greece. Bulgaria has a special condition for the applicability of its earnings stripping rule. Only if a debt to equity ratio of more than 3:1 exists, the earnings stripping rules are applicable. In Italy, no threshold for net interest expenses exists. If corporations have net interest expenses above the threshold they are only deductible up to a certain amount calculated as percentage of (tax adjusted) earnings before interest and taxes (EBIT) or earnings before interest, taxes, depreciation and amortization (EBITDA). The predominant EBITDA percentage is 30% which can be found in Germany, Italy and Spain. Greece and Portugal apply 50% EBITDA in 2015 but both will decrease this threshold to 30% EBITDA from 2017 onwards. Besides the aforementioned Member States that use an EBITDA threshold for debt provided by third and related parties, five more Member States follow the same approach. However, they differ in several respects: some use EBIT (75% EBIT in Bulgaria, 80% EBIT in Denmark), some take other amounts as measures (25% EBITDA for related parties and 75% of net interest charges for third parties in France) or apply it to loans from related parties only (Finland, France, Slovakia).

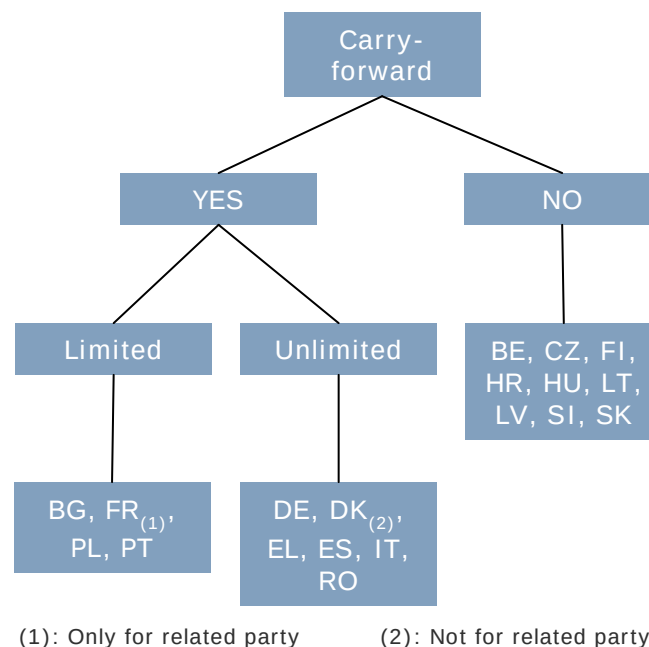
Another prevalent approach for interest deduction limitation rules is the so-called fixed ratio approach. In contrast to earnings stripping rules, this approach is based on a ratio derived from the balance sheet of a corporation. The most commonly used ratio is the debt to equity ratio stands even if the definition of the used measures and the allowed level of debt ('the safe haven') can vary from Member State to Member State. Four Member States following this approach (Belgium, Hungary, Latvia, Romania) apply ratios in the range from 3:1 (Hungary, Romania) to 4:1 (Latvia) up to 5:1 (Belgium, 1:1 for certain direct shareholders only) on debt from any kind of creditor – external and internal. The other seven Member States, apply this approach exclusively to related party loans with critical ratios ranging from 1:1 (Poland), 1.5:1 (France) to the most commonly used ratio of 4:1 (Croatia, Czech Republic, Denmark, Lithuania, Slovenia). Deduction of interest associated with debt exceeding the fixed ratio of debt to equity is disallowed for corporate income tax purposes.

The description of the three prevailing approaches has revealed considerable differences between countries. Although it is possible to qualitatively compare these different approaches according to their main characteristics, it is not possible to derive a general conclusion, in terms of a ranking, about the tightness of interest deduction

limitation rules. Whether a corporation would be hit by a certain interest deduction limitation rule (rather than another) depends largely on the specific case and cannot be determined a priori.

A general consequence irrespective of the chosen approach is the non-deductibility of the excessive interest expenses. An important issue then is whether the non-deductible interest expense can be carried forward to subsequent years. This can be especially important for earnings stripping rules: In an economic crisis with decreasing sales, the figures determining the allowable interest deductibility (EBIT and EBITDA) are also decreasing whereas the interest expenses for external and internal debt remain constant. The probability that interest expenses are not deductible is therefore increasing. A carry-forward for non-deductible interest can limit this effect as excessive interest expenses can potentially be deducted from taxable income in subsequent years. In Figure 2, Member States are grouped according to whether they allow or disallow a carry-forward for non-deductible interest expenses.

Figure 2: Carry-forwards for non-deductible interest expenses in interest deduction limitation rules



Generally, only Member States that use an earnings stripping rule have a carry-forward rule in place. Romania is the only Member State which follows a fixed ratio approach and offers a carry-forward for excessive interest expenses. A carry-forward of non-deductible interest expense can be limited or unlimited in time. Each Member State applying earnings stripping rules for all parties grants a carry-forward (Bulgaria, Denmark, Germany, Greece, Italy, Portugal, Spain). The majority of these Member States (five out of seven) impose no time limit for the carry-forwards (Denmark, Germany, Greece, Italy, and Spain). If Member States grant an unlimited carry-forward for non-deductible interest expenses, the interest deduction limitation rule tends to have only a timing effect. It should be noted that in Member States following the arm's length principle or the fixed ratio approach (exception: Romania) no similar rules can be found.

In summary, all Member States apply some kind of interest deduction limitation rule. Nine Member States follow the arm's length principle for interest deduction limitation without having established specific rules. Seven countries apply the fixed ratio ap-

proach with respect to debt granted by related parties. There is a trend toward limiting interest deduction for loans from both third and related parties (currently eleven Member States with earnings stripping rules or a fixed ratio approach). These extended restrictions mostly take the form of earnings stripping rules that have spread in recent years. Introduced by Germany and Italy in 2008, several other Member States like Bulgaria, Greece, Portugal and Spain have decided to implement this type of approach. The effect of earnings stripping rules is often mitigated by the possibility to carry forward non-deductible interest.

6.2 Quantitative analysis

As discussed in the previous section, Member States restrict interest deductibility by using the arm's length approach, earnings stripping rules or some fixed ratio approach. If interest deduction limitation rules are binding, interest expenses are no longer deductible for tax purposes. This section is intended to show how binding interest deduction limitation rules affect the cost of capital and the EATR in the EU28 Member States.

The Devereux/Griffith methodology does not allow for a general and consistent comparison of the tightness of interest deduction rules. Specific characteristics like EBITDA thresholds and different safe haven ratios cannot be modelled coherently because the model refers to a hypothetical incremental investment project without specifying these characteristics for the underlying company. Moreover, the debt capital is assumed to be taken from the capital market, i.e. provided by a third party. Therefore, interest deduction limitation rules that are only targeted at related party debt are not considered at all.³² Interest deduction limitation rules following the arm's length principle are not relevant in the model either because the interest paid for the debt capital, by assumption, equals the market interest rate.

With respect to interest deduction limitation rules targeted at third party debt, the computations consider a scenario in which the deduction limitation is binding and, as a consequence, interest expenses are completely non-deductible (scenario 1). The analysis thus does not reflect between-country differences in the criteria that determine when the specific interest deduction limitation kicks in; the relevant criteria are assumed to be fulfilled. The results should be interpreted accordingly.

As a sensitivity analysis, a second scenario will be analysed (scenario 2). An important characteristic of interest deduction limitation rules is whether they allow for a carry-forward of non-deductible interest expenses or not. If non-deductible interest expenses can be carried forward and deducted in future periods, the overall effect of interest deduction limitation rules is, in principle, only a timing effect. In contrast, the effect of non-deductible interest expenses that cannot be carried forward is final and cannot be recovered. Thus, interest deduction limitation rules allowing for a carry-forward seem to be less severe. To reflect the value of an interest carry-forward, wherever available, the non-deductibility of interest expenses in case of binding interest deduction limitation rules is only valued at 50%. In other words, we assume that a deduction limitation with interest carry-forward merely leads to a delayed interest deduction. In present value terms, this delay still implies a disadvantage relative to immediate deductibility. We assume this disadvantage to amount to 50% of the initial interest expense. This is the case for Denmark, Germany, Greece, Italy, Romania and Spain. If the carry-forward is only available for a limited number of periods (Bulgaria, Poland, Portugal) we assume the disadvantage relative to immediate deductibility to amount

³² See the detailed qualitative descriptions for each Member State in Section A2.1 in the appendix.

to 75%.³³ Clearly, these calculations only approximate the implications of interest carry-forwards in a stylized and simplified way.

6.2.1 Corporate Level

6.2.1.1 Marginal investments (cost of capital)

The cost of capital provides information on the optimal scale of investment in a certain location. Interest deduction limitation rules have a negative impact on the cost of capital in the EU Member States and thereby decrease the optimal scale of investment.

Table 4 presents the costs of capital for retained earnings, new equity, debt and the mean cost of capital across all financing sources in the status quo without binding interest deduction limitation rules. If a Member State employs interest deduction limitation rules that apply to related and third party debt, the two right-hand columns show the costs of capital for debt financing and the overall mean for binding interest deduction limitation rules (scenario 1). The costs of capital for retained earnings and new equity are not affected by interest deduction limitation rules. Member States without implemented interest deduction limitation rules in place are also not affected. In scenario 2, described in the previous section, the cost of capital taking into account any available carry-forward for non-deductible interest is shown in comparison to scenario 1. Apart from the costs of capital, the table also provides insights on how binding interest limitation rules affect the ranking of the EU28 Member States.

The costs of capital for debt financing vary from 3.9% in Belgium to 6.1% in Spain in the status quo assuming full deductibility of interest expenses. Generally, the cost of capital for debt-financed investment is below the real rate of return of the alternative investment (lending) which is assumed to be 5%. The marginal profit of the investment is completely absorbed by the interest expenses and the tax base at the corporate level amounts to zero. Further timing effects associated with the definition of the tax base, depreciation in particular, drive the cost of capital below the real market interest rate. Put differently, the cost of capital for debt-financed investments is very similar, close to the capital market interest rate, across most Member States. With binding interest deduction limitation rules, the non-deductibility of interest expenses has a considerable impact on the cost of capital.

For binding interest deduction limitation rules under scenario 1, the spread for the costs of capital increase from 4.1% in Luxembourg (no interest deduction limitation rules) to 9.3% in Spain for debt-financed investments. All Member States with binding interest deduction limitation rules show a considerable increase in the cost of capital for debt financing. The smallest increase is observed in Bulgaria (16.0%) while in other Member States as Belgium and France the costs of capital for debt financing almost double. Obviously, the effect of non-deductibility of interest on the cost of capital is the more pronounced the higher the profit tax rate which hits the return on investment. The costs of capital in Member States with low corporate income tax rates, like Bulgaria, are thus much less affected by interest deduction limitation rules compared to Member States with rather high corporate income tax rates, like France.

³³ In France, the carry-forward is only available for debt provided by a related party. As this is not included in the model, the carry-forward is also not implemented.

Table 4: Effect of interest deduction limitation rules on marginal investments at the corporate level (cost of capital in %)

	Status Quo				Interest Deduction Limitation Rules				Status Quo		Interest Deduction Limitation Rules			
					Scenario 1		Scenario 2				Scenario 1		Scenario 2	
	RE	NE	D	Mean	D	Mean	D	Mean	D	Mean	D	Mean	D	Mean
AT	6.9	6.9	4.6	6.1	-	-	-	-	10	21	7	14	7	16
BE	6.7	6.7	3.9	5.7	7.5	7.0	7.5	7.0	1	7	25	23	27	24
BG*	5.6	5.6	4.8	5.3	5.6	5.6	5.4	5.5	18	3	16	3	15	3
CY	6.3	6.3	4.9	5.8	-	-	-	-	22	12	12	8	12	9
CZ	6.2	6.2	4.5	5.6	-	-	-	-	6	5	4	3	4	4
DE°	7.4	7.4	4.7	6.5	7.4	7.4	5.8	6.9	14	23	24	25	19	23
DK°	6.7	6.7	4.6	6.0	6.7	6.7	5.7	6.3	10	17	21	21	18	19
EE	5.0	6.7	5.0	5.2	-	-	-	-	26	1	14	1	14	1
EL°	7.5	7.5	4.7	6.5	7.5	7.5	6.1	7.0	14	23	25	26	22	24
ES°	9.3	9.3	6.1	8.1	9.3	9.3	7.0	8.5	28	28	28	28	26	27
FI	6.5	6.5	4.8	5.9	-	-	-	-	18	16	10	11	10	12
FR	8.9	9.5	4.5	7.4	8.9	8.9	8.9	8.9	6	27	27	27	28	28
HR	6.0	6.0	4.2	5.4	-	-	-	-	3	4	2	2	2	2
HU	6.6	6.6	4.9	6.0	6.6	6.6	6.6	6.6	22	17	20	19	24	20
IE	6.1	6.1	4.9	5.7	-	-	-	-	22	7	12	6	12	6
IT°	5.6	5.6	4.6	5.2	7.3	6.2	5.8	5.7	10	1	22	17	19	6
LT	6.0	6.0	4.8	5.6	-	-	-	-	18	5	10	3	10	4
LU	7.0	7.0	4.1	6.0	-	-	-	-	2	17	1	12	1	14
LV	6.1	6.1	4.9	5.7	6.1	6.1	6.1	6.1	22	7	17	14	22	16
MT	8.2	8.2	4.4	6.8	-	-	-	-	4	26	3	22	3	22
NL	6.8	6.8	4.5	6.0	-	-	-	-	6	17	4	12	4	14
PL*	6.4	6.4	4.7	5.8	6.4	6.4	6.0	6.2	14	12	19	18	21	18
PT*	7.3	7.3	4.4	6.3	7.3	7.3	6.6	7.0	4	22	22	24	24	24
RO°	6.1	6.1	4.8	5.7	6.1	6.1	5.5	5.9	18	7	17	14	16	12
SE	6.5	6.5	4.6	5.8	-	-	-	-	10	12	7	8	7	9
SI	6.2	6.2	4.7	5.7	-	-	-	-	14	7	9	6	9	6
SK	6.5	6.5	4.5	5.8	-	-	-	-	6	12	4	8	4	9
UK	7.2	7.2	5.5	6.6	-	-	-	-	27	25	15	19	16	20

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

*: Member States allow a carry-forward for non-deductible interest expenses (limited in time)

°: Member States allow a carry-forward for non-deductible interest expenses (unlimited in time)

In the case of binding interest deduction limitation rules, the cost of capital for debt financing equals the costs of capital for both financing with retained earnings and new equity in ten Member States. In France, interest deduction limitation rules increase the cost of capital for debt financing to the level of the cost of capital for financing with retained earnings whereas new equity remains the most costly source of financing given that France levies an additional tax on distributed earnings at the corporate level. In two Member States (Belgium, Italy), the cost of capital for debt financing is above the costs of capital for equity financing when interest deduction limitation rules are binding. These two countries have put an allowance for corporate equity (ACE) in place. The deduction of notional interest on equity makes equity financing preferable compared to debt financing with binding interest deduction limitation rules.

In the status quo, the cost of capital for debt financing is below the assumed post-tax rate of return of 5% for nearly all Member States. Debt-financed investments in corporations are thus treated preferentially for tax purposes compared to an alternative investment on the capital market. This preferential treatment is abolished under binding

interest deduction limitation rules. In scenario 1, the cost of capital rises above the assumed real rate of return in all Member States under binding interest deduction limitation rules.

Table 4 also presents a ranking of all EU28 Member State with ranks assigned according to the cost of capital for debt financing and the overall mean for the status quo scenario 1 and scenario 2 respectively,.

In the status quo, Belgium has the lowest cost of capital for debt financing with a value of 3.9%. Seven Member States featuring interest deduction limitation rules (Denmark, France, Germany, Greece, Italy, Portugal, Poland) rank in the top 15 in the status quo, three of them (Portugal, France, Italy) even in the top 10. When interest deduction limitation rules become effective, this ranking changes considerably. In scenario 1, all Member States with interest deduction limitation rules are at the bottom of the ranking. Considering no interest deduction limitation rules, the costs of capital are very similar in most Member States as differing corporate tax rates play only a minor role because the return on investment is shielded from tax anyway. Therefore, Member States with very low corporate income tax rates as Bulgaria can be found at the top of the Member States with interest deduction limitation rules.

In scenario 2, all Member States which allow for an unlimited carry-forward of non-deductible interest gain in one or multiple positions compared to scenario 1. Considering the carry-forward thus has an effect. The magnitude of this effect is, obviously, driven by the assumed disadvantage, in present value terms, from delaying interest deduction into the future or losing the carry-forward entirely. Thus, the results for scenario 2 should be interpreted accordingly.

To sum up, if interest deduction limitation rules are binding, the costs of capital are considerably affected and all Member States with interest deduction limitation rules can be found at the end of the ranking. Theoretically, interest deduction limitation rules might thus negatively impact the scale of investment in those Member States. Moreover, the important cross-country differences in corporate tax rates which are without much relevance for a debt-financed marginal investment in the status quo get apparent again if interest deduction limitation rules are binding.

6.2.1.2 Profitable investments (EATR)

If a company plans to undertake a profitable investment, it often has to choose between two or multiple mutually exclusive investment locations. The EATR at the corporate level provides information on how tax systems impact on the net present value of the profitable investment. Binding interest deduction limitation rules can increase the EATR, alter the ranking of location alternatives from a tax perspective and thereby affect the choice of investment location. Generally, the tax treatment of ordinary returns on investment, in the form of interest expenses, is less important for profitable investments which earn economic rents above the ordinary return.

Table 5 presents the EATR of the EU28 Member States in the status quo for all three financing sources and the weighted mean. The table again contains the results for the interest deduction limitation rules without considering potential relief from a carry-forward of non-deductible interest (scenario 1) and the results for a sensitivity analysis (scenario 2). Moreover, the ranking of the EU28 Member States for the different scenarios is presented.

Table 5: Effect of interest deduction limitation rules on profitable investments at the corporate level (EATR in %)

	EATR in %								Rank					
	Status Quo				Interest Deduction Limitation Rules				Status Quo		Interest Deduction Limitation Rules			
					Scenario 1		Scenario 2				Scenario 1		Scenario 2	
	RE	NE	D	Mean	D	Mean	D	Mean	D	Mean	D	Mean	D	Mean
AT	26.0	26.0	17.3	23.0	-	-	-	-	19	19	16	18	16	19
BE	31.0	31.0	21.9	27.8	33.7	32.0	33.7	32.0	24	24	26	25	27	25
BG*	10.2	10.2	6.7	9.0	10.2	10.2	9.3	9.9	1	1	1	1	1	1
CY	17.2	17.2	11.6	15.2	-	-	-	-	6	6	4	4	4	4
CZ	19.0	19.0	12.4	16.7	-	-	-	-	9	10	7	9	7	10
DE°	31.5	31.5	22.1	28.2	31.5	31.5	26.1	29.6	25	25	25	24	24	24
DK°	24.2	24.2	16.0	21.3	24.2	24.2	20.1	22.8	16	16	20	19	19	18
EE	15.0	22.0	15.0	15.7	-	-	-	-	14	8	11	6	12	6
EL°	30.6	30.6	20.5	27.1	30.6	30.6	25.6	28.9	22	23	23	23	22	22
ES°	36.3	36.3	26.5	32.9	36.3	36.3	30.5	34.3	27	27	27	27	26	27
FI	20.9	20.9	14.2	18.6	-	-	-	-	11	12	8	11	9	11
FR	42.6	44.3	29.9	38.3	42.6	42.8	42.6	42.8	28	28	28	28	28	28
HR	18.9	18.9	11.9	16.5	-	-	-	-	8	9	6	8	6	9
HU	21.6	21.6	15.0	19.3	21.6	21.6	21.6	21.6	15	13	19	16	20	16
IE	15.9	15.9	10.7	14.1	-	-	-	-	3	3	3	3	3	3
IT°	25.0	25.0	21.4	23.7	31.1	27.2	25.8	25.3	23	20	24	21	23	20
LT	15.5	15.5	10.2	13.6	-	-	-	-	2	2	2	2	2	2
LU	29.1	29.1	18.9	25.5	-	-	-	-	20	21	17	20	18	21
LV	16.1	16.1	10.9	14.3	16.1	16.1	16.1	16.1	4	4	12	7	13	8
MT	36.5	36.5	24.3	32.2	-	-	-	-	26	26	21	26	21	26
NL	25.6	25.6	16.9	22.5	-	-	-	-	17	18	14	17	14	17
PL*	19.8	19.8	13.2	17.5	19.8	19.8	18.2	19.2	10	11	18	14	17	12
PT*	30.2	30.2	20.0	26.6	30.2	30.2	27.7	29.3	21	22	22	22	25	23
RO°	16.8	16.8	11.2	14.8	16.8	16.8	14.0	15.8	5	5	13	10	8	7
SE	22.0	22.0	14.6	19.4	-	-	-	-	12	14	9	12	10	13
SI	17.5	17.5	11.6	15.5	-	-	-	-	7	7	5	5	5	5
SK	22.3	22.3	14.6	19.6	-	-	-	-	13	15	10	13	11	14
UK	24.0	24.0	17.0	21.5	-	-	-	-	18	17	15	15	15	15

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

*: Member States allow a carry-forward for non-deductible interest expenses (limited in time)

°: Member States allow a carry-forward for non-deductible interest expenses (unlimited in time)

In the status quo, the EATRs for debt financing vary from 6.7% in Bulgaria to 29.9% in France. Both Member States apply interest deduction limitation rules and are therefore affected by binding interest deduction limitation rules. In scenario 1, the EATR for debt financing increases in France from 29.9% to 42.6% and in Bulgaria from 6.7% to 10.2%. The spread in the EATRs for debt financing in the case of binding interest deduction limitation rules is thus increasing to 32.4 percentage points (status quo: 23.2 percentage points) in the EU28 Member States. The differences in corporate income tax rates between the EU28 Member States turn more relevant if interest deduction limitation rules are binding. In this case, the ordinary return on investment is no longer shielded from taxation.

The EATR increase at the corporate level is similar across all Member States in scenario 1, i.e. as long as potential carry-forward rules are not taken into account. The smallest increase, in relative terms, can be observed in Spain (36.7%) while the increase exceeds 50% in five Member States (Belgium, Bulgaria, Denmark, Poland, Por-

tugal). The relatively small increase in Spain can be explained by the fact that the deduction of interest expenses is considerably restricted in the status quo for local profit tax purposes.

The complete non-deductibility of interest costs leads to the same EATRs for equity and debt financing in ten Member States (Bulgaria, Denmark, Germany, Greece, Hungary, Latvia, Poland, Portugal, Romania, and Spain) featuring interest deduction limitation rules in scenario 1. This is not fulfilled in Belgium, France and Italy. In Belgium and Italy, the existence of an ACE leads to a preference for equity financing. An additional tax on dividends in France disadvantages investments financed with new equity.

In scenario 2 which accounts for the possibility of a carry-forward, the EATRs for debt financing in Member States with interest deduction limitation rules decrease to a smaller extent for Bulgaria, Poland and Portugal. These three Member States allow only a carry-forward which is limited in time. For the six Member States which do not limit the carry-forward of non-deductible interest in future periods the decrease is much higher.

Table 5 presents all EU28 Member State ranked according to the level of their EATR for debt financing and the overall mean for each scenario (status quo, scenario 1, scenario 2). As the EATR is used as a measure to decide upon the location of a profitable investment, the table ranks the EU Member States according to their attractiveness as investment locations for the overall mean and the case of debt.

The top position of Bulgaria in both scenarios is attributable to the low corporate income tax rate of 10%. Due to this low corporate income tax rate, the effect of binding interest deduction limitation rules in Bulgaria is relatively limited. Other Member States with higher corporate income tax rates like Latvia, Poland and Romania lose eight positions in the ranking of locations in the debt financing case if interest deduction limitation rules are effective. Member States with very high corporate income tax rates, as Germany and France, rank at the end in the status quo and their rank is therefore nearly not changing in scenario 1.

If the possibility of a carry-forward of excessive interest is taken into account, it is immediately clear that Member States which allow for a carry-forward might benefit compared to scenario 1 whereas Member States that do not allow for a carry-forward might lose further positions in the case of debt financing. This is the case for Hungary, Belgium and Latvia. Member States granting only a limited carry-forward as Portugal fall behind Greece, Italy and Germany which all have a carry-forward without timing restrictions. In sum, binding interest deduction limitation rules boost the EATR. Economically, Member States get less attractive for profitable investments compared to Member States that do not have interest deduction limitation rules. An allowance for a carry-forward - limited or unlimited in time - can recover the increase in EATR only to a limited extent.

6.2.2 Shareholder level

In the following, the influence of personal taxation on the investment behaviour of a corporation shall be discussed. Taxation at the shareholder level might not be of great importance to large corporations as the number of shareholders can be very high, the jurisdictions of their residence might vary or shareholders might even be unknown. For small and medium-sized corporations, this might not be true as they often have a limited number of domestic shareholders.

Interest deduction limitation rules are primarily intended to prevent profit shifting of multinational corporations and shareholder taxes should therefore not be relevant in this context. Nevertheless, medium-sized corporations could be affected in an economic crisis. This might be especially relevant for earnings stripping rules as in an economic crisis the sales (which is relevant for the allowed EBITDA) decreases where-

as the interest expenses remain constant. Therefore, binding interest deduction limitation might also be relevant for corporations including shareholder taxes to a limited extent.

Table 6 presents the cost of capital and the EATR for debt financing as well as for the overall mean in the status quo, the case of binding interest deduction limitation rules (scenario 1) and a sensitivity analysis accounting for the availability of carry-forwards for non-deductible interest expenses. Because of the limited applicability of the scenario, only some general trends will be discussed in the following.

Table 6: Effect of interest deduction limitation rules on profitable and marginal investments at the shareholder level (EATR and cost of capital in %)

	Cost of Capital in %						EATR in %					
	Status Quo		Interest Deduction Limitation Rules				Status Quo		Interest Deduction Limitation Rules			
			Scenario 1		Scenario 2				Scenario 1		Scenario 2	
	D	Mean	D	Mean	D	Mean	D	Mean	D	Mean	D	Mean
AT	4.6	5.6	-	-	-	-	31.5	34.3	-	-	-	-
BE	4.0	5.1	7.6	6.4	7.6	6.4	35.1	37.7	44.1	40.9	44.1	40.9
BG*	4.8	5.2	5.6	5.5	5.4	5.4	10.1	11.7	13.4	12.9	12.6	12.6
CY	5.0	4.4	-	-	-	-	21.6	19.3	-	-	-	-
CZ	4.6	4.9	-	-	-	-	21.4	22.6	-	-	-	-
DE°	4.7	6.0	7.4	6.9	5.9	6.4	35.9	39.1	42.9	41.5	38.9	40.1
DK°	4.7	5.2	6.8	5.9	5.7	5.6	40.6	41.7	45.4	43.4	43.0	42.6
EE	5.0	5.7	-	-	-	-	15.5	18.2	-	-	-	-
EL°	4.7	5.9	7.5	6.9	6.1	6.4	30.1	33.8	38.4	36.7	34.2	35.3
ES°	6.1	7.7	9.2	8.8	7.0	8.1	38.0	41.9	45.4	44.5	41.0	42.9
FI	4.8	5.2	-	-	-	-	30.9	32.1	-	-	-	-
FR	5.0	4.5	9.3	6.0	9.3	6.0	49.4	48.7	56.8	51.2	56.8	51.2
HR	4.3	4.8	-	-	-	-	20.6	22.2	-	-	-	-
HU	4.9	6.2	6.6	6.7	6.6	6.7	24.6	28.8	30.2	30.7	30.2	30.7
IE	4.9	5.2	-	-	-	-	43.2	43.9	-	-	-	-
IT°	4.6	4.6	7.4	5.6	5.9	5.0	33.7	33.5	41.2	36.2	37.0	34.7
LT	4.7	6.1	-	-	-	-	20.1	25.1	-	-	-	-
LU	4.1	6.3	-	-	-	-	31.3	37.4	-	-	-	-
LV	4.9	5.7	6.1	6.1	6.1	6.1	17.3	20.2	22.0	21.8	22.0	21.8
MT	4.5	5.7	-	-	-	-	24.0	28.0	-	-	-	-
NL	4.5	6.0	-	-	-	-	31.4	35.7	-	-	-	-
PL*	4.7	5.4	6.4	6.0	6.0	5.9	24.7	27.0	30.1	28.9	28.7	28.4
PT*	4.4	5.7	7.3	6.7	6.6	6.4	34.9	38.1	42.4	40.7	40.5	40.1
RO°	4.8	5.4	6.2	5.8	5.5	5.6	21.2	23.2	25.9	24.9	23.6	24.0
SE	4.6	5.3	-	-	-	-	32.5	34.2	-	-	-	-
SI	4.8	4.5	-	-	-	-	26.8	26.1	-	-	-	-
SK	4.5	5.4	-	-	-	-	14.5	18.1	-	-	-	-
UK	5.5	5.0	-	-	-	-	33.9	32.4	-	-	-	-

D = Debt; Mean = weighted mean over retained earnings, new equity, debt

*: Member States allow a carry-forward for non-deductible interest expenses (limited in time)

°: Member States allow a carry-forward for non-deductible interest expenses (unlimited in time)

The analysis at the corporate level has shown that the cost of capital is much more affected than the EATR if interest deduction limitation rules are binding. In the status quo, the cost of capital at the shareholder level is comparable to the cost of capital at the corporate level as a debt-financed marginal investment is nearly not affected by

the taxes levied at the shareholder level.³⁴ The marginal profit is completely paid as interest expenses to the external lender. If interest deduction limitation rules are in place, taxes on the marginal profit of the investment have to be paid at the corporate level. Apart from this change at the corporate level, no other changes occur and the marginal profit is still completely absorbed by the payable interest expenses. Therefore, the costs of capital in the case of binding interest deduction limitation rules for debt financing are very similar at corporate and shareholder level and basically the same conclusions as at the corporate level can be made. Binding interest deduction limitation rules might also negatively impact on the scale of investment from the shareholders' perspective as the cost of capital is increasing considerably.

If interest deduction limitation rules are binding, the EATRs for debt financing increase in scenario 1 for all Member States. The non-deductibility of interest expenses at the corporate level decreases the distributed dividend and increases the EATR at the shareholder level. The overall effect is slightly different between the Member States and depends on the specific characteristics of the tax system at the shareholder level. A relatively low increase can be observed in Denmark (11.8%) while in four Member States (Belgium, Bulgaria, Greece, Latvia) the increase is beyond 25%. Even in scenario 1, Bulgaria keeps the lowest EATR both for debt financing (13.4%) and overall (12.9%) despite the non-deductibility of interest expenses. The highest EATR in this scenario is observable in France (56.8% for debt financing, 51.2% overall). In scenario 2, the EATRs for Member States which allow a carry-forward unlimited in time decreases for debt financing by 2.4 percentage points (Denmark, Romania) or even higher percentage points (Germany, Greece, Italy, Spain). EATRs for debt financing in Member States which limit their carry-forward for non-deductible interest (Bulgaria, Poland, Portugal) decrease to a smaller extent.

7. Impact of fundamental tax reforms

7.1 Overview of fundamental tax reforms

The effect of the four different fundamental tax reform options on the effective tax burdens (i.e. cost of capital and EATR) will be assessed in the following. All fundamental tax reforms are intended to eliminate the distinction between debt and equity in current corporate tax systems. This section is intended to provide a brief descriptive overview of each fundamental tax reform and the required adaptations in the Devereux/Griffith model.

7.1.1 Comprehensive Business Income Tax (CBIT)

The CBIT has been first proposed by the US Department for Treasury in 1992.³⁵ Under a CBIT, the debt-equity distinction becomes irrelevant by disallowing interest deductions at the corporate level, thus aligning the treatment of interest with that of dividends.³⁶ The abolition of interest deductibility results in a taxation of corporate profits after depreciation but before interest.³⁷ Hence, corporate income tax is transformed into a broad-based source tax withheld at company level.³⁸ Since all capital is subject to tax at the level of the firm, the introduction of a CBIT should be combined with an

³⁴ See Table 4 for the results at the corporate level.

³⁵ See US Department of Treasury (1992).

³⁶ See Cnossen (1996, p. 86); Cnossen (2002, p. 542); Hey (2014, p. 342).

³⁷ See Mirrlees et al. (2010, p. 425).

³⁸ See De Mooij/Devereux (2011, p. 98); De Mooij (2012, p. 502).

elimination of capital income taxation at the shareholder level.³⁹ Capital income taxes (dividend, interest and capital gains) at the shareholder level are not levied anymore.

In the Devereux/Griffith model, the complete non-deductibility of interest expenses impacts debt-financed investments at the corporate level. At the shareholder level, the suspension of capital income taxation at the shareholder level affects all investments irrespective of the financing source.

7.1.2 Allowance for Corporate Equity (ACE)

The ACE achieves a similar treatment of equity and debt by providing an additional allowance that should reflect the cost of equity finance.⁴⁰ This fundamental tax reform basically operates in the opposite direction as the aforementioned CBIT.⁴¹ The equity allowance is granted at an imputed rate of return (the so-called notional interest rate) on a company's equity. The determination of the underlying notional interest rate is the decisive element of an ACE introduction.⁴²

The implementation of the ACE affects investments financed with retained earnings and new equity at the corporate level in the Devereux/Griffith model. At the shareholder level, no further modifications have to be conducted. The decisive impact of the notional interest rate has already been mentioned. In the Devereux/Griffith model, full neutrality between debt and equity at the corporate level is achieved if the notional interest rate equals the market interest rate of the model (current nominal rate: 7.1%).⁴³ In this case, only profits that exceed the ordinary rate of return will be taxed.⁴⁴ As an additional analysis, possible notional returns below and above the market interest rate will be regarded as Member States might choose a notional return that is not necessarily derived from the market interest rate.

7.1.3 Allowance for Corporate Capital (ACC)

The ACC allows for the deductibility of a notional return on all capital, i.e. debt and equity at the corporate level. In return, it disallows the deduction of all actual interest payments in the determination of the corporate tax base. Instead, an allowance for the nominal cost of finance is granted which is equal to a single notional interest deduction for debt and equity.⁴⁵ A presumed return on equity can be deducted while interest deductibility is limited to the notional amount.⁴⁶ An ACC can be seen as a combination of ACE and CBIT.⁴⁷

The ACC affects equity and debt financed investments in the Devereux/Griffith model as an additional allowance for equity financing is granted whereas the interest deductibility is limited. The introduction of an ACC does not require additional modifications at the shareholder level. But as for the ACE, the determination of the notional return for debt and equity is important. In a first scenario, the uniform notional interest rate for all capital will be set equal to the market interest rate of the model (7.1%). In a sensitivity analysis, the notional deduction rate will be set below and above the market interest rate. This will account for the case that some firms might face a higher or

³⁹ See US Department of Treasury (1992, p. 39); Cnossen (1996, p. 86); De Mooij (2012, p. 503).

⁴⁰ See Devereux/Freeman (1991, p. 4).

⁴¹ See Gammie (1992, p. 266).

⁴² See Mirrlees et al. (2010, p. 425).

⁴³ See Spengel et al. (2015, p. B-24).

⁴⁴ See IFS Capital Taxes Group (1991, p. 19).

⁴⁵ See Boadway/Bruce (1984, p. 234).

⁴⁶ See Schön (2012, p. 491).

⁴⁷ See Fatica et al. (2012, p. 15).

a lower interest rate than the one determined by the government of the Member State.

7.1.4 Cost of Capital Allowance (COCA)

The ACC and COCA are similar concepts as they only differ with regard to the taxation of income at the shareholder level. Under a COCA, the tax deductibility of interest expenses is replaced by a uniform deduction on both equity and debt invested in the business.⁴⁸ Aside from depreciation charges, COCA is the only deduction available to a corporation, even if it pays out cash dividends or interest that exceeds the COCA amount.⁴⁹ Apart from those corporate level changes, the tax treatment of investors is modified as well: Instead of dividend or interest income, investors are subject to tax with a return on their investments calculated at the same COCA rate as applied by the corporation, regardless of whether they actually receive that return in cash.⁵⁰ Payments beyond the anticipated return are not included in the taxable income and thus, in principle, are exempt from taxation. As the taxation at the shareholder level is independent of the amount actually received, the concept of capital gains taxation is no longer relevant for the COCA.⁵¹ Therefore, capital gains taxation is completely abolished.

The required modifications at the corporate level for the COCA resemble the changes for the ACC in the Devereux/Griffith model. Additionally, the taxation at the shareholder level has to be modified as only the notional amount deducted at the corporate level will be taxed at the shareholder level. The taxation of the notional amount is also relevant if the alternative investment is considered as this ensures an equal treatment of all investments. As for the ACE and ACC, the determination of the COCA rate will impact the results of the study. Therefore, different COCA rates will be regarded.

7.2 Corporate level

This Section analyses the effects of fundamental tax reforms on the effective tax burden at the corporate level only. First, the analysis of the cost of capital informs about the extent to which fundamental tax reforms affect the cost of capital and thus the theoretically implied incentives for the scale of investment in the EU28 Member States.⁵² Second, the effect of the fundamental reforms on the EATR is demonstrated at the corporate level. This analysis illustrates how tax incentives for discrete location choices are affected by the implementation of fundamental tax reforms.

By limiting the analysis to the corporate level, only those reform elements affecting the deduction of interest expense or notional interest expenses at the corporate level are considered. Hence, ACC and COCA represent an identical case in this setting.⁵³

7.2.1 Overall impact of fundamental tax reforms

The results in Table 7 present the EU28 average for the status quo and all fundamental tax reforms. For the status quo and each fundamental tax reform, the cost of capital and EATR for each financing source as well as the overall mean and the difference of debt and new equity are presented. This overview shows whether and to which ex-

⁴⁸ See Kleinbard (2007, p. 10); Kleinbard (2015, p. 7).

⁴⁹ See Kleinbard (2007, p. 11); Kleinbard (2015, pp. 50-51).

⁵⁰ See Kleinbard (2007, p. 10); Kleinbard (2015, p. 52).

⁵¹ See Kleinbard (2015, p. 56).

⁵² As the EMTR can be directly derived from the cost of capital, the results for the EMTR are not separately discussed. The resulting EMTR can be found in Section A3 in the appendix.

⁵³ See the description in the previous section.

tent the goal of financing neutrality can be achieved in the EU28 Member States on average if a fundamental tax reform is implemented.

Complete financing neutrality requires that the effective tax level, expressed in terms of the cost of capital or the EATR, is the same no matter whether the investment in the company is financed by retained earnings, new equity or debt. In this case, there is no tax induced bias toward a certain source of financing. In addition to financing neutrality, it is interesting to see the extent to which tax systems achieve investment neutrality. A tax system is investment neutral if the marginal investment and the alternative investments are taxed equally, i.e. if the marginal investment decision and, as a consequence, the optimal scale of investment is not distorted by the tax system. Investment neutrality can be achieved under perfect capital market conditions, a single interest rate in particular, and, with respect to investment in real assets, neutral tax depreciation which reflects true economic depreciation, and depending on further design features of the tax system.

Whether and to which extent investment neutrality is achieved can be assessed by comparing the cost of capital with the real market interest rate, which in these model computations is set to 5%. Remember that, as explained in Section 4.1, the cost of capital represents the minimum pre-tax rate of return required for an investment to be actually undertaken. If the tax system drives the cost of capital, i.e. the minimum required rate of return of corporate investment, above the market interest rate, it deters investment in the company. In return, if the cost of capital falls below the real market interest rate (here: 5%), the tax system promotes real investment in the company because the required rate of return on such investment is lower than on alternative financial investments. Table 7 informs about the costs of capital for all three sources of financing and their weighted mean.

As compared to the status quo, the CBIT accentuates tax distortions on investment, in particular if the marginal investment is financed with debt as the cost of capital increases to 6.8%. ACE and ACC/COCA systems, as implemented for Table 7, almost achieve full investment neutrality. However, the cost of capital fall slightly below the model's real market interest rate of 5% and, consequently, the results in Table 7 suggest that there is promotion of real investment. Under these tax systems, the return of the marginal investment is shielded from corporate tax by actual or, respectively, notional interest expense. Consequently, the tax system would drive no wedge between the cost of capital and the real market interest rate. In other words, the costs of capital should amount to 5%. But if non-neutral, i.e. economically generous, tax depreciation allowances are available, these create additional tax savings driving the cost of capital further below the real interest rate.⁵⁴

⁵⁴ The Devereux/Griffith methodology relies, in principle, on a one-periodic approach. Considering investment-related cash flows over the assets' full useful life under ideal conditions, the exact pattern of tax depreciation would turn irrelevant because any associated timing effects would be neutralized by the tax-deductible notional interest rate on equity. In other words, investment neutrality could be achieved even if tax depreciation was not neutral and did not follow true economic depreciation.

Table 7: Effect of fundamental tax reforms on the cost of capital and the EATR of the EU28 average at the corporate level (cost of capital and EATR in %)

		Status Quo	Fundamental Tax Reform		
			CBIT	ACE	ACC/COCA
Cost of Capital	RE	6.7	6.8	4.7	4.7
	NE	6.8	6.9	4.8	4.8
	D	4.7	6.8	4.7	4.7
	Mean	6.0	6.8	4.7	4.7
	D-NE	-2.1	-0.1	-0.1	-0.1
EATR	RE	23.6	23.9	16.4	16.4
	NE	23.9	24.2	16.7	16.7
	D	16.3	23.9	16.3	16.3
	Mean	21.1	24.0	16.4	16.4
	D-NE	-7.6	-0.3	-0.4	-0.4

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

D-NE displays the difference of debt and new equity expressed in percentage points

In the status quo, debt-financed investments face a lower cost of capital and EATR compared to investments financed with retained earnings and new equity. The cost of capital for debt financing amounts to 4.7% only whereas the costs of capital for equity financing (retained earnings and new equity) are considerably higher. A similar result can be found for the EATR. This reflects the extent of the corporate debt bias in the existing corporate tax systems.

All fundamental tax reforms (CBIT, ACE, ACC/COCA) are intended to achieve financing neutrality at the corporate level. The results in Table 7 show that all fundamental tax reforms largely achieve this goal. The cost of capital and the EATR are very similar for all financing sources. However, they significantly differ in the way how financing neutrality is achieved.

The CBIT comprises a full non-deductibility of interest expenses at the corporate level. This modification of the corporate tax base leads to a “levelling up”⁵⁵ of effective tax levels under debt financing to the costs of capital and the EATRs for equity-financed investments: The EU28 average cost of capital of debt-financed investments increases from 4.7% to 6.8% and the EATR changes from 16.3% to 23.9%. The implementation of a CBIT thus increases the effective tax level, i.e. both the cost of capital and the EATR, compared to status quo. In consequence, the goal of financing neutrality is achieved but raising the effective tax burden by disallowing interest deduction might have a negative impact on both the scale of investment and the attractiveness of the EU28 Member States as a location for investment.

The ACE works in the opposite direction as compared to the CBIT. By granting an additional deduction for equity financing, a “levelling down” to the cost of capital and the EATR of debt financing is achieved: The average cost of capital of investments financed with retained earnings decreases to 4.7% and for new equity to 4.8%. Nevertheless, whether financing neutrality is achieved in an ACE system highly depends on the applied notional interest rate as discussed below. No matter what exactly is the applied notional interest rate, the additional allowance for equity financing reduces both the cost of capital and the EATR relative to the status quo. The implementation of an ACE thus works in favor of financing neutrality and, all other things equal, might

⁵⁵ The same terms have already been used by Bond (2000).

have positive effects on the scale of investment. Furthermore, the EU28 Member States might also become more attractive as locations for international investment.

ACC and COCA allow for a notional deduction on debt and equity financing at the corporate level and thus lead to the same effects. The notional deduction for all capital aligns the treatment of debt and equity financing immediately, i.e. the notional deduction achieves a “levelling” anyway. Therefore, financing neutrality can always be achieved and in contrast to the ACE, the determination of the notional interest rate has no impact on financing neutrality. But the notional interest rate is relevant for the determination of the overall positive or negative effect on the scale of investment and discrete location decisions.

The importance of the notional interest rate for ACE and ACC/COCA has been already discussed. In Table 7, the notional interest rate equals the nominal market interest rate (7.1%) and full financing neutrality is achieved for those fundamental tax reforms. But Member States could choose different methods to determine the notional interest rates which can be seen in the current ACE systems in Belgium and Italy.⁵⁶ In Belgium, the notional interest rate is derived from government bonds and may not exceed 3%.⁵⁷ Italy has set the notional interest rates to 4% in 2014, 4.5% in 2015 and 4.75% in 2016. Therefore, it is interesting to assess how different notional interest rates affect the effective tax levels and a sensitivity analysis is conducted for the ACE and ACC/COCA. In Table 8, the resulting EU28 average costs of capital and EATR for each source of finance as well as the overall mean are presented for potential notional interest rates below and above the nominal market interest rate (5% and 9% respectively).

Table 8: Effect of different notional interest deduction rates (NID-Rate) on the EU28 average for the ACE and ACC/COCA at the corporate level (cost of capital and EATR in %)

		ACE		ACC/COCA	
		NID-Rate: 5 %	NID-Rate: 9 %	NID-Rate: 5 %	NID-Rate: 9 %
Cost of Capital	RE	5.3	4.2	5.3	4.2
	NE	5.4	4.3	5.4	4.3
	D	4.7	4.7	5.3	4.2
	Mean	5.1	4.4	5.3	4.2
	D-NE	-0.7	0.4	-0.1	-0.1
EATR	RE	18.6	14.4	18.6	14.4
	NE	18.9	14.7	18.9	14.7
	D	16.3	16.3	18.5	14.3
	Mean	17.8	15.1	18.6	14.4
	D-NE	-2.6	1.6	-0.4	-0.4

The results for the ACE in Table 7 and Table 8 show that financing neutrality can be achieved and the debt bias will be eliminated in case the notional interest rate equals the market interest rate. For notional interest rates below the market interest rate, the debt bias is not completely eliminated whereas a preference for equity financing

⁵⁶ See Zangari (2014, p. 42).

⁵⁷ This restriction has been introduced in 2012. In previous years, the notional interest rates have been higher than 3% (2009: 4.473%; 2010: 3.8%; 2011: 3.425%; 2012: 3.0%).

may be induced if the notional interest rate exceeds the market interest rate. This result is valid for marginal and profitable investments.

The sensitivity analysis for ACC/COCA shows that financing neutrality is achieved whereas a positive or negative impact on investment cannot be determined a priori. It depends on the relationship between notional interest rate and market interest rate as well as on the importance of each financing source: The costs of capital decline with the increase of the notional interest deduction thus potentially stimulating investment. If a low notional interest rate is chosen, the tax advantage of debt financing is reduced substantially and the overall mean for the cost of capital could in fact increase. The same conclusions hold for profitable investments because the overall EATR could be higher or lower as compared to the status quo. The EATR for equity financing decreases for all notional interest rates whereas the EATR for debt financing can also increase.

In the following, a more detailed analysis of the effects of fundamental tax reforms in the single Member States is conducted. This section is intended to elaborate on differences in the Member States.

7.2.2 Marginal investments (cost of capital)

Any modification of the corporate tax base has a significant effect on the effective tax burden levied on marginal investment. In other words, the effects of fundamental tax reforms are most strongly reflected if the cost of capital, i.e. the pre-tax return of marginal investments is considered. In addition, considering the cost of capital allows for an in-depth assessment of how different notional interest rates impact on effective tax levels, and associated investment incentives, at the margin, respectively for the ACE, ACC and COCA.

The detailed calculation results for each EU28 Member State and for each fundamental tax reform scenario are presented in Table 9. The first four columns show the costs of capital for 2015 based on the current tax codes (status quo). The next eight columns display the results for the CBIT and the ACE reform, respectively by source of finance. The last four columns show the results for the ACC and the COCA which are identical for both reform options at the corporate level.

7.2.2.1 CBIT

In Table 9, columns 6 and 7, the costs of capital for investments financed with retained earnings and new equity correspond to those in the status quo. The slight differences for the EU28 average for equity-financed investments compared to the status quo can be explained by the impact of the Italian and Belgian tax code respectively. For all fundamental tax reforms, it is assumed that the ACE systems in place in both Member States will not be maintained in case a fundamental tax reform is introduced. This avoids confounding of multiple fundamental tax reforms (e.g. analysis of ACE and CBIT at the same time). Under this assumption, the costs of capital for equity-financed investments increase in both Member States for the CBIT. In Belgium and Italy, the costs of capital amount to 7.5% and 7.3% respectively for retained earnings, new equity and debt.

A CBIT increases the cost of capital for debt-financed investments. But the increase in the costs of capital is not uniform across the Member States. As already noted in Section 5.1, the marginal return of a debt-financed investment is paid as interest expense to the external lender and the corporate tax base amounts to zero if interest expenses are deductible. The benefit of interest deduction, and in turn the disadvantage from non-deductibility of interest expenses, is greater in Member States with high tax rates. The cost of capital for Bulgaria, for example, increases only from 4.8% to 5.6% whereas the cost of capital for investments in France increases from 4.5% to 8.9%.

Table 9: Effect of fundamental tax reforms on marginal investments at the corporate level (cost of capital in %)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Status Quo					CBIT					ACE					ACC/COCA				
	RE	NE	D	Mean	D-NE	RE	NE	D	Mean	D-NE	RE	NE	D	Mean	D-NE	RE	NE	D	Mean	D-NE
AT	6.9	6.9	4.6	6.1	-2.3	6.9	6.9	6.9	6.9	0.0	4.6	4.6	4.6	4.6	0.0	4.6	4.6	4.6	4.6	0.0
BE	6.7	6.7	3.9	5.7	-2.8	7.5	7.5	7.5	7.5	0.0	3.9	3.9	3.9	3.9	0.0	3.9	3.9	3.9	3.9	0.0
BG	5.6	5.6	4.8	5.3	-0.8	5.6	5.6	5.6	5.6	0.0	4.8	4.8	4.8	4.8	0.0	4.8	4.8	4.8	4.8	0.0
CY	6.3	6.3	4.9	5.8	-1.4	6.3	6.3	6.3	6.3	0.0	5.5	5.5	4.9	5.3	-0.6	5.5	5.5	4.9	5.3	-0.6
CZ	6.2	6.2	4.5	5.6	-1.6	6.2	6.2	6.2	6.2	0.0	4.5	4.5	4.5	4.5	0.0	4.5	4.5	4.5	4.5	0.0
DE	7.4	7.4	4.7	6.5	-2.7	7.4	7.4	7.4	7.4	0.0	4.7	4.7	4.7	4.7	0.0	4.7	4.7	4.7	4.7	0.0
DK	6.7	6.7	4.6	6.0	-2.1	6.7	6.7	6.7	6.7	0.0	4.6	4.6	4.6	4.6	0.0	4.6	4.6	4.6	4.6	0.0
EE	5.0	6.7	5.0	5.2	-1.7	5.0	6.7	5.0	5.2	-1.7	5.0	6.7	5.0	5.2	-1.7	5.0	6.7	5.0	5.2	-1.7
EL	7.5	7.5	4.7	6.5	-2.8	7.5	7.5	7.5	7.5	0.0	4.7	4.7	4.7	4.7	0.0	4.7	4.7	4.7	4.7	0.0
ES	9.3	9.3	6.1	8.1	-3.2	9.3	9.3	9.3	9.3	0.0	6.1	6.1	6.1	6.1	0.0	6.1	6.1	6.1	6.1	0.0
FI	6.5	6.5	4.8	5.9	-1.7	6.5	6.5	6.5	6.5	0.0	4.8	4.8	4.8	4.8	0.0	4.8	4.8	4.8	4.8	0.0
FR	8.9	9.5	4.5	7.4	-4.9	8.9	9.5	8.9	8.9	-0.6	4.5	5.1	4.5	4.6	-0.6	4.5	5.1	4.5	4.6	-0.6
HR	6.0	6.0	4.2	5.4	-1.7	6.0	6.0	6.0	6.0	0.0	4.2	4.2	4.2	4.2	0.0	4.2	4.2	4.2	4.2	0.0
HU	6.6	6.6	4.9	6.0	-1.7	6.6	6.6	6.6	6.6	0.0	4.9	4.9	4.9	4.9	0.0	4.9	4.9	4.9	4.9	0.0
IE	6.1	6.1	4.9	5.7	-1.3	6.1	6.1	6.1	6.1	0.0	4.9	4.9	4.9	4.9	0.0	4.9	4.9	4.9	4.9	0.0
IT	5.6	5.6	4.6	5.2	-1.0	7.3	7.3	7.3	7.3	0.0	4.6	4.6	4.6	4.6	0.0	4.6	4.6	4.6	4.6	0.0
LT	6.0	6.0	4.8	5.6	-1.2	6.0	6.0	6.0	6.0	0.0	4.8	4.8	4.8	4.8	0.0	4.8	4.8	4.8	4.8	0.0
LU	7.0	7.0	4.1	6.0	-2.9	7.0	7.0	7.0	7.0	0.0	4.1	4.1	4.1	4.1	0.0	4.1	4.1	4.1	4.1	0.0
LV	6.1	6.1	4.9	5.7	-1.2	6.1	6.1	6.1	6.1	0.0	4.9	4.9	4.9	4.9	0.0	4.9	4.9	4.9	4.9	0.0
MT	8.2	8.2	4.4	6.8	-3.7	8.2	8.2	8.2	8.2	0.0	4.4	4.4	4.4	4.4	0.0	4.4	4.4	4.4	4.4	0.0
NL	6.8	6.8	4.5	6.0	-2.3	6.8	6.8	6.8	6.8	0.0	4.5	4.5	4.5	4.5	0.0	4.5	4.5	4.5	4.5	0.0
PL	6.4	6.4	4.7	5.8	-1.6	6.4	6.4	6.4	6.4	0.0	4.7	4.7	4.7	4.7	0.0	4.7	4.7	4.7	4.7	0.0
PT	7.3	7.3	4.4	6.3	-2.9	7.3	7.3	7.3	7.3	0.0	4.4	4.4	4.4	4.4	0.0	4.4	4.4	4.4	4.4	0.0
RO	6.1	6.1	4.8	5.7	-1.3	6.1	6.1	6.1	6.1	0.0	4.8	4.8	4.8	4.8	0.0	4.8	4.8	4.8	4.8	0.0
SE	6.5	6.5	4.6	5.8	-1.9	6.5	6.5	6.5	6.5	0.0	4.6	4.6	4.6	4.6	0.0	4.6	4.6	4.6	4.6	0.0
SI	6.2	6.2	4.7	5.7	-1.4	6.2	6.2	6.2	6.2	0.0	4.7	4.7	4.7	4.7	0.0	4.7	4.7	4.7	4.7	0.0
SK	6.5	6.5	4.5	5.8	-2.0	6.5	6.5	6.5	6.5	0.0	4.5	4.5	4.5	4.5	0.0	4.5	4.5	4.5	4.5	0.0
UK	7.2	7.2	5.5	6.6	-1.7	7.2	7.2	7.2	7.2	0.0	5.5	5.5	5.5	5.5	0.0	5.5	5.5	5.5	5.5	0.0
EU28	6.7	6.8	4.7	6.0	-2.1	6.8	6.9	6.8	6.8	-0.1	4.7	4.8	4.7	4.7	-0.1	4.7	4.8	4.7	4.7	-0.1

RE= Retained Earnings; NE = New Equity; D = Debt; Mean = weighted mean over RE, NE, D;
D-NE displays the difference of debt and new equity expressed in percentage points.

The implementation of a CBIT ensures financing neutrality for marginal investments in almost all EU28 Member States. For most Member States, the costs of capital for all three financing sources are identical. The remaining difference between new equity and debt can be explained by the taxes levied on distributed earnings in Estonia and France. The CBIT does not affect debt-financed investments in Estonia as this EU Member State taxes only distributed earnings. In France, the difference can be explained by an additional tax of 3% on distributed earnings.

7.2.2.2 ACE

The ACE works in the opposite direction compared to the CBIT. The allowance for corporate equity narrows the tax base thus inducing a decline in effective tax rates and the cost of capital. In Table 9, financing neutrality for nearly each Member State is achieved as a notional interest of 7.1% has been assumed.

Member States are differently affected by the introduction of an ACE. As for the CBIT, the greatest effects of the ACE can be found in Member States with high corporate income tax rates. The tax advantage due to the additional tax shield from the deduction of notional interest on equity is greater if the tax rate is higher. Therefore, the cost of capital for investments financed with retained earnings decreases by 4.4 percentage points in France as opposed to only 0.8 percentage points in Bulgaria.

In the status quo, Italy has a low cost of capital for equity financing (5.6%) compared to other Member States. The reason is that Italy already has an ACE in place in the status quo which allows the deduction of a notional return on equity at a rate of 4.5% for 2015. In the specifically modeled ACE scenario, the cost of capital is decreasing to 4.6%. The difference between the status quo and the ACE scenario can be explained by the different underlying notional interest rate.⁵⁸

In Table 9, columns 11-13, a notional interest of 7.1% for the ACE has been used to eliminate the debt bias completely. But in some Member States, a difference between debt and equity financing still persists. As a consequence, financing neutrality is not fully achieved when the EU28 average effective tax levels for the different ways of financing are considered. One reason for the differences of the costs of capital for the EU28 average is the distribution tax levied in Estonia and France. Additionally, the costs of capital in Cyprus are differing. In Cyprus, any income from the financial asset, one of the five asset types considered in the model computations, is not subject to corporate income tax but a distinct "Defense Contribution" is levied on the corresponding proceeds. The introduction of an ACE exclusively for the corporate income tax thus does not affect investments in the financial asset. As a result, the decrease in the mean cost of capital for the five different assets in Cyprus is lower because only four out of five assets benefit from the introduction of an ACE.

7.2.2.3 ACC/COCA

The results in Table 9, columns 16-18 show the mean cost of capital for each financing source and the overall mean for the ACC/COCA at the corporate level. The results for debt financing for the ACC/COCA equal the results for debt financing in the status quo and in the ACE scenario. Additionally, the results for retained earnings and new equity are the same as for the ACE. This pattern can be observed for each Member State and can be explained by the modeled underlying notional interest rate of 7.1%: In this situation, the results for debt financing remain unchanged relative to the status quo because the actual interest expenses equal the notional deduction. For equity financing, the reform effects correspond to those under an ACE regime at the corporate level.

⁵⁸ Belgium has also an ACE in place in the status quo. As the notional interest rate is lower than in Italy (1.63%), the effect is much less pronounced.

7.2.3 Profitable investments (EATR)

In contrast to the cost of capital, the EATR at the corporate level is mainly influenced by the statutory corporate income tax rate. Any modification of the tax base as intended by all fundamental tax reforms is less important for highly profitable investments as the excess return (the return exceeding the normal return) is taxed at the statutory tax rate with no further impact of tax base regulations.

Table 10 presents the detailed calculation results for each EU28 Member State in the fundamental tax reform scenarios. Again, an unweighted average for all 28 EU Member States is displayed in the bottom row of the table. The EATRs in the status quo are given in the first four columns. In the remaining columns, the EATR for the four fundamental reform options separated for each financing source and the respective overall mean are presented. ACC and COCA can be summarized to one case as they have the same consequences at the corporate level.

The general mechanisms of how the fundamental reforms affect marginal investments hold also for profitable investments. In the status quo, debt finance is favored as interest expenses can be deducted whereas this is not available for equity financing. The additional deduction does not unfold an amplified effect as the excess return is always taxed at the statutory tax rate. If the tax base is aligned by either limiting the interest deductibility or granting an additional deduction for equity, the EATRs for all three financing sources should be equal. Hence, it is not a surprise that the results in Table 10 reveal financing neutrality for all fundamental tax reforms in most Member States.

7.2.3.1 CBIT

In contrast to marginal investments, the EATR for debt financing is changing rather uniformly at the corporate level if the status quo and the CBIT scenario are compared. The tax treatment of ordinary returns on investment, in the form of interest expenses, is less important for profitable investments which earn economic rents above the ordinary return. On average, the EATR for debt financing increases by 46.8% in Table 10 column 8. This increase is slightly less prevalent in Member States with profit taxes that are based on another tax base than the corporate income tax. These mostly local additional profit taxes restrict the deduction of interest expenses already in the status quo (e.g. IRAP in Italy) and can be found in France, Germany, Hungary, Italy, and Spain. For example, the EATR for Spain in the case of debt financing increases by 36.7% which is lower compared to the EU28 average increase of 46.8%.

Apart from Estonia, the EATRs for debt-financed investments as well as the overall mean are increasing in the CBIT scenario. The tax attractiveness of the EU28 Member States as a location for investments is thus possibly decreasing.

7.2.3.2 ACE

The ACE is levelling down the EATR for equity financing to the level of debt financing. Table 10, columns 11-13 shows that this alignment is achieved for nearly all Member States. Similar to the CBIT, the ACE unfolds a rather uniform effect in the Member States. The EATR for a high-tax Member State as Portugal (corporate income tax rate: 30%) is increasing to the same extent as in a low-tax Member State as Bulgaria (corporate income tax rate: 10%). Member States which levy profit taxes that are not affected by the introduction of an ACE for the corporate income tax benefit slightly less from the additional deduction compared to other Member States.

Table 10: Effect of fundamental tax reforms on profitable investments at the corporate level (EATR in %)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Status Quo				CBIT				ACE				ACC/COCA							
	RE	NE	D	Mean	D-NE	RE	NE	D	Mean	D-NE	RE	NE	D	Mean	D-NE	RE	NE	D	Mean	D-NE
AT	26.0	26.0	17.3	23.0	-8.7	26.0	26.0	26.0	26.0	0.0	17.3	17.3	17.3	17.3	0.0	17.3	17.3	17.3	17.3	0.0
BE	31.0	31.0	21.9	27.8	-9.1	33.7	33.7	33.7	33.7	0.0	21.9	21.9	21.9	21.9	0.0	21.9	21.9	21.9	21.9	0.0
BG	10.2	10.2	6.7	9.0	-3.5	10.2	10.2	10.2	10.2	0.0	6.7	6.7	6.7	6.7	0.0	6.7	6.7	6.7	6.7	0.0
CY	17.2	17.2	11.6	15.2	-5.6	17.2	17.2	17.2	17.2	0.0	13.7	13.7	11.6	13.0	-2.1	13.7	13.7	11.6	13.0	-2.1
CZ	19.0	19.0	12.4	16.7	-6.6	19.0	19.0	19.0	19.0	0.0	12.4	12.4	12.4	12.4	0.0	12.4	12.4	12.4	12.4	0.0
DE	31.5	31.5	22.1	28.2	-9.5	31.5	31.5	31.5	31.5	0.0	22.1	22.1	22.1	22.1	0.0	22.1	22.1	22.1	22.1	0.0
DK	24.2	24.2	16.0	21.3	-8.2	24.2	24.2	24.2	24.2	0.0	16.0	16.0	16.0	16.0	0.0	16.0	16.0	16.0	16.0	0.0
EE	15.0	22.0	15.0	15.7	-7.0	15.0	22.0	15.0	15.7	-7.0	15.0	22.0	15.0	15.7	-7.0	15.0	22.0	15.0	15.7	-7.0
EL	30.6	30.6	20.5	27.1	-10.1	30.6	30.6	30.6	30.6	0.0	20.5	20.5	20.5	20.5	0.0	20.5	20.5	20.5	20.5	0.0
ES	36.3	36.3	26.5	32.9	-9.8	36.3	36.3	36.3	36.3	0.0	26.5	26.5	26.5	26.5	0.0	26.5	26.5	26.5	26.5	0.0
FI	20.9	20.9	14.2	18.6	-6.8	20.9	20.9	20.9	20.9	0.0	14.2	14.2	14.2	14.2	0.0	14.2	14.2	14.2	14.2	0.0
FR	42.6	44.3	29.9	38.3	-14.4	42.6	44.3	42.6	42.8	-1.7	29.9	31.7	29.9	30.1	-1.7	29.9	31.7	29.9	30.1	-1.7
HR	18.9	18.9	11.9	16.5	-7.0	18.9	18.9	18.9	18.9	0.0	11.9	11.9	11.9	11.9	0.0	11.9	11.9	11.9	11.9	0.0
HU	21.6	21.6	15.0	19.3	-6.6	21.6	21.6	21.6	21.6	0.0	15.0	15.0	15.0	15.0	0.0	15.0	15.0	15.0	15.0	0.0
IE	15.9	15.9	10.7	14.1	-5.2	15.9	15.9	15.9	15.9	0.0	10.7	10.7	10.7	10.7	0.0	10.7	10.7	10.7	10.7	0.0
IT	25.0	25.0	21.4	23.7	-3.6	31.1	31.1	31.1	31.1	0.0	21.5	21.5	21.5	21.5	0.0	21.5	21.5	21.5	21.5	0.0
LT	15.5	15.5	10.2	13.6	-5.2	15.5	15.5	15.5	15.5	0.0	10.2	10.2	10.2	10.2	0.0	10.2	10.2	10.2	10.2	0.0
LU	29.1	29.1	18.9	25.5	-10.2	29.1	29.1	29.1	29.1	0.0	18.9	18.9	18.9	18.9	0.0	18.9	18.9	18.9	18.9	0.0
LV	16.1	16.1	10.9	14.3	-5.2	16.1	16.1	16.1	16.1	0.0	10.9	10.9	10.9	10.9	0.0	10.9	10.9	10.9	10.9	0.0
MT	36.5	36.5	24.3	32.2	-12.2	36.5	36.5	36.5	36.5	0.0	24.3	24.3	24.3	24.3	0.0	24.3	24.3	24.3	24.3	0.0
NL	25.6	25.6	16.9	22.5	-8.7	25.6	25.6	25.6	25.6	0.0	16.9	16.9	16.9	16.9	0.0	16.9	16.9	16.9	16.9	0.0
PL	19.8	19.8	13.2	17.5	-6.6	19.8	19.8	19.8	19.8	0.0	13.2	13.2	13.2	13.2	0.0	13.2	13.2	13.2	13.2	0.0
PT	30.2	30.2	20.0	26.6	-10.3	30.2	30.2	30.2	30.2	0.0	20.0	20.0	20.0	20.0	0.0	20.0	20.0	20.0	20.0	0.0
RO	16.8	16.8	11.2	14.8	-5.6	16.8	16.8	16.8	16.8	0.0	11.2	11.2	11.2	11.2	0.0	11.2	11.2	11.2	11.2	0.0
SE	22.0	22.0	14.6	19.4	-7.5	22.0	22.0	22.0	22.0	0.0	14.6	14.6	14.6	14.6	0.0	14.6	14.6	14.6	14.6	0.0
SI	17.5	17.5	11.6	15.5	-5.9	17.5	17.5	17.5	17.5	0.0	11.6	11.6	11.6	11.6	0.0	11.6	11.6	11.6	11.6	0.0
SK	22.3	22.3	14.6	19.6	-7.7	22.3	22.3	22.3	22.3	0.0	14.6	14.6	14.6	14.6	0.0	14.6	14.6	14.6	14.6	0.0
UK	24.0	24.0	17.0	21.5	-7.0	24.0	24.0	24.0	24.0	0.0	17.0	17.0	17.0	17.0	0.0	17.0	17.0	17.0	17.0	0.0
EU28	23.6	23.9	16.3	21.1	-7.6	23.9	24.2	23.9	24.0	-0.3	16.4	16.7	16.3	16.4	-0.4	16.4	16.7	16.3	16.4	-0.4

RE= Retained Earnings; NE = New Equity; D = Debt; Mean = weighted mean over RE, NE, D;

D-NE displays the difference of debt and new equity expressed in percentage points.

7.2.3.3 ACC/COCA

The analysis for the marginal investment has shown that ACC and COCA ensure financing neutrality independent of the chosen notional interest rate for most EU28 Member States. In Table 10, columns 16-18, the results for retained earnings and new equity are equal to the ACE whereas the EATR financed with debt remains unaffected compared to the status quo. This result is again related to the underlying notional interest rate of 7.1%.

7.2.4 Interim findings

The analysis of the four fundamental tax reform options (CBIT, ACE, ACC/COCA) at the corporate level is summarised in the following. The CBIT disallows the deductibility of interest expenses at the corporate level whereas the ACE grants an additional deduction for investments financed by equity. The ACC and COCA allow a notional deduction for all capital, namely debt and equity at the corporate level. All fundamental tax reform options represent different approaches to eliminate the debt bias and establish financing neutrality at the corporate level.

If a CBIT is implemented, both the cost of capital and EATR for debt-financed investments increase and are “levelled up” to the effective tax levels under equity financing. Resulting from the increases observed in our stylised model calculations, the introduction of a CBIT potentially has negative effects on the scale of investments as well as on the attractiveness of the EU28 Member States as a location for profitable investments.

Under the ACE, effective tax levels of equity-financed investments are “levelled down” to those under debt financing. The ACE, however, is the only system in which financing neutrality is limited to designs where the notional interest rate is equal to the market interest rate. As the ACE provides for lower levels of effective taxation as compared to status quo, its introduction presumably has a positive impact on the scale of investments and location choices for profitable investments in the EU28 Member States.

For the ACC and COCA, the effective tax levels of debt-financed investments also depend on the concrete level of the notional interest rate. The introduction of both fundamental tax reform options leads to a “levelling” of effective tax levels at the corporate level. Thus, the advantageousness of an ACC/COCA and its impact on the scale of investments and location of profitable investments depends on the underlying notional interest rate.

7.3 Shareholder level

The results presented so far are important for large corporations where the taxation at the shareholder level plays no or little role since the tax position of relevant shareholders is not known anyway. Still, the taxation at the shareholder level can be relevant for corporations with a limited number of domestic shareholders such as small and medium-sized corporations as well as young and innovative corporations. In the model, three different forms of shareholder taxation are considered: dividend taxation, capital gains taxation and the tax rate on interest, which is the return from the alternative investment option for the investor, i.e. the capital market.

The same fundamental tax reforms as for the corporate level are analysed: CBIT, ACE, ACC and COCA. The effective tax burden at the shareholder level is directly influenced by the modifications at the corporate level for a fundamental tax reform. Apart from the reform influences at the corporate level, the CBIT and COCA requires additional adaptations of shareholder taxation. As the ACE and ACC do not require any further modification at the shareholder level and only differ with regard to debt-financed in-

vestments if the same notional interest rate is chosen, the analysis for both fundamental tax reforms is summarised in one section.

The Devereux/Griffith model considers three different types of shareholders: top-rate qualified, top-rate non-qualified and zero-taxed shareholder. The analysis in the following is restricted to the top-rate qualified shareholder.⁵⁹ Only the cost of capital and the EATR at the shareholder level are presented for each fundamental tax reform.

7.3.1 Overall impact of fundamental tax reforms

In Table 11, the EU28 average of the costs of capital and the EATR for the status quo and for all fundamental tax reforms at the shareholder level (top-rate qualified shareholder) are presented. As for the corporate level, the cost of capital and EATR for the status quo and each fundamental tax reform separated by financing source is displayed. It can thus be examined whether the goal of financing neutrality is achieved at the shareholder level.

Financing neutrality is achieved if the effective tax level in terms of cost of capital or EATR is the same for all financing sources (retained earnings, new equity and debt). In addition to financing neutrality, it is interesting to see the extent to which tax systems achieve investment neutrality. An investment neutral tax system leaves the marginal investment untaxed and, as a consequence, does not distort the optimal scale of investment. It has already been explained that investment neutrality at the corporate level can be achieved under certain conditions as a perfect capital market with a single interest rate and with respect to investment in real assets, neutral tax depreciation which reflects true economic depreciation, and depending on further design features of the tax system.

Investment neutrality is achieved if the cost of capital corresponds to the real market interest rate of 5%.⁶⁰ In this case, a real investment in the company needs to yield the same pre-tax return as the capital market to satisfy the investor's post-tax return requirement. This benchmark can be used for all Member States. If the tax system, considering both corporate and shareholder level, drives the cost of capital above the real market interest rate, it deters investment in the company. In return, if the cost of capital falls below the real market interest rate, the tax system promotes real investment in the company because the required pre-tax rate of return on such investment is lower than on alternative financial investments.

Considering Table 11, some general remarks with respect to the potential degree of investment neutrality, including shareholder taxes, can be made. As the CBIT leads to a complete abolishment of shareholder taxation, the return of the alternative investment received by the shareholder is 5%. As for the corporate level, the CBIT subjects the returns on investment to corporate tax independent of the source of finance. Overall, the cost of capital increases to 6.8%. The introduction of ACE and ACC achieves the goal of investment neutrality at the corporate level largely. Investment neutrality at the shareholder level is achieved if the return of the corporate investment, including personal taxes, and the alternative investment are equally taxed. The results in Table 11 show that the costs of capital for retained earnings are significantly lower compared to new equity and debt and might thus promote investment. Investment neutrality in the COCA scenario is given at the corporate level and is also ensured at the shareholder level by the definition of the COCA. As the COCA always levies the same tax burden on the alternative investment and the corporate invest-

⁵⁹ The calculation results for the other two types of shareholder can be found in Sections A3.3 and A3.4 in the appendix.

⁶⁰ For a brief discussion of requirements of investment neutrality, see also Section 7.2.1.

ment by the taxation of the same notional amount, investment neutrality is always achieved. The existence of non-neutral, i.e. economically generous, tax depreciation allowances create additional tax savings driving the cost of capital further below the real interest rate.⁶¹

Table 11: Effect of fundamental tax reforms on the cost of capital and the EATR of the EU28 average at the shareholder level (cost of capital and EATR in %)

		Status Quo	Fundamental Tax Reform			
			CBIT	ACE	ACC	COCA
Cost of Capital	RE	5.7	6.8	3.7	3.7	4.8
	NE	6.6	6.9	4.6	4.6	4.9
	D	4.7	6.8	4.7	4.7	4.8
	Mean	5.5	6.8	4.2	4.2	4.8
EATR	RE	31.3	23.9	25.7	25.7	15.8
	NE	33.8	24.2	28.1	28.1	16.1
	D	28.4	23.9	28.4	28.4	15.7
	Mean	30.5	24.0	26.9	26.9	15.8

In the status quo, the costs of capital for debt financing are significantly lower compared to the costs of capital for retained earnings and new equity. This is a consequence of the deductibility of interest expenses at the corporate level which is not compensated at the shareholder level. Moreover, investments financed with retained earnings seem to be preferred to new equity.⁶² For profitable investments, the EATR on debt-financed investment is also lower compared to equity financing.

The results in Table 11 show that *financing neutrality* at the shareholder level is not achieved by all fundamental tax reforms. Only the CBIT and the COCA seem to achieve full financing neutrality whereas ACE and ACC still discriminate between financing with retained earnings and new equity. But it should be noted that the same results for different financing sources in the case of ACE and ACC is only given in some Member States which fulfil additional conditions with regard to the taxation at the shareholder level. The seemingly very similar costs of capital for debt and equity financing are a result of the averaging.

The CBIT affects the costs of capital for all financing ways because of the non-deductibility of interest expenses at the corporate level and the complete suspension of shareholder taxation. The costs of capital increase from 5.7% to 6.8% for retained earnings and from 6.6% to 6.9% for new equity. Compared to the status quo, the costs of capital for equity-financed investments are thus rather negatively impacted: The required post-tax rate of return of the alternative investment is increasing since personal income taxes are not levied anymore. The non-deductibility of interest expenses at the corporate level also increases the cost of capital for debt financing. As no additional tax is levied at the shareholder level, the costs of capital at the corporate and the shareholder level are identical. This conformity between corporate and shareholder level can also be found for the EATR. But in contrast to the costs of capital, the EATR is decreasing as the excess return, distributed in the form of dividends, is no longer taxed at the shareholder level. The decreasing EATRs at the shareholder level for most Member States can positively impact discrete location choices for corporations where shareholder taxation plays a role.

⁶¹ See Section 7.2.1 for details.

⁶² See Section 5.2.

The cost of capital decreases considerably by 2 percentage points for retained earnings and new equity if an ACE is introduced. As the taxation at the shareholder level remains unaffected, the difference between retained earnings and new equity still prevails. Investments financed with retained earnings face now a lower cost of capital compared to debt financing. Financing neutrality between new equity and debt seems to be achieved but this is only an effect of the averaging. It can be shown that this neutrality can only be found in a Member State if the notional interest rate equals the market interest rate and the tax rate on dividend income and the alternative investment, i.e. lending are the same. The same arguments hold for the EATR.

The implications of the ACC system are similar to those of the ACE if the notional interest rate equals the market interest rate. But if the notional interest rate deviates from the market interest rate, financing neutrality for debt and new equity financing may still be given as long as the tax rate for dividend income and interest income, i.e. the return from the alternative investment, are equal. As the taxation at the shareholder level is the same as for the status quo, the costs of capital for investments financed with retained earnings are still lower compared to new equity financing. These results are valid for cost of capital and EATR.

The COCA eliminates the difference between retained earnings and new equity as dividend taxation and capital gains taxation is suspended. Compared to the status quo, the cost of capital is decreasing to 4.8% for financing with retained earnings and to 4.9% for financing with new equity. The equality stems from the abolition of the dividend tax and capital gains tax at the shareholder level. Financing neutrality can now be found for all three financing sources since the tax levied on the notional amount equals the tax rate on the notional income from the alternative investment. As the COCA taxes the notional return of all investments at a uniform rate, the investor is indifferent about which source of finance to use such that financing neutrality is established. The EATRs for all three financing sources are decreasing to a large extent as only a notional amount, approximating ordinary returns, is taxed at the shareholder level and an additional deduction for equity-financed investments is available at the corporate level.

Similar to the corporate level, an important sensitivity analysis for the ACE, ACC and COCA concerns the effect of different notional interest rates on effective tax levels. In Table 12, the resulting EU28 average depending on the notional interest rate for each financing source as well as the overall mean are presented.

Table 12: Effect of different notional interest deduction rates (NID-Rate) on the EU28 average for the ACE, ACC and COCA at the shareholder level (cost of capital and EATR in %)

		ACE		ACC		COCA	
		NID-Rate: 5 %	NID-Rate: 9 %	NID-Rate: 5 %	NID-Rate: 9 %	NID-Rate: 5 %	NID-Rate: 9 %
Cost of Capital	RE	4.3	3.2	4.3	3.2	5.4	4.3
	NE	5.3	4.1	5.3	4.1	5.5	4.3
	D	4.7	4.7	5.4	4.2	5.4	4.3
	Mean	4.6	3.8	4.8	3.6	5.4	4.3
EATR	RE	27.4	24.1	27.4	24.1	18.2	13.5
	NE	29.9	26.6	29.9	26.6	18.5	13.8
	D	28.4	28.4	30.1	26.8	18.1	13.5
	Mean	28.0	25.8	28.6	25.3	18.2	13.6

For the ACE, financing neutrality can be achieved for debt financing and investments financed with new equity in case the notional interest rate equals the market interest rate and the tax rate on dividend income and the alternative investment, i.e. lending are the same. Investments financed with retained earnings face even a lower cost of capital compared to debt financing for any notional interest rate. Although the findings for the ACC are essentially the same, financing neutrality between debt and new equity may still be given for the ACC irrespective of the notional interest rate as long as the tax rate for dividend income and interest income, i.e. the return from the alternative investment, are equal. The sensitivity analysis further reveals that financing neutrality can be established irrespective of the level of the notional interest rate if a COCA is introduced.

In the following sections, differences of the fundamental tax reforms in each Member States will be discussed.

7.3.2 Marginal investments (cost of capital)

As discussed in Section 7.2.2, the effects of fundamental tax reforms at the corporate level are more strongly reflected in the effective tax burden on marginal investment because a modification of the corporate tax base definition has an important impact if income exceeds expenses only by little whereas it plays relatively little role for highly profitable investment. This carries over to results at the shareholder level. Additionally, the modifications of shareholder taxation for the CBIT and the COCA can also have a major effect on the cost of capital at the shareholder level.

In Table 13, the results for the four fundamental tax reforms are presented for each financing source and for the overall mean.

7.3.2.1 CBIT

The CBIT affects the cost of capital for all financing ways because of the suspension of capital income taxation and the complete non-deductibility of interest expenses at the corporate level.

In Table 13, columns 5 and 6, the costs of capital for equity-financed investments are increasing as the personal income tax on interest income derived from the alternative capital market investment is abolished. Especially in Member States where the status quo tax rates levied on interest income are very high, relative to capital gains tax and dividend tax, the costs of capital are remarkably increasing once this tax is abolished (the after-tax return of the alternative investment increases sharply in this case). This is the case in Cyprus, France and the UK. In two Member States, Lithuania and Luxembourg, the costs of capital at the shareholder level are decreasing for new equity and retained earnings. Both Member States levy very low tax rates on interest income and tax capital gains and dividends at much higher tax rates in the status quo. Therefore, the costs of capital are only increasing to a small extent due to the suspension of interest income taxation and the effect is, in turn, more than compensated by the elimination of capital gains taxation and dividend taxation. For Hungary and Ireland, only the costs of capital for new equity decrease which can be explained by the high dividend tax rates in both Member States in the status quo compared to capital gains tax and the tax on interest income.

Table 13: Effect of fundamental tax reforms on marginal investments at the shareholder level (cost of capital in % for top-rate qualified shareholder)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Status Quo				CBIT				ACE/ACC				COCA			
	RE	NE	D	Mean	RE	NE	D	Mean	RE	NE	D	Mean	RE	NE	D	Mean
AT	6.0	7.0	4.6	5.6	6.9	6.9	6.9	6.9	3.7	4.6	4.6	4.1	4.7	4.7	4.7	4.7
BE	5.2	8.2	4.0	5.1	7.5	7.5	7.5	7.5	2.4	5.4	4.0	3.3	4.1	4.1	4.1	4.1
BG	5.4	5.4	4.8	5.2	5.6	5.6	5.6	5.6	4.7	4.6	4.8	4.7	4.8	4.8	4.8	4.8
CY	3.9	5.1	5.0	4.4	6.3	6.3	6.3	6.3	3.1	4.3	5.0	3.9	5.2	5.2	4.9	5.1
CZ	4.9	6.2	4.6	4.9	6.2	6.2	6.2	6.2	3.3	4.6	4.6	3.9	4.6	4.6	4.6	4.6
DE	6.5	7.4	4.7	6.0	7.4	7.4	7.4	7.4	3.8	4.7	4.7	4.2	4.8	4.8	4.8	4.8
DK	5.2	6.8	4.7	5.2	6.7	6.7	6.7	6.7	3.1	4.7	4.7	3.8	4.8	4.8	4.8	4.8
EE	5.9	6.7	5.0	5.7	5.0	6.7	5.0	5.2	5.9	6.7	5.0	5.7	5.0	6.7	5.0	5.2
EL	6.6	6.9	4.7	5.9	7.5	7.5	7.5	7.5	3.7	4.1	4.7	4.1	4.7	4.7	4.7	4.7
ES	8.5	9.2	6.1	7.7	9.3	9.3	9.3	9.3	5.3	6.1	6.1	5.6	6.1	6.1	6.1	6.1
FI	5.3	5.9	4.8	5.2	6.5	6.5	6.5	6.5	3.7	4.2	4.8	4.1	4.8	4.8	4.8	4.8
FR	4.0	6.0	5.0	4.5	8.9	9.5	8.9	8.9	-0.4	1.6	5.0	1.7	5.2	5.5	4.9	5.1
HR	4.8	6.1	4.3	4.8	6.0	6.0	6.0	6.0	3.1	4.3	4.3	3.7	4.3	4.3	4.3	4.3
HU	6.6	8.3	4.9	6.2	6.6	6.6	6.6	6.6	4.9	6.6	4.9	5.1	5.0	5.0	5.0	5.0
IE	5.0	7.8	4.9	5.2	6.1	6.1	6.1	6.1	3.7	6.6	4.9	4.4	4.9	4.9	4.9	4.9
IT	4.4	5.3	4.6	4.6	7.3	7.3	7.3	7.3	3.4	4.3	4.6	3.9	4.7	4.7	4.7	4.7
LT	6.7	7.4	4.7	6.1	6.0	6.0	6.0	6.0	5.5	6.2	4.7	5.3	4.8	4.8	4.8	4.8
LU	7.3	8.5	4.1	6.3	7.0	7.0	7.0	7.0	4.5	5.6	4.1	4.5	4.3	4.3	4.3	4.3
LV	6.1	6.1	4.9	5.7	6.1	6.1	6.1	6.1	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9
MT	6.7	4.5	4.5	5.7	8.2	8.2	8.2	8.2	2.9	0.7	4.5	3.2	4.5	4.5	4.5	4.5
NL	6.7	7.8	4.5	6.0	6.8	6.8	6.8	6.8	4.4	5.5	4.5	4.5	4.6	4.6	4.6	4.6
PL	5.7	6.4	4.7	5.4	6.4	6.4	6.4	6.4	4.1	4.7	4.7	4.4	4.8	4.8	4.8	4.8
PT	6.2	7.3	4.4	5.7	7.3	7.3	7.3	7.3	3.3	4.4	4.4	3.8	4.5	4.5	4.5	4.5
RO	5.6	6.2	4.8	5.4	6.1	6.1	6.1	6.1	4.3	4.8	4.8	4.5	4.8	4.8	4.8	4.8
SE	5.4	6.6	4.6	5.3	6.5	6.5	6.5	6.5	3.5	4.6	4.6	4.0	4.7	4.7	4.7	4.7
SI	4.1	6.2	4.8	4.5	6.2	6.2	6.2	6.2	2.7	4.8	4.8	3.6	4.8	4.8	4.8	4.8
SK	6.2	4.8	4.5	5.4	6.5	6.5	6.5	6.5	4.2	2.8	4.5	4.2	4.5	4.5	4.5	4.5
UK	4.5	5.4	5.5	5.0	7.2	7.2	7.2	7.2	2.8	3.7	5.5	3.8	5.5	5.5	5.5	5.5
EU28	5.7	6.6	4.7	5.5	6.8	6.9	6.8	6.8	3.7	4.6	4.7	4.2	4.8	4.9	4.8	4.8

RE= Retained Earnings; NE = New Equity; D = Debt; Mean = weighted mean over RE, NE, D

The suspension of personal income taxes does not affect the costs of capital for debt financing as interest taxes cancel out in the status quo and dividend taxes are neither relevant.⁶³ The increase for the costs of capital of debt financing is therefore solely related to the non-deductibility of interest expenses at the corporate level. Especially Member States with high corporate income tax rates as France and Malta are hit by the non-deductibility of interest expenses at the corporate level.

7.3.2.2 ACE/ACC

The introduction of an ACE or ACC does not require any additional modifications at the shareholder level. Therefore, the costs of capital at the shareholder level are only affected by the modifications at the corporate level.

In Table 13, columns 9 and 10, the costs of capital for retained earnings and new equity are considerably decreasing for all Member States. A very large decrease can be found in France where the costs of capital amount to -0.4% for retained earnings and 1.6% for new equity in the ACE scenario. These very low or even negative costs of capital have to be explained in more detail. First, France levies a very high income tax rate on interest income which reduces the cost of capital. In the status quo, France has also a very low cost of capital of 4.0% for retained earnings. Second, the additional deduction at the corporate level is most beneficial for Member States with high corporate income tax rates. Also in other Member States with high corporate income tax rates as Germany, the costs of capital at the shareholder level are more decreasing than in low-tax Member States as Bulgaria and Cyprus.

Additionally, the costs of capital for new equity and debt financing are equal in some Member States (Austria, Croatia, Czech Republic, Denmark, Germany, Latvia, Poland, Romania, Slovenia, Spain, Sweden). All these Member States levy the same tax rate on dividend income and the income from the alternative investment.

If an investment is financed with debt, the costs of capital are not affected by personal taxes. Specifically, dividend taxation is irrelevant because the marginal return is fully absorbed by debt servicing. The tax rate on interest earned from capital market investments which primarily drives the shareholder's opportunity costs naturally turn irrelevant in the case of external debt financing.

In the case of new equity financing, the shareholder receives the return on investment in form of a dividend. At the corporate level, no tax is levied on the marginal investment as the ordinary return, by assumption, equals the notional deductible amount and thus is shielded from corporate tax. The dividend received by the shareholder is therefore equal to the ordinary return which could also be earned from the alternative capital market investment. If dividend income and the income from the alternative investment opportunity, i.e. the capital market, are taxed at the same rates, taxes cancel out in a similar way as for debt-financed investments.

If the tax rate on dividends is higher than the tax rate on the income from the alternative investment, the marginal return for investments financed with new equity face a higher tax burden which results in higher costs of capital. This is the case in Belgium, Hungary, Ireland, Lithuania, Luxembourg and the Netherlands where lower costs of capital for debt financing compared to equity financing can be found. The opposite development can be observed in nine Member States (Bulgaria, Cyprus, Finland, France, Greece, Italy, Portugal, Slovakia, United Kingdom) where the tax rate on dividend income is lower compared to the tax rate on the interest income from the alternative investment.

⁶³ See Section 5.2.

The same conclusions hold for the ACC as the same underlying notional interest rate has been used. If the notional interest rate equals the market interest rate, the allowable deductible amount for debt financing in the ACC scenario resembles the actual interest expenses. The costs of capital for debt-financed investments in Table 13, column 11 remain therefore unchanged compared to the status quo. The financing neutrality between new equity and debt is also achieved if the tax rates for the alternative investment and dividend income are the same at the shareholder level.

7.3.2.3 COCA

The COCA grants a notional deduction for debt and equity financing at the corporate level and therefore resembles the ACC. The distinctive feature of the COCA is that only the amount deducted at the corporate level is taxed in the hands of the shareholders. The actual received dividend is not taxed. For the purposes of this study, it is assumed that the notional amount at the shareholder level is taxed at the same rate as the actual dividends received in the status quo. Even if the corporation does not pay any dividends to its shareholders, the notional amount is taxed at the shareholder level. Therefore, capital gains taxation is also not levied anymore.

Apart from investments financed with new equity and retained earnings, the taxation of the notional amount at the shareholder level is relevant for investments financed with debt as well: For debt financing, the funds for the additional investment are provided by an external lender. The notional deduction for this additional investment has to be attributed to the external lender and not to the shareholder considered in the Devereux/Griffith model. In this case, the shareholder can undertake an alternative investment at the capital market as no funds of the shareholder are additionally invested in the corporation. The actual returns generated by the alternative investment will also be exempt from taxation in the hands of the shareholder. Again, the shareholder is subject to tax with a notional return on this investment. This equal treatment of income for all investments ensures that taxes do not influence the decision of the shareholder.

In contrast to all other scenarios, the costs of capital for retained earnings are equal to those in case of new equity financing in most Member States. This is related to the abolishment of dividend tax and capital gains tax at the shareholder level. Compared to the status quo where new equity financing had a higher cost of capital than retained earnings, the EU28 average is now very similar. Differences occur only in Estonia and France.

For financing with retained earnings, the costs of capital decrease considerably following the introduction of a COCA in most Member States. In contrast, they increase in Cyprus, France, Italy, Slovenia and the United Kingdom as evident in Table 13, columns 13 and 14. These Member States impose lower tax rates on capital gains than on dividends at status quo. Since all notional income at the shareholder level is taxed at a rate that corresponds to the previous tax rate on dividends in the COCA scenario, investments financed with retained earnings will be disadvantaged and taxed at a higher rate than before in these Member States.

For the ACE and ACC, it has been already discussed that taxes cancel out if the dividend income (new equity financing) and the income from the alternative capital market investment are taxed at the same rate. This is always fulfilled by the definition of the COCA as a tax on a uniform notional amount is levied on all kind of investments. Thus, taxes always cancel out. The decrease of the costs of capital compared to the status quo is mainly caused by the additional deduction granted at the corporate level.

Personal taxes have only a very limited effect on the costs of capital for debt-financed investments at the shareholder level as the marginal return is fully absorbed by debt servicing. Therefore, the costs of capital for debt-financed investments remain mainly

unchanged in the COCA scenario. A slight increase occurs in Member States such as Belgium or Denmark where the tax rate on the notional return is higher than the tax rate on interest at status quo.

Following the introduction of a COCA, financing neutrality can be established at shareholder level in nearly all Member States since an equal tax rate on the notional return of the real investment and on the notional return of the alternative investment is levied such that taxes cancel out. An exception applies to Cyprus, Estonia and France due to the adverse impact of corporate level particularities.⁶⁴

7.3.3 Profitable investments (EATR)

The EATR at the shareholder level is significantly influenced by the tax burden on dividend income. In the model, it is always assumed that the excess return of the profitable investment is ultimately distributed to the shareholders and taxed as a dividend. The tax rate on the alternative investment, i.e. lending is relevant to a limited extent as it influences the discount rate of the shareholder. Capital gains taxation plays only a moderate role. The direction of the effects (decrease or increase) for the implementation of fundamental tax reforms might therefore be especially different compared to marginal investments if the taxation of dividends at the shareholder level is modified. This is the case for CBIT and COCA.

The analysis for marginal investments has already shown that fundamental tax reforms could lead to financing neutrality at the shareholder level as well. For profitable investments, the same effects can be expected for the following reasons.

The CBIT leads to financing neutrality as no additional tax is levied at the shareholder level and debt and equity financing yield the same EATR at the corporate level. For ACE and ACC, it has been shown that financing neutrality between new equity and debt is achieved for marginal investments if the income from the alternative investment and dividend income is taxed at equal rates. As the excess return of a profitable investments is always taxed as a dividend at the shareholder level, financing neutrality is also achieved for profitable investments. The COCA achieves financing neutrality for retained earnings, new equity and debt for marginal investments since taxation is limited to a notional return in any case. As neither the excess return from the real investment, nor the excess return from the alternative financial investment is taxed in the COCA scenario at the shareholder level, financing neutrality should also be achieved for profitable investments.

In Table 14, the detailed calculation results for each EU28 Member State and for each fundamental tax reform are presented for the top-rate qualified shareholder.

7.3.3.1 CBIT

In contrast to marginal investments, the EU28 average EATR decreases from 28.4% to 24.0% in the CBIT scenario according to Table 14 column 8. Among the EU28 Member States, very different developments occur. For most Member States, the EATRs are decreasing whereas for Malta and Slovakia an increase occurs.

⁶⁴ See Section 7.2.2.2 and 7.2.2.3.

Table 14: Effect of fundamental tax reforms on profitable investments at the shareholder level (EATR in % for top-rate qualified shareholder)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Status Quo				CBIT				ACE/ACC				COCA			
	RE	NE	D	Mean	RE	NE	D	Mean	RE	NE	D	Mean	RE	NE	D	Mean
AT	35.3	38.1	31.5	34.3	26.0	26.0	26.0	26.0	28.8	31.5	31.5	30.0	16.5	16.5	16.5	16.5
BE	38.0	45.5	35.1	37.7	33.7	33.7	33.7	33.7	31.1	38.6	35.1	33.2	21.7	21.7	21.7	21.7
BG	12.7	12.3	10.1	11.7	10.2	10.2	10.2	10.2	9.4	9.0	10.1	9.6	6.5	6.5	6.5	6.5
CY	17.4	21.7	21.6	19.3	17.2	17.2	17.2	17.2	14.5	18.7	21.6	17.4	12.0	12.0	11.1	11.7
CZ	22.6	27.1	21.4	22.6	19.0	19.0	19.0	19.0	16.9	21.4	21.4	18.9	11.9	11.9	11.9	11.9
DE	40.4	42.9	35.9	39.1	31.5	31.5	31.5	31.5	33.4	35.9	35.9	34.5	21.5	21.5	21.5	21.5
DK	41.8	45.4	40.6	41.7	24.2	24.2	24.2	24.2	37.0	40.6	40.6	38.6	15.2	15.2	15.2	15.2
EE	19.2	22.4	15.5	18.2	15.0	22.0	15.0	15.7	19.2	22.4	15.5	18.2	15.0	22.0	15.0	15.7
EL	35.7	36.7	30.1	33.8	30.6	30.6	30.6	30.6	27.3	28.3	30.1	28.4	19.9	19.9	19.9	19.9
ES	43.7	45.4	38.0	41.9	36.3	36.3	36.3	36.3	36.2	38.0	38.0	37.0	25.7	25.7	25.7	25.7
FI	32.4	34.1	30.9	32.1	20.9	20.9	20.9	20.9	27.5	29.2	30.9	28.9	13.2	13.2	13.2	13.2
FR	47.7	51.1	49.4	48.7	42.6	44.3	42.6	42.8	40.3	43.7	49.4	43.9	30.6	31.6	29.8	30.4
HR	22.4	26.6	20.6	22.2	18.9	18.9	18.9	18.9	16.3	20.6	20.6	18.2	11.7	11.7	11.7	11.7
HU	30.2	35.8	24.6	28.8	21.6	21.6	21.6	21.6	24.6	30.2	24.6	25.2	14.7	14.7	14.7	14.7
IE	43.3	49.3	43.2	43.9	15.9	15.9	15.9	15.9	40.7	46.7	43.2	42.2	8.7	8.7	8.7	8.7
IT	33.0	35.5	33.7	33.5	31.1	31.1	31.1	31.1	30.3	32.8	33.7	31.8	21.0	21.0	21.0	21.0
LT	27.4	29.8	20.1	25.1	15.5	15.5	15.5	15.5	23.0	25.4	20.1	22.2	9.8	9.8	9.8	9.8
LU	40.2	43.3	31.3	37.4	29.1	29.1	29.1	29.1	32.3	35.3	31.3	32.2	18.5	18.5	18.5	18.5
LV	21.7	22.0	17.3	20.2	16.1	16.1	16.1	16.1	17.0	17.3	17.3	17.1	10.6	10.6	10.6	10.6
MT	31.2	24.0	24.0	28.0	36.5	36.5	36.5	36.5	18.9	11.7	24.0	20.0	23.6	23.6	23.6	23.6
NL	37.6	40.7	31.4	35.7	25.6	25.6	25.6	25.6	31.0	34.2	31.4	31.5	16.2	16.2	16.2	16.2
PL	27.9	30.1	24.7	27.0	19.8	19.8	19.8	19.8	22.5	24.7	24.7	23.5	12.5	12.5	12.5	12.5
PT	39.4	42.2	34.9	38.1	30.2	30.2	30.2	30.2	31.9	34.7	34.9	33.2	19.3	19.3	19.3	19.3
RO	24.0	25.9	21.2	23.2	16.8	16.8	16.8	16.8	19.3	21.2	21.2	20.2	10.7	10.7	10.7	10.7
SE	34.7	37.7	32.5	34.2	22.0	22.0	22.0	22.0	29.4	32.5	32.5	30.8	13.7	13.7	13.7	13.7
SI	24.6	31.3	26.8	26.1	17.5	17.5	17.5	17.5	20.1	26.8	26.8	23.1	10.7	10.7	10.7	10.7
SK	20.9	15.5	14.5	18.1	22.3	22.3	22.3	22.3	13.2	7.9	14.5	13.1	14.6	14.6	14.6	14.6
UK	31.1	33.7	33.9	32.4	24.0	24.0	24.0	24.0	26.2	28.7	33.9	29.1	15.6	15.6	15.6	15.6
EU28	31.3	33.8	28.4	30.5	23.9	24.2	23.9	24.0	25.7	28.1	28.4	26.9	15.8	16.1	15.7	15.8

The highest decrease for debt financing can be found in Ireland from 43.2% to 15.9%. Ireland levies very high personal income taxes (dividend tax rate: 51%) in the status quo. For other Member States with high personal income tax rates as Denmark, a similar development can be found. Slovakia where the EATR is increasing levies no tax on dividend income in the status quo, but on interest income and capital gains. The abolition of the tax on the alternative investment increases the discount rate of the shareholder and decreases the net present value of the incremental investment. This results in a higher EATR. In Malta, the effect of dividend taxation is eliminated as a full imputation credit is granted in the status quo. As the imputation credit is not available for the CBIT, the effect of the high corporate income tax in Malta is not mitigated at the shareholder level.

The introduction of a CBIT affects also investments financed with retained earnings and new equity. For investments financed with retained earnings, the decrease from 31.3% to 23.9% for the EU28 average is slightly smaller than for investments financed with new equity (decrease from 33.8% to 24.2%). Generally, dividend taxation has a higher impact on investments financed with new equity. The suspension of dividend taxation is therefore more beneficial for investments financed with new equity.

7.3.3.2 ACE/ACC

According to Table 14, columns 9 and 10, the EATR for equity-financed investments is decreasing but a lower EATR for financing with retained earnings remains in most Member States compared to new equity. Considerable differences can be observed between the different Member States.

The highest decrease in the EATR at the shareholder level can be found in Malta and Slovakia. The full imputation credit granted in Malta disposes the effect of any dividend tax at the shareholder level to a large extent and no tax is levied on the additional dividend received. Therefore, the EATRs are decreasing by 39.4% for retained earnings and by 51.3% for new equity. In Slovakia, the decrease by 36.8% for retained earnings and 49.4% for new equity is mainly related to the non-taxation of dividends at the shareholder level.

The decrease in the EATRs at the shareholder level is lower for Member States which levy high personal income taxes. For Ireland, the introduction of the ACE only leads to a reduction of the EATR by 8.2% for retained earnings and 7.6% for new equity. In other Member States as Bulgaria and Croatia which levy very low personal income tax rates, the decrease in the EATRs is much higher and amounts to more than 20%.

7.3.3.3 COCA

The EATR in the case of the COCA is highly affected by the suspension of dividend taxation at the shareholder level. The excess return of the profitable investment is not taxed anymore at the shareholder level as only the notional return deducted at the corporate level is taxed. Therefore, it is not a surprise that the EATR for all three financing sources is remarkably decreasing in Table 14, columns 13-16.

Comparing the effects for the single Member States it can be concluded that Member States which levy high tax rates in the status quo benefit at most from the suspension of the tax on the actual received dividend. In Ireland and Denmark, the EATRs for equity financing are decreasing by more than 60%. In contrast to that, the EATRs for Malta and Estonia are only decreasing by 2% for new equity financing in the COCA case because in both Member States no additional taxation of dividends at the shareholder level occurs in the status quo. The reduction of more than 20% for financing with retained earnings in these two Member States can be traced back to the abolishment of capital gains taxes.

7.3.4 Interim findings

All four fundamental tax reforms (CBIT, ACE, ACC, COCA) require a modification at the corporate level and impact the cost of capital and EATR at the shareholder level. The effects of the four fundamental tax reforms at the shareholder level are summarised in the following.

The complete suspension of personal income taxation in case of a CBIT aligns the effective tax levels at the shareholder level to those at the corporate level. In consequence, financing neutrality can be established in most Member States. This is, however, to the disadvantage of the cost of capital of equity-financed investments that are predominantly increasing. At the same time, the EATRs are decreasing for most Member States, also for debt-financed investments, since the positive effect of the suspension of personal income taxes outweighs the negative effect of the non-deductibility of interest costs on debt-financed investments at the corporate level.

For the ACE and ACC, in contrast, financing neutrality remains restricted to certain forms of equity-financed investments provided that the taxation of dividends and the returns on the alternative investment are the same. With regard to the ACE, it is further important that the notional interest rate equals the market interest rate. The introduction of an ACE or ACC respectively predominantly leads to lower levels of both cost of capital and EATR at the shareholder level.

The COCA limits the taxation at the shareholder level to the notional amount which has been deducted at the corporate level. The actual returns received by the shareholders are not relevant for personal income taxation. Financing neutrality can be achieved irrespective of the notional interest rate since all returns to the shareholder are taxed at the same rate based on a notional amount. The EATR at the shareholder level is largely decreasing for all three financing possibilities as the excess return is not taxed anymore at the shareholder level.

7.4 Revenue neutral implementation of fundamental tax reforms

The analysis in the previous sections has shown that the current debt bias in tax systems in the EU Member States can, in principle, be mitigated by fundamental tax reforms. Given that the effective tax levels for profitable and marginal investments (EATR and cost of capital) turned out to be highly affected by the introduction of any fundamental tax reform, any such reform would have considerable effects on the tax revenues collected by the Member States. Even if the Member States acknowledge the advantage of establishing financing neutrality in their tax systems, they might be reluctant to introduce a fundamental tax reform because they want to avoid negative effects on their tax revenues. Against this background, this section is intended to provide insights on how a revenue neutral introduction of the fundamental tax reforms could be achieved and how revenue neutrality would impact on the results of this study.

In this report, revenue neutrality will be assumed to hold if the EATR of the reform scenario (i.e. with the implementation of a fundamental reform option) corresponds to the EATR of the pre-reform scenario (without fundamental reform option). The weighted average across sources of financing and types of assets is used as the starting point for the following considerations.

Two different levels of revenue neutrality will be considered. At the corporate level, revenue neutrality will be achieved by adjusting the statutory corporate income tax rate in the post-reform scenario to arrive at the same EATR as in the pre-reform sce-

nario. In doing so, we rely on the linear relationship⁶⁵ between EATR, the EMTR and statutory corporate income tax rate τ ⁶⁶

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

where $\tilde{p}$ represents the cost of capital and p the pre-tax profitability of the incremental investment.

At the shareholder level, revenue neutrality will be achieved by adjusting the personal income tax rate on dividend income⁶⁷ in the post-reform scenario to arrive at the same overall EATR as in the pre-reform scenario. The statutory corporate income tax rate will be kept constant in this case. In doing so, we rely on the linear relationship⁶⁸ between the EATR, the EMTR and the statutory tax rate on distributed profits⁶⁹

$$EATR = \frac{\tilde{p}}{p} * EMTR + \frac{p - \tilde{p}}{p} * [1 - \gamma * (1 - \tau)]$$

where $\tilde{p}$ represents the cost of capital, p the pre-tax profitability of the incremental investment and τ the statutory corporate income tax rate. The γ denotes the system of dividend taxation at the shareholder level and is expressed by the statutory tax rate on dividends m^d , the type of dividend taxation system c (e.g. imputation system or classical system) and the effective capital gains tax z upon the disposal of shares.⁷⁰

$$\gamma = \frac{1 - m^d}{(1 - c) * (1 - z)}$$

We will adjust the statutory tax rate on distributed profits m^d to achieve revenue neutrality at the shareholder level.

In the following, only the results at the corporate level and for the top-rate qualified shareholder will be discussed. The detailed calculation results can be found in Section A3.5 in the appendix.

By calculating revenue neutral tax rates, the same EATRs as in the pre-reform scenario are achieved. The attractiveness of the Member States as a place for investment remains thus, by definition, unaffected after a revenue neutral implementation of fundamental tax reforms. Still, any adjustment of statutory tax rates at corporate and shareholder level will impact on the costs of capital and the EMTR in each Member State. From a theoretical point of view, a revenue neutral implementation of fundamental tax reforms can therefore increase or decrease the overall level of investment. For this purpose, the costs of capital and EMTR will be recalculated taking into account fundamental tax reforms and the adjusted revenue neutral statutory tax rates. Again, the distinction of revenue neutrality at the corporate level and the shareholder level will be taken into account. This analysis can be found in Section 7.5.

⁶⁵ It should be noted that in the presented formulas the statutory tax rates also impact the EMTR and the cost of capital respectively.

⁶⁶ See Devereux/Griffith (1999, pp. 21-22); Spengel (2003, p. 75).

⁶⁷ In the COCA scenario, the tax rate on the notional amount at the shareholder level is adapted. This corresponds by assumption to the dividend tax rate at the shareholder level in current tax codes.

⁶⁸ It should be noted that in the presented formulas the statutory tax rates also impact the EMTR and the cost of capital respectively.

⁶⁹ See Devereux/Griffith (1999, pp. 21-22); Spengel (2003, p. 75).

⁷⁰ See Devereux/Griffith (1999, p. 14); Spengel (2003, p. 69).

For the calculations of the EATR, a pre-tax profitability of 20% has been used so far. In Section 4.1, it has already been discussed that EATRs are sensitive to changes of the pre-tax profitability and approach the statutory income tax rate for high levels of profitability. Therefore, the resulting EATR, the required adjustment of statutory tax rates and the resulting cost of capital have to be recalculated for varying levels of pre-tax profitability and each fundamental tax reform. In the sensitivity analysis in Section 7.6, the results for a pre-tax return of 10% and 30% are accordingly presented.

7.4.1 Corporate level

A revenue neutral implementation at the corporate level, in the approximate sense explained above, can be achieved if the statutory corporate income tax rate in each Member State is adjusted so that the EATR of the post-reform scenario (with fundamental reform option) corresponds to the EATR of the pre-reform scenario (without fundamental reform option). A CBIT broadens the tax base at the corporate level due to the non-deductibility of interest costs. In order to obtain revenue neutrality, therefore, statutory corporate income tax rates can be reduced.

If an ACE is introduced, the tax bases decrease due to the deductibility of a notional interest on equity-financed investments. For ACC/COCA, similar effects will occur depending on the notional interest rate and the importance of each financing source. Therefore, revenue neutrality demands an upward adjustment of the statutory corporate income tax rates.

Table 15 displays at the corporate level the EU28 average for the overall EATR (mean over all sources of financing and types of assets) for the status quo and all fundamental tax reform options as well as the underlying averages of the applicable statutory corporate income tax rates. In the last two columns, the adjusted average statutory corporate income tax rates for all EU28 Member States to achieve a revenue neutral implementation of each fundamental tax reform are presented.

In the status quo, the overall EATR for the EU28 average amounts to 21.1% and the average of the corporate income tax rates is 20.5%. This average corporate income tax rate first is kept constant if the fundamental tax reforms are implemented. Compared to the status quo, the overall EATR for the EU28 average increases (CBIT) or decreases (ACE, ACC/COCA) if a fundamental tax reform is introduced.⁷¹

Table 15: Required adjustments of corporate income tax rates (CITR) to achieve a revenue neutral implementation of fundamental tax reforms for the EU28 average (EATR and CITR in %, change in percentage points)

		EATR	CITR	Revenue neutrality	
				CITR	change
Pre-Reform	Status Quo	21.1	20.5	-	-
Fundamental Tax Reform	CBIT	24.0	20.5	17.7	-2.8
	ACE (NID: 5%)	17.8	20.5	25.0	4.5
	ACE (NID: 7.1%)	16.4	20.5	27.6	7.1
	ACE (NID: 9%)	15.1	20.5	30.5	10.0
	ACC/COCA (NID: 5%)	18.6	20.5	23.8	3.2
	ACC/COCA (NID: 7.1%)	16.4	20.5	27.6	7.1
	ACC/COCA (NID: 9%)	14.4	20.5	32.3	11.8

⁷¹ See the detailed analysis in Section 7.2.

For the CBIT, the overall EU28 average EATR increases from 21.1% to 24.0% after its implementation. Here, revenue neutrality is achieved if the EATR remains at 21.1% as in the status quo. Based on the approximations explained above, this can be achieved – on average - if Member States reduce their corporate income tax rates by 2.8 percentage points from 20.5% to 17.7%.

For ACE and ACC/COCA, the impacts on the EATR at the corporate level will be the same if the notional interest rate equals the market interest rate. Therefore, in case the notional interest rate amounts to 7.1%, a revenue neutral implementation of these reform options would require the same upward adjustments of corporate income tax rates. The adjusted EU28 average corporate income tax rate would increase by 7.1 percentage points from 20.5% to 27.6% in order to keep the average EATR constant at 21.1%.

If notional interest rates differ from the market interest rate, ACE and ACC/COCA show different effects. ACC/COCA requires a lower increase of the EU28 average corporate income tax rate if the notional interest rate is below the market interest rate. In this case, ACC/COCA allows an additional deduction for equity financing but at the same time restricts the deductibility of interest expenses. The tax base is therefore higher compared to ACE which is restricted to an additional deduction for equity financing. A revenue neutral implementation of ACC/COCA would increase the EU28 average corporate income tax rate to 23.8% whereas for ACE, a slightly higher average corporate income tax rate of 25.0% would be needed. It should be further noticed that for very low notional interest rates in the ACC/COCA scenario, the average corporate income tax rate could in fact decrease.

If the notional interest rate is higher than the nominal market interest rate, the reverse effect occurs. ACC/COCA now allows higher deductions compared to the ACE. The required average adaption of the corporate income tax rate is therefore higher for ACC/COCA and amounts to 11.8 percentage points. For ACE, the required average corporate income tax rate is 30.5%.

Comparing the required adjustments of the corporate income tax rates for all fundamental tax reform options, it is remarkable that the change is rather small for the CBIT (-2.8 percentage points) whereas for ACE and ACC/COCA a much larger increase occurs. This can be explained by the underlying weights used for the calculations (55% retained earnings, 10% new equity, 35% debt). Still, independent of the chosen underlying weights, the introduction of a CBIT could always be combined with a decrease of the corporate income tax rate. A revenue neutral implementation of an ACE would require an increase of corporate income tax rates whereas the effect for the ACC/COCA cannot be determined a priori.

The general trends observed for the EU28 average can also be found if the effects in each Member State are considered (Table 16, columns 1 and 2). Columns 3 to 5 display the resulting overall EATR after the implementation of the fundamental tax reforms.⁷² For these calculations, the corporate income tax rates presented in column 2 have been used. Columns 6, 8 and 10 display the required corporate income tax rates to achieve the same EATR as in the status quo (column 1) and therefore guarantee revenue neutrality as considered here. Columns 7, 9 and 11 are expressed as percentage points and compare the difference of the current corporate income tax rate in column 2 and the revenue neutral corporate income tax rate in columns 6, 8 and 10. The results presented for ACE and ACC/COCA are based on a notional interest rate of 7.1%.

⁷² For ACE and ACC/COCA, the underlying notional interest rate of 7.1% has been used.

Table 16: Specific adjustments of corporate income tax rates (CITR) in the single Member States to achieve a revenue neutral implementation of fundamental tax reforms (EATR and CITR in %, change in percentage points)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Status Quo		Post-reform EATR			Revenue neutral CITR					
	EATR	CITR	CBIT	ACE	ACC / COCA	CBIT	change	ACE	change	ACC / COCA	change
AT	23.0	25.0	26.0	17.3	17.3	22.1	-2.9	33.3	8.3	33.3	8.3
BE	27.8	33.0	33.7	21.9	21.9	27.0	-6.0	42.6	9.6	42.6	9.6
BG	9.0	10.0	10.2	6.7	6.7	8.8	-1.2	13.5	3.5	13.5	3.5
CY	15.2	12.5	17.2	13.0	13.0	10.5	-2.0	15.8	3.3	15.8	3.3
CZ	16.7	19.0	19.0	12.4	12.4	16.7	-2.3	25.7	6.7	25.7	6.7
DE	28.2	15.0	31.5	22.1	22.1	11.9	-3.1	23.8	8.8	23.8	8.8
DK	21.3	23.5	24.2	16.0	16.0	20.6	-2.9	31.7	8.2	31.7	8.2
EE	15.7	0.0	15.7	15.7	15.7	0.0	0.0	0.0	0.0	0.0	0.0
EL	27.1	29.0	30.6	20.5	20.5	25.6	-3.4	38.3	9.3	38.3	9.3
ES	32.9	28.0	36.3	26.5	26.5	24.6	-3.4	37.8	9.8	37.8	9.8
FI	18.6	20.0	20.9	14.2	14.2	17.6	-2.4	27.1	7.1	27.1	7.1
FR	38.3	33.3	42.8	30.1	30.1	29.3	-4.0	44.5	11.2	44.5	11.2
HR	16.5	20.0	18.9	11.9	11.9	17.4	-2.6	27.6	7.6	27.6	7.6
HU	19.3	19.0	21.6	15.0	15.0	16.7	-2.3	25.6	6.6	25.6	6.6
IE	14.1	12.5	15.9	10.7	10.7	10.7	-1.8	17.4	4.9	17.4	4.9
IT	23.7	27.5	31.1	21.5	21.5	20.2	-7.3	30.9	3.4	30.9	3.4
LT	13.6	15.0	15.5	10.2	10.2	13.1	-1.9	20.7	5.7	20.7	5.7
LU	25.5	21.0	29.1	18.9	18.9	17.6	-3.4	30.8	9.8	30.8	9.8
LV	14.3	15.0	16.1	10.9	10.9	13.1	-1.9	20.4	5.4	20.4	5.4
MT	32.2	35.0	36.5	24.3	24.3	30.9	-4.1	46.4	11.4	46.4	11.4
NL	22.5	25.0	25.6	16.9	16.9	22.0	-3.0	33.5	8.5	33.5	8.5
PL	17.5	19.0	19.8	13.2	13.2	16.7	-2.3	25.3	6.3	25.3	6.3
PT	26.6	21.0	30.2	20.0	20.0	17.5	-3.5	31.0	10.0	31.0	10.0
RO	14.8	16.0	16.8	11.2	11.2	14.0	-2.0	21.6	5.6	21.6	5.6
SE	19.4	22.0	22.0	14.6	14.6	19.4	-2.6	29.5	7.5	29.5	7.5
SI	15.5	17.0	17.5	11.6	11.6	15.0	-2.0	22.6	5.6	22.6	5.6
SK	19.6	22.0	22.3	14.6	14.6	19.3	-2.7	29.7	7.7	29.7	7.7
UK	21.5	20.0	24.0	17.0	17.0	17.8	-2.2	26.1	6.1	26.1	6.1
EU28	21.1	20.5	24.0	16.4	16.4	17.7	-2.8	27.6	7.1	27.6	7.1

Columns 6 and 7 of Table 16 show that in case of a revenue neutral implementation of a CBIT, Member States can reduce their corporate income tax rates between 1.2 (Bulgaria) and 7.3 percentage points (Italy). The decrease is higher in Member States which levy high corporate income tax rates. In Estonia, no adjustment of the corporate income tax rate is required due to the exemption of retained earnings from corporate income tax. In Belgium and Italy, a larger decrease of 6.0 and 7.3 percentage points respectively can be found. This relates to the simulated introduction of the CBIT by the concurrent abolition of the existing ACE regimes in both Member States.⁷³ The corporate income tax rate in Germany is decreasing from 15.0% to 11.9%. Here, it

⁷³ See the explanation in Section 4.2.

should be noted that the surcharge to the corporate income tax as well as the local business tax in Germany remain constant, however.⁷⁴

For ACE and ACC/COCA, the required adjustments of the corporate income tax rates presented in Table 16 are the same because the effects of ACE and ACC/COCA are always equal if a notional interest rate of 7.1% is considered.⁷⁵ In contrast to the CBIT, a revenue neutral implementation of ACE and ACC/COCA requires an increase in the corporate income tax rate in each Member State with the exception of Estonia. In Member States as France and Malta, the corporate income tax rate has to be increased by more than 11 percentage points to achieve a revenue neutral implementation.

In summary, a revenue neutral implementation of a CBIT allows for a decrease in the statutory corporate income tax rate as the tax base at the corporate level is increased. For the ACE, the additional deduction granted at the corporate level leads to a decrease of the tax base and as a consequence, the corporate income tax rate has to be increased for a revenue neutral implementation. The required adjustment of the corporate income tax rate for ACC/COCA depends on the chosen notional interest rate. Revenue neutrality could thus require an increase or decrease of the corporate income tax rate.

7.4.2 Shareholder level

Revenue neutrality at the shareholder level is assumed to be achieved if the EATR in the post-reform scenario is aligned to the EATR in the pre-reform scenario by adjusting the personal income tax rate on dividend income. Again, revenue neutral tax rates for each of the four fundamental tax reforms (CBIT, ACE, ACC, COCA) have to be calculated. With regard to the CBIT and the COCA, however, some preliminary remarks have to be made because both reforms require additional modification of shareholder taxes.

The CBIT combines the non-deductibility of interest expenses at the corporate level with a complete elimination of shareholder taxation. This results in an equal EATR at corporate and shareholder level as already discussed in Section 7.3. Given that the elimination of shareholder taxes is a fundamental feature of the CBIT proposal, any (adjustment of) personal income taxes on dividends is not a viable option. Still, given the post-reform EATR of the CBIT, it is possible to calculate the change of the corporate income tax rate that is required to achieve the pre-reform EATR at the shareholder level.

Under a COCA system, the investor is taxed on his notional return on investment rather than on actual dividends received. For profitable investments that yield high economic rents distributed as dividends largely exceeding the notional return under the COCA, the tax base for the purpose of shareholder taxation is considerably reduced relative to the status quo. As a consequence, a revenue neutral implementation of a COCA system would require high or even very high tax rates on the notional return, ranging up to levels of 100% or more. That high tax rate would also hit the alternative investment, leading to a strong decrease in the shareholder's discount rate. Considering these countervailing effects, after all, the EATR could decrease with an increasing personal tax rate on the notional return. Revenue neutrality in terms of aligning the EATR under COCA to pre-reform levels by adjusting shareholder-level tax rates is therefore not feasible. The analysis of revenue neutrality at the shareholder level is therefore restricted to CBIT, ACE and ACC.

⁷⁴ In the calculations, the effective tax rate of the local business tax amounts to 15.12%.

⁷⁵ See the analysis in Section 7.2.1.

For the CBIT, the adjustment of the statutory corporate income tax rate is calculated whereas for the ACE and ACC, the required adjustment of the dividend income tax rate is relevant. Analogous to the corporate level, Table 17 presents the EU28 average for the overall EATR (mean over all sources of financing and types of assets) for the status quo and all fundamental tax reform options for the top-rate qualified shareholder. Moreover, the underlying averages of the applicable statutory corporate income tax rates and personal income tax rates on dividends are presented. In the last three columns, the adjusted average statutory corporate income tax rate for the CBIT and the adjusted average personal income tax rate for dividends (ACE and ACC) are presented.

Table 17: Required adjustments of corporate income tax rates (CITR) and personal income tax rates on dividends (PITR) to achieve a revenue neutral implementation of fundamental tax reforms for the EU28 average (EATR, CITR and PITR in %, change in percentage points)

		EATR	CITR	PITR (Div.)	Revenue neutrality		
					CITR	PITR (Div.)	change
Pre-Reform	Status Quo	30.5	20.5	22.7	-	-	-
Fundamental Tax Reform	CBIT	24.0	20.5	-	27.1	-	6.6
	ACE (NID: 5%)	28.0	20.5	22.7	-	26.7	4.0
	ACE (NID: 7.1%)	26.9	20.5	22.7	-	28.3	5.6
	ACE (NID: 9%)	25.8	20.5	22.7	-	29.7	7.0
	ACC (NID: 5%)	28.6	20.5	22.7	-	25.8	3.1
	ACC (NID: 7.1%)	26.9	20.5	22.7	-	28.3	5.6
	ACC (NID: 9%)	25.3	20.5	22.7	-	30.5	7.8

The introduction of a CBIT decreases the overall EATR for the EU28 average at shareholder level from 30.5% to 24.0% whereas the average underlying corporate income tax rate amounts to 20.5%. In line with the above mentioned approximation, the corporate income tax rates have to be increased by 6.6 percentage points on average to achieve the pre-reform EATR of 30.5%. This result is due to the abolishment of capital income taxation at the shareholder level.

To achieve a revenue neutral implementation of ACE and ACC at the shareholder level, the personal income tax rate on dividends has to be adjusted. In the status quo, this tax rate amounts to 22.7% on average. Again, the effects of both fundamental tax reforms (ACE and ACC) are the same if the notional interest rate equals the nominal market interest rate of 7.1%. In this case, the dividend tax rate has to be increased by 5.6 percentage points on average to achieve the pre-reform EATR of 30.5%. For notional interest rates deviating from the nominal market interest rate of 7.1%, the similar effects as at the corporate level can be found. A lower notional interest rate decreases the tax base in the ACE scenario whereas for the ACC the additional deduction for equity financing is combined with a limited deduction for interest expenses. The EATR is therefore lower for the ACE (28.0%) compared to the ACC (28.6%). Consequently, the required adjustment of the dividend tax rate for a revenue neutral implementation is higher for the ACE (4.0 percentage points). For higher notional interest rates, the reverse effect occurs. Since the ACC leads to a lower EATR in the post-reform scenario for a notional interest rate of 9% compared to the ACE, the dividend tax rate has to be increased by 7.8 percentage points on average for a revenue neutral implementation. For the ACE, the dividend tax rate has to be increased by 7.0 percentage points on average. If a low notional interest rate is chosen, the ACC could in fact also require a decrease of the personal income tax rate on dividends to achieve revenue neutrality.

Table 18 displays the required adjustments for the corporate income tax rate (CBIT) and the dividend income tax rate (ACE and ACC) in each Member State to achieve a revenue neutral implementation of each of the fundamental tax reform options. Columns 4 and 5 display the resulting overall EATR after the implementation of the fundamental tax reforms. ACE and ACC are summarised to one case as the underlying notional interest rate amounts to 7.1%. In columns 6 and 8, the required corporate income tax rate (CBIT) and income tax rate on dividends to achieve the same EATR as in the status quo (column 1) are presented. Columns 7 and 9 display the differences between the existing and the adjusted tax rate.

Table 18: Specific adjustments of corporate income tax rates (CITR) and personal income tax rates on dividends (PITR) in the single Member States to achieve a revenue neutral implementation of fundamental tax reforms (EATR, CITR and PITR in %, change in percentage points)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Status Quo			Post-reform EATR		Revenue neutral CITR		Revenue neutral PITR (Div.)	
	EATR	CITR	PITR (Div.)	CBIT	ACE/ACC	CBIT	change	ACE/ACC	change
AT	34.3	25.0	25.0	26.0	30.0	33.0	8.0	31.7	6.7
BE	37.7	33.0	25.0	33.7	33.2	37.1	4.1	32.5	7.5
BG	11.7	10.0	5.0	10.2	9.6	11.5	1.5	8.0	3.0
CY	19.3	12.5	17.0	17.2	17.4	14.6	2.1	19.7	2.7
CZ	22.6	19.0	15.0	19.0	18.9	22.7	3.7	20.3	5.3
DE	39.1	15.0	26.4	31.5	34.5	22.1	7.1	34.2	7.8
DK	41.7	23.5	42.0	24.2	38.6	41.1	17.6	46.7	4.7
EE	18.2	0.0	0.0	15.7	18.2	5.0	5.0	0.0	0.0
EL	33.8	29.0	18.0	30.6	28.4	32.0	3.0	27.0	9.0
ES	41.9	28.0	24.0	36.3	37.0	33.6	5.6	33.1	9.1
FI	32.1	20.0	28.0	20.9	28.9	31.1	11.1	32.9	4.9
FR	48.7	33.3	43.4	42.8	43.9	38.7	5.4	51.8	8.4
HR	22.2	20.0	14.0	18.9	18.2	23.4	3.4	19.6	5.6
HU	28.8	19.0	16.0	21.6	25.2	26.2	7.2	21.7	5.7
IE	43.9	12.5	51.0	15.9	42.2	39.3	26.8	53.4	2.4
IT	33.5	27.5	23.3	31.1	31.7	29.9	2.4	26.2	2.9
LT	25.1	15.0	15.0	15.5	22.2	25.2	10.2	19.3	4.3
LU	37.4	21.0	22.0	29.1	32.2	28.9	7.9	30.8	8.7
LV	20.2	15.0	10.0	16.1	17.1	19.1	4.1	14.5	4.5
MT	28.0	35.0	35.0	36.5	20.0	26.8	-8.2	44.1	9.1
NL	35.7	25.0	25.0	25.6	31.5	35.0	10.0	31.9	6.9
PL	27.0	19.0	19.0	19.8	23.5	26.0	7.0	24.2	5.2
PT	38.1	21.0	27.4	30.2	33.2	28.7	7.7	35.4	8.0
RO	23.2	16.0	16.0	16.8	20.2	22.4	6.4	20.4	4.4
SE	34.2	22.0	30.0	22.0	30.8	34.3	12.3	35.1	5.1
SI	26.1	17.0	25.0	17.5	23.1	25.2	8.2	29.0	4.0
SK	18.1	22.0	0.0	22.3	13.1	17.8	-4.2	7.7	7.7
UK	32.4	20.0	37.5	24.0	29.1	27.7	7.7	41.7	4.2
EU28	30.5	20.5	22.7	24.0	26.9	27.1	6.5	28.3	5.6

The individual results for each Member State confirm, in principle, the conclusions drawn for the EU28 average. A revenue neutral implementation of a CBIT at the shareholder level requires an increase in the corporate income tax rate in all Member States except Malta and Slovakia. This is due to the full imputation system (Malta) and the non-taxation of dividends (Slovakia) in these two countries. The CBIT increases the tax base at the corporate level and decreases the dividend received at the shareholder level. To counter this effect compared to the status quo, the dividend tax rate has to be reduced. In Member States which levy high personal income taxes on dividends as Denmark and Ireland, the corporate income tax rate has to be increased by more than 15 percentage points.

For ACE and ACC, an increase in the adjusted dividend tax rate is found for all Member States except for Estonia where no adjustments have to be made as both fundamental tax reforms do not unfold any effect at the corporate level. The increase in all other Member States varies between 2.4 percentage points in Ireland and 9.1 percentage points in Malta and Spain. The required adjustment is higher for Member States with high corporate income tax rates as the tax saving effect at the corporate level because of the granted additional deduction is higher in those Member States. A revenue neutral implementation at the shareholder level thus requires a higher increase in the personal income tax rate on dividends.

In summary, to achieve revenue neutrality at the shareholder level the corporate income tax rates (CBIT) or the personal income tax rates on dividends (ACE and ACC) have to be increased. The result for the CBIT contrasts with the decreasing corporate income tax rate found at the corporate level and can be explained by the complete non-taxation of the dividend received at the shareholder level. For the ACE, the dividend tax rate has to be increased whereas for the ACC, the required adjustment depends on the notional interest rate.

7.5 Resulting cost of capital following a revenue neutral implementation of fundamental tax reforms

Any adjustment of statutory tax rates impacts the cost of capital and thus, according to the assumptions underlying the model, the level of investment in a country. In the previous section, the required adjustments of corporate income tax rates and personal income tax rates on dividends were computed. These revenue neutral tax rates will be used in the following to recalculate the cost of capital for each of the four fundamental tax reform options. This analysis provides insights whether a fundamental tax reform option addresses the debt bias, promotes investments and at the same time can be implemented in a revenue neutral way.

7.5.1 Corporate level

Table 19 presents the average cost of capital in the EU28 Member States for the three sources of finance and the overall mean for the status quo and for each fundamental tax reform option.⁷⁶ The two columns for each fundamental tax reform option show the resulting costs of capital by applying the current corporate income tax rates and the adjusted revenue neutral tax rates determined in the previous section (Section 7.4).⁷⁷ A revenue neutral implementation of the CBIT is achieved by decreasing the corporate income tax rate whereas for ACE and ACC/COCA the corporate income tax

⁷⁶ The detailed resulting cost of capital for each Member State can be found in Section A3.6 in the appendix.

⁷⁷ The general effect of fundamental tax reforms on the cost of capital and the specific effect in single Member States has been discussed in detail in Section 7.2.

rate has to be increased. The results presented for ACE and ACC/COCA in Table 19 are based on an underlying notional interest rate of 7.1%.

Table 19: Costs of capital for fundamental tax reforms with current and adjusted (revenue neutral) corporate income tax rates (CITR) compared to status quo at the corporate level (EU28 average, cost of capital in %)

	Status Quo	Fundamental Tax Reform					
		CBIT		ACE		ACC/COCA	
		current CITR	adjusted CITR	current CITR	adjusted CITR	current CITR	adjusted CITR
RE	6.7	6.8	6.5	4.7	4.5	4.7	4.5
NE	6.8	6.9	6.6	4.8	4.6	4.8	4.6
D	4.7	6.8	6.5	4.7	4.5	4.7	4.5
Mean	6.0	6.8	6.5	4.7	4.5	4.7	4.5

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

The tax burden on marginal investments is largely affected by the determination of the tax base and is only to a minor degree affected by the tax rate. This general insight explains that costs of capital for current and adjusted (revenue neutral) corporate income tax rates remain almost unaffected. The cost of capital for debt-financed investment is still largely increasing in the CBIT scenario whereas for ACE and ACC/COCA, the costs of capital for equity-financed investments (retained earnings and new equity) are decreasing as the marginal return remains untaxed. Due to favourable depreciation allowances, the costs of capital fall even below the assumed real capital market interest rate of 5% which is the benchmark.

It is striking that the costs of capital under adjusted corporate income tax rates are lower than the current costs of capital for all fundamental tax reforms while the required adjustment of the corporate income tax rates for a revenue neutral implementation differs. The CBIT allows a decrease in tax rates whereas ACE and ACC/COCA require an increase.

Under a CBIT, the marginal return of an investment is taxed independent from its source of finance. Therefore, a decreasing tax rate results in a lower tax burden and, thus, a lower cost of capital. For ACE and ACC/COCA, the marginal return of an investment is shielded from corporate taxation due to the notional interest deduction. Therefore, an increase in tax rates has no effect on the taxation of the marginal return. However, generous depreciation allowances already reduce the costs of capital under current corporate income tax rates. Higher statutory tax rates increase the tax saving stemming from depreciation allowances and thus decreases the costs of capital.

The importance of the tax base definition for marginal investments and their implications for a revenue neutral implementation is also confirmed if notional interest rates below and above 7.1% as assumed for the base case are considered. Table 20 presents the cost of capital for each financing source and notional interest rates of 5% and 9% respectively with current and adjusted revenue neutral corporate income tax rates.

Table 20: Costs of capital with current and adjusted (revenue neutral) corporate income tax rates (CITR) for ACE and ACC/COCA with different notional interest rates at the corporate level (EU28 average, cost of capital in %)

	ACE				ACC/COCA			
	NID-Rate: 5 %		NID-Rate: 9 %		NID-Rate: 5 %		NID-Rate: 9 %	
	current CITR	adjusted CITR	current CITR	adjusted CITR	current CITR	adjusted CITR	current CITR	adjusted CITR
RE	5.3	5.4	4.2	3.4	5.3	5.4	4.2	3.2
NE	5.4	5.5	4.3	3.5	5.4	5.5	4.3	3.3
D	4.7	4.6	4.7	4.3	5.3	5.3	4.2	3.2
Mean	5.1	5.1	4.4	3.7	5.3	5.4	4.2	3.2

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

With a notional interest rate of 5%, the marginal return of the investment is not completely shielded from corporate taxation for ACE (only equity financing) and ACC/COCA (all financing sources). The costs of capital for equity financing are higher compared to the results for the ACE and ACC/COCA presented in Table 19 which shows the importance of the tax base determination for marginal investments. The adjusted higher corporate income tax rate for a revenue neutral implementation slightly increases the costs of capital. The costs of capital for a notional interest rate of 9% are decreasing to a much larger extent for a revenue neutral implementation which can be explained by two reasons. First, the notional interest deduction generally creates a tax subsidy for marginal investments as it exceeds the marginal return. The revenue implementation requires a rather high increase of the corporate statutory income tax rates which increases in the tax subsidy and reduces the cost of capital.⁷⁸ Second, the effect of favourable depreciation allowances is again more pronounced for higher tax rates.

Summing up, a revenue neutral implementation of the fundamental tax reform options leaves the costs of capital at the corporate level almost unchanged. Therefore, the general conclusions made for the effect of fundamental tax reforms on the costs of capital in the previous section before adjusting statutory corporate income tax rates still hold if revenue neutrality is considered. Based on the underlying model assumptions, all fundamental reform options are likely to eliminate the debt bias to a large extent. The CBIT leads to a “levelling up” to the effective tax levels under equity financing and has potentially negative effects on the scale of investments even if a revenue neutral implementation is considered. Under the ACE, the costs of capital for equity-financed investments are “levelled down” to those under debt financing. A revenue neutral implementation of the ACE might thus achieve the goals of revenue neutrality and the promotion of investment activity by extending the scale of investment at the same time. The “levelling” in the case of ACC/COCA can also be managed in a revenue neutral and investment promoting way. However, this conclusion depends on the chosen notional interest rate.

7.5.2 Shareholder level

A revenue neutral implementation of fundamental tax reforms at the shareholder level has been considered by adjusting the corporate income tax rate in the case of the CBIT and the personal income tax rate on dividend for ACE and ACC.⁷⁹ Table 21 pre-

⁷⁸ See the results in Section 7.4.1.

⁷⁹ Please note that COCA is not considered at shareholder level in case of a revenue neutral scenario. See Section 0.

sents the costs of capital at the shareholder level (top-rate qualified shareholder) for the status quo and each fundamental tax reform option under current and adjusted income tax rates.⁸⁰ The computations for ACE and ACC are based on an assumed notional interest rate of 7.1%.

Table 21: Costs of capital for fundamental tax reforms with current and adjusted (revenue neutral) corporate income tax rates (CITR) and personal income tax rates on dividends (PITR) compared to status quo at the shareholder level (EU28 average, cost of capital in %)

	Status Quo	Fundamental Tax Reform					
		CBIT		ACE		ACC	
		current CITR	adjusted CITR	current PITR (Div.)	adjusted PITR (Div.)	current PITR (Div.)	adjusted PITR (Div.)
RE	5.7	6.8	7.5	3.7	3.7	3.7	3.7
NE	6.6	6.9	7.6	4.6	5.4	4.6	5.4
D	4.7	6.8	7.5	4.7	4.7	4.7	4.7
Mean	5.5	6.8	7.5	4.1	4.2	4.1	4.2

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

In case of a CBIT, the costs of capital generally increase due to missing shareholder taxation.⁸¹ By contrast, the EATR which is the measure for the revenue neutrality in this study decreases because of the non-taxation of the excess return at the shareholder level. As a consequence, the corporate income tax rate has to be increased remarkably to achieve a revenue neutral implementation. The costs of capital increase because the marginal return of the investment is taxed at a higher rate.

For ACE and ACC, the costs of capital remain unchanged if the investment is financed with retained earnings or debt. The adjustment of the personal income tax rate on dividends for a revenue neutral implementation does not unfold any effect as dividend taxation is generally not relevant for marginal investments financed with retained earnings and debt.⁸² The required adjustment of the personal income tax rate on dividends by more than 5 percentage points on average therefore affects only investments financed with new equity. This results in higher costs of capital. Still, the cost of capital for investments financed with new equity is lower compared to the status quo.

Table 22 accounts for the resulting costs of capital if notional interest rates below (5%) and above (9%) the nominal interest rate of 7.1% are considered. Again, the costs of capital for investments financed with retained earnings and debt remain constant whereas the increase in the personal income tax rate on dividends for a revenue implementation leads to higher costs of capital for new equity financing.

⁸⁰ The detailed calculation results for the other types of shareholders and each Member State can be found in Section A3.6

⁸¹ The required post-tax rate of return of the alternative investment is increasing since personal income taxes are not levied anymore which increases the costs of capital. See Section 7.3.1.

⁸² See Section 5.2 for a detailed explanation of the impact of shareholder taxes on the cost of capital.

Table 22: Costs of capital with current and adjusted (revenue neutral) corporate income tax rates (CITR) and personal income tax rates on dividends (PITR) for ACE and ACC/COCA with different notional interest rates at the shareholder level (EU28 average, cost of capital in %)

	ACE				ACC			
	NID-Rate: 5 %		NID-Rate: 9 %		NID-Rate: 5 %		NID-Rate: 9 %	
	current PITR	adjusted PITR	current PITR	adjusted PITR	current PITR	adjusted PITR	current PITR	adjusted PITR
RE	4.3	4.3	3.2	3.2	4.3	4.3	3.2	3.2
NE	5.3	5.8	4.1	5.1	5.3	5.7	4.1	5.2
D	4.7	4.7	4.7	4.7	5.4	5.4	4.2	4.2
Mean	4.6	4.6	3.8	3.9	4.8	4.8	3.6	3.7

In summary, the impact of a revenue neutral implementation of the fundamental tax reform options at the shareholder level is twofold. If the CBIT is introduced, the costs of capital increase because a higher corporate income tax rate is necessary to achieve revenue neutrality. Compared to the current tax rates, the negative impact of a CBIT on the level of investment is thus even more pronounced. A revenue neutral implementation of the CBIT still ensures financing neutrality. The revenue neutral implementation of ACE and ACC leaves the cost of capital for retained earnings and debt unaffected whereas the costs of capital for new equity financing are increasing. This contradicts the goal of financing neutrality as the difference between new equity and debt increases. However, the overall effect on the level of investment is rather minor but is also depending on the importance of each financing source. And compared to the status quo, the revenue neutral implementation of ACE or ACC would still positively impact on the level of investment.

7.6 Sensitivity analysis

The computation of effective tax burdens is based on various assumptions on the economic parameters, for instance regarding a pre-tax rate of return on profitable investment projects of 20%.⁸³ Since the pre-tax return represents an important input parameter to the EATR calculations, a two-sided sensitivity analysis is conducted: In the following, the effect of the fundamental tax reforms options on EATR is reassessed assuming a lower pre-tax profitability of 10% and a higher pre-tax profitability of 30%, respectively.

7.6.1 Impact of profitability on the EATRs for fundamental tax reforms

The results in Table 23 present the EU28 average EATRs at the corporate level in the status quo and for all fundamental tax reforms under the standard profitability assumption ($p=20\%$) as well as for the lower ($p=10\%$) and higher ($p=30\%$) level of profitability.

⁸³ See Section 5.1 for an overview of the economic assumptions used for the calculations.

Table 23: Effect of fundamental tax reforms on EATR at the corporate level for varying levels of pre-tax profitability (EU28 average, EATR in %)

		Status Quo	Fundamental Tax Reform		
			CBIT	ACE	ACC/COCA
p = 10 %	RE	23.9	24.6	9.5	9.5
	NE	24.6	25.2	10.1	10.1
	D	9.3	24.6	9.3	9.3
	Mean	18.9	24.6	9.5	9.5
	D-NE	-15.3	-0.6	-0.8	-0.8
p = 20 %	RE	23.6	23.9	16.4	16.4
	NE	23.9	24.2	16.7	16.7
	D	16.3	23.9	16.3	16.3
	Mean	21.1	24.0	16.4	16.4
	D-NE	-7.6	-0.3	-0.4	-0.4
p = 30 %	RE	23.5	23.7	18.7	18.7
	NE	23.7	23.9	18.9	18.9
	D	18.6	23.7	18.6	18.6
	Mean	21.8	23.8	18.7	18.7
	D-NE	-5.1	-0.2	-0.3	-0.3

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

D-NE displays the difference of debt and new equity expressed in percentage points

Generally, the EATRs for equity financing in the status quo remain mainly constant irrespective of alternative pre-tax returns whereas the EATRs for debt financing show a considerable variation. The determination of the tax base gets much more important if a lower pre-tax profitability is assumed. As the tax saving resulting from the deductibility of interest expenses is held fixed for all pre-tax returns, the effect of the relief for debt finance is more pronounced if a low pre-tax profitability is assumed and vice versa.

The results from the baseline analysis in Section 7.2 remain robust across profitability levels: The CBIT leads to a “levelling up” of the EATR of debt-financed investments to the EATR of equity financing. The ACE, in contrast, “levels down” the EATR of equity-financed investments to the EATR of debt-financed investments. This pattern also holds for the ACC/COCA irrespective of the profitability level due to the underlying notional interest rate of 7.1%. Financing neutrality can thus be achieved irrespective of the pre-tax rate of return under the same conditions that have been derived in the baseline analysis. This stems from the fact that although the pre-tax profitability is an important input parameter to the EATR, it affects all financing choices uniformly and thus leads to a consistent effect across financing possibilities.

Beyond conclusions on the robustness of the findings on the effect of the fundamental tax reform options, the sensitivity analysis reveals a remarkable variation in EATR across levels of profitability. Based on this, conclusions on the intensity of the effects of the fundamental tax reforms can be drawn:

In case a CBIT is introduced, the overall EATR for the EU28 average is highest for low levels of profitability (24.6%) and lowest for high levels of profitability (23.8%). For a pre-tax return of 10%, the overall EATR for the EU28 average increases by 5.7 percentage points compared to the status quo whereas the average increase only amounts to 2.0 percentage points assuming a high pre-tax profitability level of 30%. Since interest is no longer deductible from taxable income, the advantage of debt fi-

nancing is eliminated and, thus, the tax base becomes broader. This effect is more pronounced for low pre-tax returns. To conclude, the disadvantageous effect from an increase in EATR upon the introduction of a CBIT is more harmful for less profitable corporations.

In contrast, especially corporations that yield low pre-tax returns benefit from the introduction of an ACE or ACC/COCA: Average decreases in the overall EATR for the EU28 average compared to the status quo amount to 9.4 percentage points for a low pre-tax profitability of 10% and to only 3.1 percentage points for a profitability of 30%. In case of ACE and ACC/COCA, only profits in excess of the notional interest rate (i.e. economic rents) are subject to tax.⁸⁴ In case of low profitability, a comparatively smaller fraction of the profit is subject to tax which results in a lower tax burden and thus lower EATRs.

Likewise, the results in Table 24 present the EU28 average EATRs at the level of the top-rate qualified shareholder in the status quo and for each fundamental tax reform option under the three different profitability assumptions.

Table 24: Effect of fundamental tax reforms on EATR at the shareholder level for varying levels of pre-tax profitability (EU28 average, EATR in %)

		Status Quo	Fundamental Tax Reform		
			CBIT	ACE / ACC	COCA
p = 10 %	RE	23.7	24.6	12.4	9.4
	NE	28.6	25.2	17.3	9.9
	D	17.8	24.6	17.8	9.3
	Mean	22.1	24.6	14.8	9.4
p = 20 %	RE	31.3	23.9	25.7	15.8
	NE	33.8	24.2	28.1	16.1
	D	28.4	23.9	28.4	15.7
	Mean	30.5	24.0	26.9	15.8
p = 30 %	RE	33.9	23.7	30.1	17.9
	NE	35.5	23.9	31.7	18.1
	D	31.9	23.7	31.9	17.9
	Mean	33.3	23.8	30.9	17.9

The results for the status quo again reveal the considerable impact of the level of profitability on effective tax levels in case of debt-financing. At the corporate level, the relief for debt financing is more pronounced for low pre-tax returns. By contrast, at the shareholder level, the mean EATR for equity financing and especially retained earnings is remarkably increasing with an increasing pre-tax return. The tax burden of a marginal investment financed with retained earnings at the shareholder level is mainly influenced by the capital gains taxation. The excess return in case of a profitable investment is always distributed and taxed as a dividend at the shareholder level. Therefore, the tax burden is relatively increasing if a higher dividend is received at the shareholder level.

With regard to the fundamental tax reforms, the sensitivity analysis at the level of the top-rate qualified shareholder again confirms the findings from the analysis of the baseline scenario in Section 7.3: Full financing neutrality at the shareholder level is restricted to the introduction of a CBIT or COCA. Despite varying levels of pre-tax

⁸⁴ See De Mooij/Devereux (2011, p. 96).

profitability, potential obstacles to financing neutrality inherent in Member States' personal income tax systems remain such that unless there is a direct impact on investor taxation, financing neutrality cannot be established. Under an ACE/ACC, neutrality thus remains restricted to equal EATRs for investments financed with new equity and debt in Member States that levy the same tax rate on dividend income and income from the alternative investment.

The findings on the effects of the fundamental tax reform options derived in Sections 7.2 and 7.3 are robust across pre-tax profitability levels with regard to the achievement of financing neutrality. The sensitivity analysis further reveals important insights on the impact of the effects induced by each reform option. The intensity of the effects varies across pre-tax profitability levels and so do the respective detrimental or beneficial tax consequences: While less profitable corporations and their shareholders may especially benefit from the introduction of an ACE, ACC or COCA and the resulting decrease in EATRs, they would in particular suffer from the disadvantage of higher EATRs upon the introduction of a CBIT.⁸⁵

7.6.2 Required adjustments of income tax rates for a revenue neutral implementation of fundamental tax reforms

The aim of this sub-section is to analyse the required adjustments of corporate and personal income tax rates for a revenue neutral implementation of the fundamental tax reforms assuming varying levels of pre-tax profitability. Table 25 presents the EU28 average of the overall EATR (mean over all sources of finance and types of assets) at the corporate level for the status quo and all fundamental tax reform options as well as the underlying averages of the applicable statutory corporate income tax rates for varying levels of pre-tax profitability. The last two columns display the adjusted revenue neutral average statutory corporate income tax rates over all EU28 Member States and each fundamental reform option. The results for the ACE and ACC/COCA are based on a notional interest rate of 7.1%.

Table 25: Required adjustments of corporate income tax rates (CITR) to achieve a revenue neutral implementation of fundamental tax reforms for the EU28 average and varying levels of pre-tax profitability (EATR and CITR in %, change in percentage points)

		EATR	CIT	Revenue neutrality	
				CIT	change
p=10 %	Status Quo	18.9	20.5	-	-
	CBIT	24.6	20.5	14.9	-5.6
	ACE	9.5	20.5	50.4	29.9
	ACC/COCA	9.5	20.5	50.4	29.9
p=20 %	Status Quo	21.1	20.5	-	-
	CBIT	24.0	20.5	17.7	-2.8
	ACE	16.4	20.5	27.6	7.1
	ACC/COCA	16.4	20.5	27.6	7.1
p=30 %	Status Quo	21.8	20.5	-	-
	CBIT	23.8	20.5	18.7	-1.8
	ACE	18.7	20.5	24.6	4.1
	ACC/COCA	18.7	20.5	24.6	4.1

⁸⁵ See also Bond (2000, p. 170).

The results in Table 25 show a similar pattern as under the standard profitability assumption: For the revenue neutral implementation of a CBIT at the corporate level, the corporate income tax rate can be adjusted downwards. The introduction of an ACE or ACC/COCA, on the other hand, requires an increase in statutory corporate income tax rates to achieve revenue neutrality. In Table 25, the required increases are equal for the ACE and ACC/COCA which stems from the underlying notional interest rate of 7.1%.⁸⁶

The varying levels of profitability provide insights on the scale of required tax rate adjustments: For a low pre-tax profitability level of 10%, the downward adjustment of the statutory corporate income tax rate is higher than for a high pre-tax profitability of 30% (-5.6 percentage points vs. -1.8 percentage points) in case of a CBIT. In turn, for the ACE and ACC/COCA, the required increase in the corporate income tax rate is higher for a low pre-tax profitability of 10% (29.9 percentage points) as compared to a high pre-tax profitability level of 30% (4.1 percentage points): It has been discussed in Section 7.6.1 that the additional equity allowances under an ACE and ACC/COCA are more valuable for low profitability levels and thus lead to a comparatively larger decline in EATR levels. Therefore, higher corporate income tax rates are necessary to re-adjust to the pre-reform EATR level.

The required adjustments of corporate income tax rates are highly dependent on the assumed pre-tax profitability. These findings illustrate the difficulties associated with the determination of adequate revenue neutral corporate income tax rates since the profitability of the corporations in an economy is very different. Single corporations might benefit more from a revenue neutral implementation of fundamental tax reforms depending on their profitability.

At the shareholder level, the sensitivity analysis regarding a revenue-neutral implementation of the fundamental tax reform options is again restricted to CBIT, ACE and ACC.⁸⁷ Analogously, Table 26 presents the EU28 average for the overall EATR (mean over all sources of finance and types of assets) for the status quo and the fundamental tax reform options for the top-rate qualified shareholder. In addition, the averages of the applicable statutory corporate income tax rates and personal income tax rate on dividends are displayed. The last three columns contain the adjusted average statutory corporate income tax rate for the CBIT as well as the adjusted average dividend tax rate and the resulting change in tax rates. Results for the ACE and ACC are based on a notional interest rate of 7.1%.

In principle, the results in Table 26 demonstrate almost the same pattern as for the baseline analysis under the standard profitability assumption at the level of the top-rate qualified shareholder. For the CBIT, however, the corporate income tax rate may even be decreased for a low pre-tax profitability of 10% whereas it has to be adjusted upwards for a pre-tax profitability of 30% in order to maintain revenue neutrality. This can be explained by the negative impact of the broadening of the tax base at the corporate level and the positive impact of the non-taxation of the excess return received at the shareholder level. The revenue neutral implementation of an ACE/ACC implies an upward adjustment of the personal income tax rate on dividends. The magnitude of the required increase in tax rates is stronger for a low pre-tax profitability as the additional deduction granted at the corporate level has a higher impact for low levels of profitability.

⁸⁶ The sensitivity results for other notional interest rates can be found in Section A3.7.2 in the appendix.

⁸⁷ Please note that COCA is not considered at shareholder level in case of a revenue neutral scenario. See Section 0.

Table 26: Required adjustments of corporate income tax rates (CITR) and personal income tax rates on dividends (PITR) to achieve a revenue neutral implementation of fundamental tax reforms for the EU28 average and varying levels of pre-tax profitability (EATR, CITR and PITR in %, change in percentage points)

		EATR	CITR	PITR (Div.)	Revenue neutrality		
					CITR	PITR (Div.)	change
p = 10 %	Status Quo	22.1	20.5	22.7	-	-	-
	CBIT	24.6	20.5	-	18.1	-	-2.4
	ACE/ACC	14.8	20.5	22.7	-	36.6	13.9
p = 20 %	Status Quo	30.5	20.5	22.7	-	-	-
	CBIT	24.0	20.5	-	27.1	-	6.6
	ACE/ACC	26.9	20.5	22.7	-	28.3	5.6
p = 30 %	Status Quo	33.3	20.5	22.7	-	-	-
	CBIT	23.8	20.5	-	30.1	-	9.6
	ACE/ACC	30.9	20.5	22.7	-	26.2	3.5

7.6.3 Cost of capital under revenue neutral income tax rates

The aim of the following section is to analyse the effects of a revenue neutral implementation of the fundamental tax reforms on the cost of capital assuming both a lower (10%) and a higher (30%) profitability than in the baseline analysis in Section 7.5. Table 27 presents the cost of capital for each financing source and overall mean for the status quo and each fundamental reform option in the EU28 Member States for varying levels of profitability. The columns for the fundamental tax reform options display the resulting cost of capital when using the current income tax rates as well as the revenue neutral tax rates. The results for the ACE and ACC/COCA are based on a notional interest rate of 7.1%, respectively. The costs of capital in the status quo remain constant as they are not affected by the variation of the pre-tax profitability.

Table 27: Costs of capital for fundamental tax reforms with current and adjusted (revenue neutral) corporate income tax rates (CITR) compared to status quo at the corporate level for varying levels of pre-tax profitability (EU28 average, cost of capital in %)

		Status Quo	Fundamental Tax Reform					
			CBIT		ACE		ACC/COCA	
			current CITR	adjusted CITR	current CITR	adjusted CITR	current CITR	adjusted CITR
p=10 %	RE	6.7	6.8	6.3	4.7	1.8	4.7	1.8
	NE	6.8	6.9	6.4	4.8	2.3	4.8	2.3
	D	4.7	6.8	6.3	4.7	1.8	4.7	1.8
	Mean	6.0	6.8	6.3	4.7	1.8	4.7	1.8
p=20 %	RE	6.7	6.8	6.5	4.7	4.5	4.7	4.5
	NE	6.8	6.9	6.6	4.8	4.6	4.8	4.6
	D	4.7	6.8	6.5	4.7	4.5	4.7	4.5
	Mean	6.0	6.8	6.5	4.7	4.5	4.7	4.5
p=30 %	RE	6.7	6.8	6.6	4.7	4.6	4.7	4.6
	NE	6.8	6.9	6.7	4.8	4.7	4.8	4.7
	D	4.7	6.8	6.6	4.7	4.6	4.7	4.6
	Mean	6.0	6.8	6.6	4.7	4.6	4.7	4.6

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

In general, the same pattern as for the baseline analysis can be observed across all levels of pre-tax profitability: For both current and adjusted corporate income tax rates, the cost of capital of debt-financed investments is increasing compared to the status quo under a CBIT whereas the cost of capital of equity-financed investments is decreasing compared to status quo and even falls below the assumed post-tax real rate of return for the ACE and ACC/COCA.

Again, the sensitivity analysis reveals insights on the magnitude of the changes in the cost of capital that result from a revenue neutral implementation of the fundamental tax reform options:

If a CBIT is introduced on a revenue neutral basis, the costs of capital of all sources of finance slightly decrease as compared to a non-revenue neutral implementation. Although the costs of capital still remain higher than at status quo, the average decrease is largest assuming a low profitability level of 10% (-0.5 percentage points). Therefore, although the statutory corporate income tax rate may be decreased upon the revenue neutral implementation of a CBIT, the introduction results in higher costs of capital (levelling up) and unfolds potentially negative effects on the scale of investments especially.

For the ACE and ACC/COCA, the same effects can be observed as the underlying notional interest rate corresponds to the nominal market interest rate. When compared to a non-revenue neutral implementation of the fundamental reform options, the revenue neutral implementation leads to decreases in the costs of capital especially if a low level of pre-tax profitability is assumed: For a pre-tax profitability of 10%, a revenue neutral implementation decreases the average cost of capital by 2.9 percentage points whereas the change only amounts to 0.1 percentage points if a high pre-tax profitability of 30% is assumed. The strong decline in the average cost of capital for a pre-tax profitability of 10% results from the required increase in statutory corporate income tax rates which makes the net present value of depreciation allowances more valuable. In some Member States such as Belgium, France or Luxembourg where the revenue neutral corporate income tax rate is especially high, the average costs of capital may even be negative which reinforces the overall average effect.⁸⁸ Therefore, although statutory corporate income tax rates need to be increased for a revenue neutral implementation of the ACE and ACC/COCA, the costs of capital can in fact decrease. Independent of the profitability level, the ACE and ACC/COCA may thus achieve revenue neutrality and promote investment as compared to the status quo.

For the top-rate qualified shareholder, Table 28 presents the cost of capital for the status quo and the fundamental tax reform options under current adjusted corporate income tax rates for the CBIT and personal income tax rates for the ACE and ACC. Upon the revenue neutral implementation of a CBIT at the shareholder level, the costs of capital decrease for a low level of pre-tax profitability as compared to a non-revenue neutral implementation because a decreasing corporate income tax rate is used. For higher profitability levels, the costs of capital increase because the marginal return is taxed at a higher rate. To conclude, for higher profitability levels, a more negative impact on the scale of investments can be observed upon the revenue neutral implementation of a CBIT.

⁸⁸ See the detailed results in Section A3.7.3 in the appendix.

Table 28: Costs of capital for fundamental tax reforms with current and adjusted (revenue neutral) corporate income tax rates (CITR) and personal income tax rates (PITR) compared to status quo at the shareholder level for varying levels of pre-tax profitability (EU28 average, cost of capital in %)

		Status Quo	Fundamental Tax Reform					
			CBIT		ACE		ACC	
			current CITR	adjusted CITR	current PITR (Div.)	adjusted PITR (Div.)	current PITR (Div.)	adjusted PITR (Div.)
p = 10 %	RE	5.7	6.8	6.5	3.7	3.7	3.7	3.7
	NE	6.6	6.9	6.6	4.6	6.8	4.6	6.8
	D	4.7	6.8	6.5	4.7	4.7	4.7	4.7
	Mean	5.5	6.8	6.6	4.2	4.4	4.2	4.4
p = 20 %	RE	5.7	6.8	7.5	3.7	3.7	3.7	3.7
	NE	6.6	6.9	7.6	4.6	5.4	4.6	5.4
	D	4.7	6.8	7.5	4.7	4.7	4.7	4.7
	Mean	5.5	6.8	7.5	4.2	4.2	4.2	4.2
p = 30 %	RE	5.7	6.8	7.9	3.7	3.7	3.7	3.7
	NE	6.6	6.9	8.0	4.6	5.1	4.6	5.1
	D	4.7	6.8	7.9	4.7	4.7	4.7	4.7
	Mean	5.5	6.8	7.9	4.2	4.2	4.2	4.2

RE = Retained Earnings; NE = New Equity; D = Debt

Mean = weighted mean over retained earnings, new equity, debt

For the ACE and ACC, the costs of capital of investments financed by retained earnings and new equity remain unaffected for the varying levels of pre-tax profitability as under the standard profitability assumption. If applied on a revenue neutral basis, the costs of capital of investments financed by new equity increase as compared to a non-revenue neutral implementation as the dividend tax rate is increased. This harms especially investments financed with new equity. Since the average costs of capital remain lower than at status quo, the revenue neutral implementation of an ACE and ACC still positively impacts the scope of investments.

8. Conclusions

The findings of this study are summarised in the following.

The study analysed the cost of capital and EATR for corporate investments in the 28 Member States of the EU. Respect was given to the tax codes for the fiscal year 2015. The computation of effective tax levels is based on the Devereux/Griffith methodology throughout the report. A distinction was made between effective tax levels at corporate and at shareholder level

The results obtained provide evidence that current corporate tax systems in the EU28 Member States prefer debt over equity financing. Most tax systems allow a complete deductibility of interest expenses and do not grant an equal deduction for equity financing. This preference for debt financing also prevails if shareholder taxation is taken into account. This might incentivise corporations and shareholders to finance investments rather with debt than with equity. As a consequence, corporations might be overleveraged. To overcome the corporate debt bias and to achieve financing neutrality several reform options have been analysed.

A first option to prevent excessive debt financing is the implementation of interest deduction limitation rules which can be found in more and more Member States. The

quantitative analysis has shown that the cost of capital and the EATR rises to the level of equity financing but Member States with interest deduction limitation rules get less attractive compared to Member States that do not have interest deduction limitation rules in place. The non-deductibility of interest expenses can lead to new problems as an increasing double taxation. Another possibility to address the current debt bias would be the introduction of fundamental tax reforms as CBIT, ACE, ACC and COCA.

All these reform options can establish financing neutrality at the corporate level to a great extent but might have different impact on the investment behaviour of corporations. The CBIT establishes financing neutrality by increasing the cost of capital and the EATR for debt-financed investments to the effective tax burdens on equity-financed investments (“levelling-up”). The ACE works the other way around as it decreases the cost of capital and EATR for equity-financed investments to the level of debt-financed investments (“levelling-down”). A critical issue is the notional interest rate since financing neutrality can only be achieved if the notional interest rate equals the market interest rate. For the ACC and COCA, financing neutrality is always achieved as the notional deduction for debt and equity is always the same. The ACC and COCA lead to a “levelling” at the corporate level.

The analysis of fundamental tax reforms at shareholder level requires some modifications of shareholder taxation and can therefore have a different effect compared to the corporate level. If a CBIT is introduced, the costs of capital are increasing whereas the EATRs are decreasing compared to the status quo. Financing neutrality is achieved anyway as no additional tax is levied at the shareholder level. ACE and ACC reduce the cost of capital and EATR for equity-financed investments if notional interest rate and market interest rate are the same. Moreover, financing neutrality between debt and new equity can be achieved if the tax rate on dividend income and the alternative investment are equal. For ACC, this is even the case if other notional interest rates than the market interest rate are chosen. The COCA establishes financing neutrality between retained earnings and new equity as dividend taxes and capital gains taxes are abolished. This can be achieved independent of the underlying notional interest rate. Moreover, the COCA decreases especially the EATR for all financing sources compared to the status quo as the actual dividend received at shareholder level is not taxed.

Due to a broader tax base that results from the non-deductibility of interest, the revenue neutral implementation of a CBIT allows for a decrease in the statutory corporate income tax rate. To maintain revenue neutrality upon the introduction of an ACE, statutory corporate income tax rates have to be increased to compensate for the narrower tax base. For the ACC/COCA, the implications of a revenue neutral introduction depend on the underlying notional interest rate: In case a very low notional interest rate is chosen, it could thus even be that corporate income tax rates must be reduced in order to ensure revenue neutrality. The effects of a revenue neutral implementation of the fundamental tax reform options on the costs of capital are minor since the tax burden of marginal investments is predominantly dependent on the underlying tax base and rather unaffected by tax rate changes. Thus, the conclusions regarding financing neutrality also hold for a revenue neutral implementation of the fundamental tax reforms.

At shareholder level, it is the corporate income tax rate that needs to be increased to ensure a revenue neutral implementation of a CBIT due to the complete suspension of shareholder taxation. Although this leads to an increase in costs of capital since the marginal return is taxed at a higher rate, financing neutrality is still maintained. For the revenue neutral introduction of an ACE at shareholder level, the personal income tax rate on dividends has to be increased whereas for the ACC, the required change again depends on the chosen notional interest rate. Due to a higher tax base at shareholder level and the necessary increase in dividend tax rates, the revenue neutral implementation of the ACE or ACC leads to higher costs of capital for investments

financed with new equity as compared to a non-revenue neutral implementation. A revenue neutral implementation of the COCA at shareholder level is not possible since the mere taxation of a notional return considerably reduces the tax base and would require very high compensatory increases in the personal income tax rate on the notional amount.

A two-sided sensitivity analysis that varies the pre-tax level of profitability confirms the robustness of the findings on both the effects of the fundamental tax reform options regarding financing choices and the effect of a revenue neutral fundamental tax reform across levels of profitability. The sensitivity analysis further reveals difficulties associated with the specification of adequate revenue neutral corporate income tax rates since their effect on single corporations is dependent on the profitability.

Overall, the current debt bias in tax systems in the EU28 Member States could be addressed by the implementation of far-reaching fundamental tax reforms. The overall effects of the CBIT are not clear cut as the increasing cost of capital at the corporate and the shareholder level contrasts with the decreasing EATR at shareholder level. If a revenue neutral implementation is considered, the CBIT may negatively affect the scale of investment. For the ACE, the level of investment could be increased and this effect is also preserved if a revenue neutral implementation is considered. The effects of the ACC depend on the chosen notional interest rate. A revenue neutral implementation of a COCA system at the shareholder level faces several difficulties whereas the overall impact on the scale of investment is positive. In summary, only the introduction of an ACE can address the debt bias and promotes investment even if a revenue neutral introduction is considered.

References

- Blouin, J./ Huizinga, H./ Laeven, L./Nicodème, G. (2014): Thin capitalization rules and multinational firm capital structure, in: European Commission Taxation Papers 42-2014, 2014
- Boadway, R./Bruce, N. (1984): A general proposition on the design of a neutral business tax, in: 24 Journal of Public Economics 1984, pp. 231-239
- Bond, S. (2000): Levelling up or levelling down? Some reflections on the ACE and CBIT proposals, and the future of the corporate tax base, in: Sijbren Cnossen, Taxing capital income in the European Union : issues and options for reform, New York 2000, pp. 160-178
- Buettner, T./ Overesch, M./ Schreiber, U./Wamser, G. (2012): The impact of thin-capitalization rules on the capital structure of multinational firms, in: 96 Journal of Public Economics 2012, pp. 930-938
- Cnossen, S. (1996): Company taxes in the European Union: Criteria and options for reform, in: 17 Fiscal Studies 1996, pp. 67-97
- Cnossen, S. (2002): Tax Policy in the European Union: A Review of Issues and Options, in: 58 FinanzArchiv 2002, pp. 466-558
- Cohen, W. M. (2010): Chapter 4 - Fifty Years of Empirical Studies of Innovative Activity and Performance, in: H. Hall BronwynRosenberg Nathan, Handbook of the Economics of Innovation, 2010, pp. 129-213
- De Mooij, R. A. (2011): The Tax Elasticity of Corporate Debt: A Synthesis of Size and Variations, in: IMF Working Paper Series WP/11/95, 2011
- De Mooij, R. A. (2012): Tax Biases to Debt Finance: Assessing the Problem, Finding Solutions, in: 33 Fiscal Studies 2012, pp. 489
- De Mooij, R. A./Devereux, M. P. (2011): An applied analysis of ACE and CBIT reforms in the EU, in: 18 International Tax and Public Finance 2011, pp. 93-120
- Desai, M. A./ Foley, C. F./Hines, J. J. R. (2004): A Multinational Perspective on Capital Structure Choice and Internal Capital Markets, in: 59 Journal of Finance 2004, pp. 2451-2487
- Devereux, M. P./Freeman, H. (1991): A General Neutral Profits Tax, in: 12 Fiscal Studies 1991, pp. 1-15
- Devereux, M. P./Griffith, R. (1998): Taxes and the location of production: evidence from a panel of US multinationals, in: 68 Journal of Public Economics 1998, pp. 335-367
- Devereux, M. P./Griffith, R. (1999): The Taxation of Discrete Investment Choices, in: IFS Working Paper Series W98/16, 1999
- Devereux, M. P./Griffith, R. (2003): Evaluating Tax Policy for Location Decisions, in: 10 International Tax and Public Finance 2003, pp. 107-126
- European Commission (2001): Company Taxation in the Internal Market, 2001
- European Commission (2012): Growth-friendly Tax Policies in the Member States and Better Tax Coordination in the EU, 2012
- European Commission (2015a): Annual Growth Survey 2016 - Strengthening the recovery and fostering convergence, 2015a
- European Commission (2015b): A Fair and Efficient Corporate Tax System in the European Union: 5 Key Areas for Action, 2015b

- European Commission (2015c): Findings from the 2015 corporate debt bias conference, 2015c
- Fatica, S./ Hemmelgarn, T./Nicodème, G. (2012): The debt-equity tax bias: consequences and solutions, in: European Commission Taxation Papers 33-2012, 2012
- Feld, L. P./ Heckemeyer, J. H./Overesch, M. (2013): Capital structure choice and company taxation: A meta-study, in: 37 Journal of Banking & Finance 2013, pp. 2850-2866
- Gammie, M. (1992): Reforming Corporate Taxation: An Evaluation of the United States Treasury Integration Proposals and other Corporate Tax Systems in an International Context - Part 2, in: British Tax Review 1992, pp. 243-276
- Gordon, R. H. (2010): Taxation and corporate use of debt : implications for tax policy, in: 63 National tax journal 2010, pp. 151-174
- Hebous, S./Weichenrieder, A. J. (2010): Debt financing and sharp currency depreciations: wholly versus partially-owned multinational affiliates, in: 146 Review of World Economics 2010, pp. 281-302
- Heckemeyer, J. H./Overesch, M. (2012): Auswirkungen der Besteuerung auf Entscheidungen international tätiger Unternehmen, in: 72 Die Betriebswirtschaft 2012, pp. 451-472
- Henrekson, M./Sanandaji, T. (2011): Entrepreneurship and the theory of taxation, in: 37 Small Business Economics 2011, pp. 167-185
- Hey, J. (2014): Base Erosion and Profit Shifting and Interest Expenditure, in: 68 BFIT 2014, pp. 332-345
- Huizinga, H./Laeven, L. (2008): International profit shifting within multinationals: A multi-country perspective, in: 92 Journal of Public Economics 2008, pp. 1164-1182
- IFS Capital Taxes Group (1991): Equity for Companies: A Corporation Tax for the 1990s. A Report of the IFS Capital Taxes Group, London 1991
- IMF (2009): Debt Bias and Other Distortions: Crisis-Related Issues in Tax Policy, 2009
- Kleinbard, E. D. (2007): Rehabilitating the Business Income Tax, in: The Hamilton Project Discussion Paper 2007-09, 2007
- Kleinbard, E. D. (2015): Reimagining Capital Income Taxation, in: Mimeo 2015
- Knauer, T./Sommer, F. (2012): Interest barrier rules as a response to highly leveraged transactions, in: 11 Review of Accounting & Finance 2012, pp. 206-232
- Mirrlees, J./ Adam, S./ Besley, T./ Blundell, R./ Bond, S./ Chote, R./ Gammie, M./ Johnson, P./ Myles, G./Poterba, J. (2010): Dimensions of Tax Design - The Mirrless Review, in: Institute for Fiscal Studies (Ed.), Oxford 2010
- Overesch, M./Voeller, D. (2010): The Impact of Personal and Corporate Taxation on Capital Structure Choices, in: 66 FinanzArchiv: Public Finance Analysis 2010, pp. 263-294
- Overesch, M./Wamser, G. (2010): Corporate tax planning and thin-capitalization rules: evidence from a quasi-experiment, in: 42 Applied Economics 2010, pp. 563-573
- Schön, W. (2012): The Distinct Equity of the Debt-Equity Distinction, in: 66 BFIT 2012, pp. 490-502
- Schreiber, U./ Spengel, C./Lammersen, L. (2002): Measuring the Impact of Taxation on Investment and Financing Decisions, in: 54 Schmalenbach Business Review 2002, pp. 2-23

- Spengel, C. (2003): Internationale Unternehmensbesteuerung in der Europäischen Union : Steuerwirkungsanalyse, empirische Befunde, Reformüberlegungen, Düsseldorf 2003
- Spengel, C./ Endres, D./ Finke, K./Heckemeyer, J. H. (2015): Effective Tax Levels Using the Devereux/Griffith Methodology, Mannheim 2015
- US Department of Treasury (1992): Integration of the Individual and Corporate Tax Systems: Taxing Business Income Once, Washington 1992
- Wamser, G. (2014): The Impact of Thin-Capitalization Rules on External Debt Usage - A Propensity Score Matching Approach, in: 76 Oxford Bulletin of Economics & Statistics 2014, pp. 764-781
- Weichenrieder, A. J./Klautke, T. (2008): Taxes and the Efficiency Costs of Capital Distortions, in: CESifo Working Paper No. 2431, 2008
- Zangari, E. (2014): Addressing the Debt Bias: A Comparison between the Belgian and the Italian ACE Systems, in: European Commission Taxation Papers 44-2014, 2014

Appendix

A1. Adaption of the formulas of the Devereux / Griffith model

A1.1 The basic formulas

The starting point of the Devereux Griffith model is the change in firm value in t due to an increase in the capital stock of one unit in t which is reversed in the next period ($t+1$). For the domestic case, the basic formulas established in prior studies have to be applied.⁸⁹ The economic rent of the project in absence of taxes R^* is defined as:

$$R^* = \frac{p-r}{1+r} \quad (1)$$

where p is the assumed pre-tax rate of return of the investment and r the real market interest rate. R is the post-tax economic rent generated by this additional investment which has to be corrected for the effective capital gains tax z .⁹⁰

$$(1-z) * R \quad (2)$$

The starting point is always the post-tax economic rent attributable to an investment financed with retained earnings (R^{RE}). For other financing possibilities or further modifications, additional terms F have to be added. Therefore, R can be described as:

$$R = R^{RE} + F \quad (3)$$

The economic rent for an investment financed with retained earnings is defined by:⁹¹

$$R^{RE} = \underbrace{-\gamma * (1-A+e)}_1 + \underbrace{\frac{\gamma}{1+\rho} * [(1+\pi) * (p+\delta) * (1-\tau) + (1+\pi) * (1-\delta) * (1-A)]}_3 \quad (4)$$

1: Investment in $t=0$ reduces dividend for shareholder

2: Taxation of additional dividend in $t=1$ and discounting

3: Income from additional investment in $t=1$

The financing terms F that have to be added to R^{RE} are displayed in the following table:⁹²

Table A1: Financing Terms in the Devereux / Griffith model

Retained Earnings	$F^{RE} = 0$ (5)
New Equity	$F^{NE} = -\frac{\rho * (1-\gamma) * (1+e)}{1+\rho}$ (6)
Debt	$F^{DE} = \frac{\gamma * (1+e) * [\rho - i * (1-\beta * \tau)]}{1+\rho}$ (7)

⁸⁹ See Devereux/Griffith (1999); Schreiber et al. (2002).

⁹⁰ See Schreiber et al. (2002, p. 13).

⁹¹ See Devereux/Griffith (1999, p. 18). The basic formula has been extended by the term e which accounts for non-profit taxes as a real estate tax.

⁹² See Spengel et al. (2015, p. B-3).

The taxation at the level of shareholder is mainly determined by the following two terms:⁹³

$$\gamma = \frac{1 - m^d}{(1 - c) * (1 - z)} \quad (8)$$

$$\rho = \frac{(1 - m^i) * i}{(1 - z)} \quad (9)$$

Generally, γ denotes the tax discrimination between new equity and distributions whereas ρ describes the shareholders nominal discount rate.⁹⁴ The term m^d is the tax rate for dividend income at the shareholder level, c is the rate of imputation tied to a dividend and z describes the effective capital gains tax. The term m^i describes the taxation of interest income at the shareholder level.

The Devereux-Griffith model can be used to calculate effective measures for profitable and marginal investment. A marginal investment has a post-tax economic rent of zero. Setting equation (3) equal to zero and solving for p (pre-tax rate of return) yields the required pre-tax rate of return to achieve a post-tax economic rent of zero. This is known as the cost of capital $\tilde{p}$ and is defined by the following formula:⁹⁵

$$\tilde{p} = \frac{(1 - A) * [\rho + \delta * (1 + \pi)] - \pi + (1 + \rho) * e}{(1 + \pi) * (1 - \tau)} - \frac{F * (1 + \rho)}{\gamma * (1 + \pi) * (1 - \tau)} - \delta \quad (10)$$

The effective marginal tax rate (EMTR) is derived from the cost of capital for each investment and is calculated as

$$EMTR = \frac{\tilde{p} - s}{\tilde{p}} \quad (11)$$

where $\tilde{p}$ denotes the cost of capital and s the required post-tax real rate of return. At the corporate level, s equals the real market interest r .

For profitable investments which yield a post-tax economic rent, the effective average tax rate (EATR) is calculated. The formula for the EATR is given by the difference of the pre-tax and post-tax economic rent of the investment (R^* and R) divided by the discounted pre-tax rate of return:

$$EATR = \frac{R^* - R}{p / (1 + r)} \quad (12)$$

A1.2 General remarks concerning the implementation of interest deduction limitation rules and fundamental tax reforms

As noted in section 2, the overall measures for effective taxation (e.g. EATR) are based on an equal weight for each of the five asset types (20%) and financing weights of 55% retained earnings, 10% new equity and 35% debt financing. The weighted

⁹³ See Spengel et al. (2015, p. B-2).

⁹⁴ See Devereux/Griffith (2003, p. 109).

⁹⁵ See Spengel et al. (2015, p. B-3).

EATR in country j with respect to the different financing possibilities (corporate and shareholder level) can be written as:⁹⁶

$$EATR^j = 0.55 * EATR^{RE} + 0.1 * EATR^{NE} + 0.35 * EATR^{DE} \quad (13)$$

The interest deduction limitation rules and the fundamental tax reforms impact the $EATR^j$ differently. Apart from modifications of the financing terms, the implementation of some fundamental reforms requires an adaptation of taxation at the shareholder level. In the following sections, we will indicate which financing possibility is impacted and whether a modification at the shareholder level is required.

A1.3 Interest deduction limitation rules/ Comprehensive business income tax (CBIT)

As noted in section 3, interest deduction limitation rules will lead to a complete non-deductibility of interest costs in our model at the corporate level. Under a CBIT, the debt-equity distinction becomes irrelevant by disallowing interest deductions at the corporate level, thus aligning the treatment of interest with that of dividends.⁹⁷ Therefore, the implementation of interest deduction limitation rules and CBIT will be the same at the corporate level.

The abolition of interest deductibility results in a taxation of corporate profits after depreciation but before interest.⁹⁸ Hence, corporate income tax is transformed into a broad-based source tax withheld at company level.⁹⁹ Since all capital is subject to tax at the level of the firm, the introduction of a CBIT should be combined with an elimination of capital income taxation at the shareholder level.¹⁰⁰ As a result, the capital income tax rates (dividend, interest and capital gains) at the shareholder level are set to zero in the CBIT case.

The implementation of the CBIT requires the following modifications:

Table A2: Necessary modifications for the implementation of the CBIT

Modification of Financing Terms	F^{RE}	F^{NE}	F^{DE}
	no	no	yes
Modification of Shareholder Taxes	yes		

As mentioned above, the implementation of interest deduction limitation rules corresponds to the modifications for the CBIT at the corporate level.

⁹⁶ The weighted cost of capital is calculated in the same way. The EMTR has to be derived from the weighted cost of capital.

⁹⁷ See Cnossen (1996, p. 86); Cnossen (2002, p. 542); Hey (2014, p. 342).

⁹⁸ See Mirrlees et al. (2010, p. 425).

⁹⁹ See De Mooij/Devereux (2011, p. 98); De Mooij (2012, p. 502).

¹⁰⁰ See US Department of Treasury (1992, p. 40); Cnossen (1996, p. 86); De Mooij (2012, p. 503).

A1.3.1 Modification of financing terms

The introduction of a CBIT will only impact F^{DE} . The regular term for financing with debt (equation (7)) can be rewritten as

$$F^{DE} = \frac{\gamma^*(1+e)^*(\rho - i + \beta^*i^*\tau)}{1+\rho}.$$

In this formula, $-i$ denotes the interest expenses payable to the external lender and $\beta^*i^*\tau$ is the tax saving due to the interest deductibility. The CBIT does not allow any deductibility of interest expenses for corporate income tax purposes. Therefore, the term $\beta^*i^*\tau$ must be equal to zero. This can be achieved by the following modification:

$$\beta = 0$$

This will simplify the financing term to the following:

$$F_{CBIT}^{DE} = \frac{\gamma^*(1+e)^*(\rho - i)}{1+\rho} \quad (14)$$

This adaptation will also be made for the implementation of interest deduction limitation rules.

A1.3.2 Modification of shareholder taxes

The introduction of a CBIT leads to a non-taxation of capital income at the shareholder level. Therefore, the tax rate for dividend income, interest income and capital gains has to be set to zero, i.e. $m^d = m^i = c = z = 0$.

As a result, γ_{CBIT} and ρ_{CBIT} can be determined:

$$\gamma_{CBIT} = \frac{1 - m^d}{(1 - c)^*(1 - z)} = 1 \quad (15)$$

$$\rho_{CBIT} = \frac{(1 - m^i)^*i}{(1 - z)} = i \quad (16)$$

These modifications will impact all calculations (debt and equity) and have to be used in the basic equation R^{RE} as well as in all financing terms (F^{RE} , F^{NE} , F^{DE}).

A1.4 Allowance for corporate equity (ACE)

The ACE achieves a similar treatment of equity and debt by providing an additional allowance that should reflect the cost of equity finance.¹⁰¹ This fundamental tax reform basically operates in the opposite direction as the aforementioned CBIT.¹⁰² The equity allowance is granted at an imputed rate of return (the so-called notional interest rate) on a company's equity. The determination of the underlying notional interest rate is the decisive element of an ACE introduction.¹⁰³

In the Devereux/Griffith model, full neutrality between debt and equity at the corporate level is achieved if the notional interest rate equals the market interest rate of the model (current nominal rate: 7.1%).¹⁰⁴ In this case, only profits that exceed the ordi-

¹⁰¹ See Devereux/Freeman (1991, p. 4).

¹⁰² See Gammie (1992, p. 266).

¹⁰³ See Mirrlees et al. (2010, p. 425).

¹⁰⁴ See Spengel et al. (2015, p. B-24).

nary rate of return will be taxed.¹⁰⁵ As an additional analysis, possible notional returns below and above the market interest rate will be regarded as Member States might choose a notional return that is not necessarily derived from the market interest rate.

The ACE will impact the calculations for financing the investment with retained earnings and new equity (see Table A3). At the shareholder level, the introduction of an ACE does not require any adaptations.

Table A3: Necessary modifications for the implementation of the ACE

Modification of Financing Terms	F^{RE}	F^{NE}	F^{DE}
	yes	yes	no
Modification of Shareholder Taxes	no		

A1.4.1 Modification of financing terms

The ACE has already been implemented for some countries in the regular yearly update of the database (e.g. Italy, Belgium).¹⁰⁶ The same methodology as in the annual update will be applied for a possible introduction of an ACE in all EU28 Member States. For both F^{RE} and F^{NE} , the term F^{ACE} has to be added:

$$F_{ACE}^{RE} = F^{RE} + F^{ACE} \quad (17)$$

$$F_{ACE}^{NE} = F^{NE} + F^{ACE} \quad (18)$$

The additional term F^{ACE} is given by the following equation:¹⁰⁷

$$F^{ACE} = i^{ord} * (1 + e) * (\tau^{res} - \tau^{ord}) * \frac{\gamma}{1 + \rho}$$

The notional return on equity is defined by i^{ord} , τ^{res} denotes the tax rate on the profit above the notional return and τ^{ord} is the tax rate on the notional return on equity.¹⁰⁸

A1.4.2 Modification of shareholder taxes

As there is no modification of shareholder taxes required, γ and ρ remain unaffected.

A1.5 Allowance for corporate capital (ACC)

The ACC allows the deductibility of a notional return on all the capital, namely debt and equity at the corporate level. Thereby, it disallows the deduction of all actual interest payments in the determination of the corporate tax base. Instead, an allowance for the nominal cost of finance is granted which is equal to a single notional interest deduction for debt and equity.¹⁰⁹ A presumed return on equity can be deducted while

¹⁰⁵ See IFS Capital Taxes Group (1991, p. 19).

¹⁰⁶ See Spengel et al. (2015, pp. B-23 - B-26).

¹⁰⁷ See Spengel et al. (2015, p. B-24).

¹⁰⁸ The term τ^{res} will equal the effective statutory profit tax rate, see Spengel et al. (2015, pp. A-1 - A-4). τ^{ord} will account for taxes that are not affected by the introduction of an ACE for corporate income tax purposes. This concerns profit taxes that rely on another tax base.

¹⁰⁹ See Boadway/Bruce (1984, p. 234).

interest deductibility is limited to the notional amount.¹¹⁰ An ACC can be seen as a combination of ACE and CBIT.¹¹¹

As for the ACE, the determination of the notional return for debt and equity is important. In a first scenario, the uniform notional deduction rate for all capital will be set equal to the market interest rate of the model (7.1%). In addition, the notional deduction rate will be set below and above the market interest rate. This will account for the case that some firms might face a higher or a lower interest rate than the one determined by the government of the Member State.

The limited deduction of interest expenses and the additional notional allowance for equity requires an adaptation of all financing terms and no adaptation at the shareholder level (see Table A4).

Table A4: Necessary modifications for the implementation of the ACC

Modification of Financing Terms	F^{RE}	F^{NE}	F^{DE}
	yes	yes	yes
Modification of Shareholder Taxes	no		

A1.5.1 Modification of financing terms

An ACC requires an adaptation of all three financing terms. For retained earnings and new equity, an additional notional return on equity has to be considered whereas for debt financing, different modifications have to be made.

ACC and retained earnings F_{ACC}^{RE} / new equity F_{ACC}^{NE}

The ACC for retained earnings and new equity requires the implementation of a notional deduction for equity. Therefore, this equals the introduction of an ACE:

$$F_{ACC}^{RE} = F_{ACE}^{RE} = F^{RE} + F^{ACE} \quad (19)$$

$$F_{ACC}^{NE} = F_{ACE}^{NE} = F^{NE} + F^{ACE} \quad (20)$$

ACC and debt F_{ACC}^{DE}

The implementation of a notional deductibility of interest expenses for debt financing requires additional modifications. As already mentioned in section A1.3.1 the deductibility of interest expenses and the resulting tax savings are given by:

$$-i + i * \beta * \tau$$

The introduction of a notional deductibility for corporate income tax purposes will not impact the actual nominal interest payments i payable to the external lender. Thus, i remains unaffected. But the tax saving due to the interest deductibility is not anymore determined by $i * \beta * \tau$ as a notional interest deduction rate i^{ord} is introduced. This notional rate is the same as for F_{ACC}^{RE} and F_{ACC}^{NE} .

¹¹⁰ See Schön (2012, p. 491).

¹¹¹ See Fatica et al. (2012, p. 15).

For the implementation, two tasks can be identified. First, the tax saving of the regular financing term F^{DE} has to be reversed. In a second step, the notional deduction has to be introduced.

The tax saving due to the deductibility of interest payments i included in F^{DE} can be reversed by simply subtracting $i * \beta * \tau$.

After the elimination of the original tax saving, a notional deductibility for interest i^{ord} is introduced for corporate income tax purposes. This results in a tax saving of:

$$\tau^{CIT} * i^{ord}$$

The notional deductibility will lead to additional tax savings for other profit taxes if they rely on the same tax base as the corporate income tax (e.g. additional surcharges). Assuming that all considered profit taxes are based on the corporate income tax base the tax saving can be written as:

$$\tau^{res} * i^{ord}$$

The term τ^{res} corresponds to the effective statutory profit tax rate.¹¹² But in some countries, single profit taxes are not affected by the introduction of a notional interest deductibility as they rely on another tax base (e.g. France, Hungary, Italy, Spain). Those tax bases do not allow any deduction of interest expenses. Therefore, the tax saving $\tau^{res} * i^{ord}$ has to be reduced by those profit taxes as they do not lead to any tax saving:

$$i^{ord} * (\tau^{res} - \tau^{ord})$$

The term τ^{ord} denotes the profit taxes that are not affected by the introduction of a notional interest deduction.

Finally, the following term has to be added which accounts for the elimination of the tax saving included in F^{DE} and the introduction of a notional deductibility i^{ord} :

$$F_{ACC}^{DE} = F^{DE} + \frac{\gamma * (1+e) * [i^{ord} * (\tau^{res} - \tau^{ord}) - \beta * i * \tau]}{1+\rho} \quad (21)$$

The term $i^{ord} * (\tau^{res} - \tau^{ord})$ denotes the tax saving from the notional interest deductibility and $\beta * i * \tau$ eliminates the original tax saving granted by F^{DE} .

Altogether, the implementation of an ACC is very similar across all financing possibilities.

A1.5.2 Modification of shareholder taxes

As there is no modification of shareholder taxes required, γ and ρ remain unaffected.

A1.6 Cost of capital allowance (COCA)

The ACC and COCA are similar concepts as they only differ with regard to the taxation of income at the shareholder level. Under a COCA, the tax deductibility of interest expenses is replaced by a uniform deduction on both equity and debt invested in the

¹¹² See Spengel et al. (2015, pp. A-1 - A-4). This is the same as the τ used in F^{DE} .

business.¹¹³ Aside from depreciation charges, COCA is the only deduction available to a corporation, even if it pays out cash dividends or interest that exceeds the COCA amount.¹¹⁴ Apart from those corporate level changes, the tax treatment of investors is modified as well: Instead of dividends or interest income, investors are subject to tax with a return on their financial investments calculated at the same COCA rate as applied by the corporation, regardless of whether they actually receive that return in cash.¹¹⁵ Payments beyond the anticipated return are not included in taxable income and thus, in principle, are exempt from taxation. As the taxation at the shareholder level is independent of the actual received amount, the concept of capital gains taxation is no longer relevant for the COCA.¹¹⁶ Therefore, capital gains taxation is completely abolished.

As for the ACE and ACC, the determination of the COCA rate will impact the results of the study. Therefore, different COCA rates will be regarded.

The COCA requires the same adaptations of the financing terms as the ACC. Additionally, the taxation at the shareholder level has to be changed (see Table A5).

Table A5: Necessary modifications for the implementation of the COCA

Modification of Financing Terms	F^{RE}	F^{NE}	F^{DE}
	yes	yes	yes
Modification of Shareholder Taxes	yes		

A1.6.1 Modification of financing terms

The COCA requires a notional deduction for debt and equity at the corporate level. This equals the ACC case. Therefore, the financing terms presented for the ACC (section A1.5.1) F_{ACC}^{RE} , F_{ACC}^{NE} and F_{ACC}^{DE} have to be taken into account for the COCA calculations.

A1.6.2 Modification of shareholder taxes

For the COCA, the taxation at the shareholder level is restricted to the same amount that has been deducted at the corporate level. This requirement can be divided in a general non-taxation (exemption) of the actual received dividend and a taxation of the amount deducted at the corporate level. Moreover, the taxation of the alternative investment which serves as the discount rate for the shareholder is also taxed at a notional amount.

Exemption of dividends

The taxation of dividends at the shareholder level is determined by γ (see equation (8)). If actual dividends should not be taxed anymore at the shareholder level, m^d and c have to be set to zero. Additionally, the suspension of capital gains taxation requires that the effective capital gains tax z also amounts to zero. The γ_{COCA} is now:

¹¹³ See Kleinbard (2007, p. 10); Kleinbard (2015, p. 7).

¹¹⁴ See Kleinbard (2015, pp. 50-51).

¹¹⁵ See Kleinbard (2007, p. 10); Kleinbard (2015, p. 52).

¹¹⁶ See Kleinbard (2015, p. 56).

$$\gamma_{COCA} = 1$$

Taxation of the alternative investment (discount rate of the shareholder)

The shareholder's discount rate is determined by ρ (see equation(9)). Instead of taxing the actual interest income earned by the alternative investment, only a notional interest rate i^{ord} is taxed at a rate m^{ord} . For the purpose of this study, m^{ord} corresponds to the previous tax rate on dividend income m^d . The ρ_{COCA} can be written as:

$$\rho_{COCA} = i - m^{ord} * i^{ord}$$

These modifications will impact all calculations (debt and equity) and have to be used in the basic equation R^{RE} as well as in all financing terms (F_{COCA}^{RE} , F_{COCA}^{NE} , F_{COCA}^{DE}).

The resulting basic equation R_{COCA}^{RE} is (similar to equation (4)):

$$R_{COCA}^{RE} = -\gamma_{COCA} * (1 - A + e) + \frac{\gamma_{COCA}}{1 + \rho_{COCA}} * [(1 + \pi) * (p + \delta) * (1 - \tau) + (1 + \pi) * (1 - \delta) * (1 - A)] \quad (22)$$

With this new formula, the dividend is not taxed at the shareholder's level. The taxation of the notional amount deducted at the corporate level will depend on the financing. The three possibilities F_{COCA}^{RE} , F_{COCA}^{NE} and F_{COCA}^{DE} are separately discussed in the following.

COCA and new equity F_{COCA}^{NE}

If the investment is financed with new equity, the shareholder increases his shares in $t=0$ by $1+e$ (see equation (6)). The corporation finances the incremental investment with this new equity. In $t=1$, the corporation can deduct an additional amount of $i^{ord} * (1+e)$ due to this increase of capital stock. This notional deduction for new equity financing is currently included in F_{ACC}^{ACE} (and F_{ACC}^{NE} respectively):

$$F_{ACC}^{ACE} = i^{ord} * (1+e) * (\tau^{res} - \tau^{ord}) * \frac{\gamma_{COCA}}{1 + \rho_{COCA}}$$

The shareholder generally receives a tax-free dividend. But the amount $i^{ord} * (1+e)$ (deducted at the corporate level) has to be taxed with m^{ord} which corresponds to the previous tax rate on dividend income m^d . The financing term F_{COCA}^{NE} has to take this into account:

$$F_{COCA}^{NE} = F_{ACC}^{NE} - \frac{m^{ord} * i^{ord} * (1+e)}{1 + \rho_{COCA}} \quad (23)$$

The taxation of the notional amount at the shareholder level $m^{ord} * i^{ord} * (1+e)$ has to be complemented by a discount factor $1 + \rho$.

COCA and retained earnings F_{COCA}^{RE}

If the investment is financed with retained earnings, the corporation uses internal funds for the additional investment. According to equation (22) (R_{COCA}^{RE}), this additional investment reduces the dividend of the shareholder in $t=0$ by $\gamma_{COCA} * (1 - A + e)$.

Generally, the quota of the shareholder in the corporation remains unchanged. Consequently, the notional deduction and taxation which can be attributed to the shareholder according to his quota is not influenced by the additional investment. As the model

only accounts for changes induced by the additional investment no further modifications have to be taken into account in $t=0$.

The situation is different in $t=1$. Basically, the corporation can deduct i^{ord} at the corporate level. The Devereux/Griffith model always considers the tax consequences of an incremental investment for one period.¹¹⁷ In $t=0$, the corporation pays cash $1+e$ out of its retained earnings in return for a new asset (asset swap). Therefore, $1+e$ of the capital stock can be directly attributed to this investment. As a consequence, the notional deduction amount $i^{ord} * (1+e)$ can be assigned to the investment in $t=1$.

This notional deduction for retained earnings financing at the corporate level is already included in F^{ACE} (and F_{ACC}^{RE} respectively):

$$F^{ACE} = i^{ord} * (1+e) * (\tau^{res} - \tau^{ord}) * \frac{\gamma_{COCA}}{1 + \rho_{COCA}}$$

As a notional deduction amount of $i^{ord} * (1+e)$ is attributed to the investment at the corporate level, the same amount has to be taxed with m^{ord} at the shareholder level. The financing term F_{COCA}^{RE} can be written as:¹¹⁸

$$F_{COCA}^{RE} = F_{ACC}^{RE} - \frac{m^{ord} * i^{ord} * (1+e)}{1 + \rho_{COCA}} \quad (24)$$

The terms for the implementation of the COCA for retained earnings and new equity have a high similarity as the notional deduction at the corporate level and the taxation of this amount at the shareholder level follow the same methodology. The only difference is given by the different baseline financing terms F^{RE} and F^{NE} .

COCA and debt F_{COCA}^{DE}

If the investment is financed by debt, the corporation borrows the required funds in $t=0$ from an external lender at the market interest rate i and conducts the additional investment. The increase in capital is caused by the external lender and not by the shareholder. Therefore, the notional deduction $i^{ord} * (1+e)$ in $t=1$ has also to be attributed to the external lender. As a result, debt financing in the case of the COCA does not lead to an additional taxation of a notional amount at the level of the shareholder.

The shareholder receives in the case of debt financing the “excess return” after the interest expenses i were paid. From the shareholder’s perspective, the limited deductibility of interest expenses (i^{ord}) will only affect the expected tax saving from interest deductibility and as a result, the received dividend. This equals the ACC case and F_{COCA}^{DE} is very similar to F_{ACC}^{DE} :¹¹⁹

$$F_{COCA}^{DE} = F^{DE} + \frac{\gamma_{COCA} * (1+e) * [i^{ord} * (\tau^{res} - \tau^{ord}) - \beta * i * \tau]}{1 + \rho_{COCA}} \quad (25)$$

The only difference is the use of γ_{COCA} instead of γ reflecting the fact that the shareholder does not pay taxes on the distributed dividends he receives from the additional investment.

¹¹⁷ See Devereux/Griffith (1999, p. 18); Schreiber et al. (2002, p. 7).

¹¹⁸ See equation (23) for further explanations.

¹¹⁹ See section A1.5.1 and equation (21) for further explanations.

A2. Additional information for interest deduction limitation rules

A2.1 Detailed qualitative description of the interest deduction limitation rules for each EU28 Member State

In the following, a short summary of the interest deduction limitation rules for each Member State is provided. The information has been derived from the International Bureau for Fiscal Documentation (IBFD), an annual survey in collaboration with PwC and additional information sources if necessary.

As interest deduction limitation rules vary considerably among Member States and have very specific characteristics, an overview table summarises the interest deduction limitation rules with regard to several dimensions at the beginning of each description. Table A6

Table A6: Template for the characteristic of interest deduction limitation rule in the EU Member States

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Threshold / Condition	Carry-forward		

Basically, three different approaches for the applicability of interest deduction limitation rules prevail: the arm's length approach, earnings stripping rules and the fixed ratio approach. This information is displayed in the top left cell. The approach also determines whether other cells contain additional information.

Another cell at the right indicates whether the interest deduction limitation rule is implemented in the Devereux/Griffith model. In the Devereux/Griffith model, the debt is always provided by an external third party. Therefore, only interest deduction limitation rules that are targeted at internal and external debt can be implemented. Moreover, interest deduction limitation rules that follow an arm's length approach depend on rather subjective and vague criteria. Therefore, interest deduction limitation rules will be not implemented if a Member State follows the arm's length approach only.

The first approach is the arm's length approach. In this case, Member States have established rather vague criteria to decide whether interest expenses are deductible or not. Member states following this approach will not show any further entry in the overview table and will not be included in the Devereux/Griffith model.

The second approach that can be found in the EU28 Member States are earnings stripping rules. In these Member States, interest is deductible up to a specified percentage of EBIT(DA). In the lower cell of the left column, it is stated whether Member States employ a certain threshold amount of net interest expenses as tax allowance which restricts the applicability of the earnings stripping rule. The threshold is usually expressed as total amount but also can be given as a predefined debt to equity ratio in single Member States. The upper cell of the middle column displays to which kind of debt the earnings stripping rules apply and is therefore divided into loans from third or related parties. As earnings stripping rules always allow the deductibility of debt up to a predefined percentage of EBIT or EBITDA, the upper cell displays the allowed percentage as well as the underlying earnings figure. The lower cell of the middle column indicates whether the earnings stripping rule provides a carry-forward for non-deductible interest expenses in later periods and whether this carry-forward is restricted in time. More specific information can be found in the description for each Member State. Only interest deduction limitation rules that apply to third parties can be included in the Devereux/Griffith model. Consequently, the right column shows a "YES" if the interest deduction limitation rule includes third party loans.

For Member States following the fixed ratio approach, the upper cell of the middle column displays whether and to which conditions a fixed ratio is determined for external and internal debt. The other cells are used in the same manner as for earnings stripping rules. In the lower cell of the left column, the condition for this approach can have different meanings: either a precondition or an alternative rule for the application of the ratio is stated here. As for earnings stripping rules, only fixed ratio approaches that are also targeted at external debt can be implemented in the Devereux/Griffith model. This is indicated in the right column.

Austria

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Arm`s Length	-	-	NO
Condition	Carry-forward		
-	-	-	

Austria does not apply any specific interest deduction limitation rules.

Still, there are certain vague guidelines in order to avoid inadequacy of shareholders` equity. Loans to shareholders then might be classified as hidden profit distribution and interest might not be deductible anymore.

Belgium

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Fixed Ratio Approach	D/E 5:1	D/E 1:1 or 5:1	YES
Condition	Carry-forward		
-	NO		

In Belgium, two debt to equity ratios apply concerning limitation of interest deduction.

First, there is a 1:1 ratio in power which holds for certain direct shareholders and for individual and non-resident corporate directors or managers granting a loan to the company. Consequently, any excessive debt and interest exceeding the market interest rate will be considered as non-deductible dividend.

The second ratio of 5:1 is related to loans by intragroup creditors and such creditors which are either taxed at a reduced rate or which are not taxed at all receiving interest income. Debt exceeding this limit will be treated as non-deductible business expense.

Bulgaria

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule	75% EBIT	75% EBIT	YES
Threshold	Carry-forward		
D/E 3:1	YES	limited	

Bulgaria applies interest deduction limitation rules on interest expenses arising from loans by third and related parties likewise whereas bank loans shall be excluded unless they are guaranteed by a related party.

As soon as liabilities exceed three times the amount of equity the interest deduction limitation rule becomes effective: the difference between the net interest expense subject to regulation and three quarters of the company`s positive EBIT is not tax-deductible. If the EBIT is negative there is no allowance for interest deduction anyway. Concerning the part of the interest expenses which is not deductible, Bulgaria has established certain carry forward rules. In case the company shows positive EBIT and has not completely used the 75% EBIT regulation the remaining interest expenses can be deducted during any of the upcoming five years.

Croatia

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Fixed Ratio Approach	-	D/E 4:1	NO
Condition	Carry-forward		
-	NO		

The interest deduction limitation rules in Croatia only refer to loans granted or guaranteed by non-resident shareholders owning at least 25% of the shares or voting rights or granted by related parties excluding financial institutions.

If the value of the loan exceeds four times the value of the shareholder`s share in the debtor`s company the interest on part of excessive debt cannot be deducted.

Cyprus

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Arm`s Length	-	-	NO
Condition -	-	-	

Cyprus does not apply any specific interest deduction limitation rules and has rather established vague criteria whether the deductibility of interest expenses is excessive.

Czech Republic

Approach	Limit or Interest Deductibility for... ...Third Party	...Related Party	Inclusion in DG-Model
Fixed Ratio Approach	-	D/E 4:1	NO
Condition -	Carry-forward NO		

In Czech Republic, companies receiving a loan by a related party have to consider a debt to equity ratio of 4:1 (6:1 for banks and insurance companies). In case the related party is non-resident and not from a country from the European Economic Area (EEA) excessive debt will be treated as dividend.

The rule does not include interest expenses of debt used for acquiring fixed assets and loans which is paid no interest for.

Denmark

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule/ Fixed Ratio Approach	80% EBIT	D/E 4:1	YES
Threshold DKK 21.3 million/ DKK 10 million	Carry-forward YES (Third Party only) unlimited		

Denmark has three interest deduction limitation rules in place. The asset test and the EBIT-rule concern debt granted by third parties and net interest expenses above the threshold of DKK 21.3 million. The debt to equity ratio limitation only holds for controlled debt and is applicable for net interest expenses of more than DKK 10 million.

The asset test says that only 4.1% of the tax value of certain qualifying assets at the end of the tax year can be deducted while excessive debt (except capital loss) cannot be deducted and carried forward. The EBIT-rule which allows deduction of net interest expenses up to 80% of EBIT allows the carry-forward for non-deductible interest for an indefinite time horizon.

The debt to equity ratio of 4:1 only applies to controlled (controlling or being controlled by more than 50 % of shares or voting rights) and group related debt. In case the debtor is able to prove the possibility to access the loan from a third party under equal conditions this limitation rule will not apply.

Estonia

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Arm`s Length	-	-	NO
Condition	Carry-forward		
-	-	-	

Estonia does not apply any specific interest deduction limitation rules.

Finland

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule	-	25% EBITDA	NO
Threshold	Carry-forward		
EUR 0.5 million	NO		

Finland applies interest deduction limitation rules only to loans from related parties. Related party hereby means having control over the other party.

Generally, net interest expenses up to the amount of EUR 0.5 million are deductible. As soon as this limit is reached the whole amount of net interest expenses can only be deducted up to 25% of tax-adjusted EBITDA. For the calculation of the threshold of EUR 0.5 million, loans from related and third parties are considered.

In case the company can prove that its equity to assets ratio is at least equal to that of the whole group the aforementioned rules will not apply.

France

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule/ Fixed Ratio Approach	75% Net Finance Charges	D/E 1.5:1 25% EBITDA Interest Expense < Interest Income	YES
Threshold	Carry-forward		
EUR 3 million/ EUR 0.15 million	YES (Related Party only)	20 years with yearly Disallowance of 5%	

France applies – as an interest deduction limitation rule for third and related parties – a 75%-deductibility of net interest expenses. There is a safe harbour limit of EUR 3 million of net interest expenses and the rule does not apply if net interest expenses are below this threshold.

The general deduction of interest expenses from loans provided or guaranteed indirectly by related parties is only granted if the lender is subject to a corporate income tax rate which is equal to at least 25% of current French corporate income tax rate. Additionally, three additional criteria have to be fulfilled that the interest deductibility is granted for related party debt. At first, the debt to equity ratio may not exceed 1.5:1 and the interest expenses may not exceed 25% of adjusted EBITDA. Lastly, the amount of interest paid may not exceed the amount of interest received by related parties. In case that there is interest which is not deductible (where excessive interest up to EUR 150,000 can be deducted irrespective of the above mentioned criteria) a carry-forward exists for the following 20 years while each year 5% of the amount carried forward become non-deductible.

Germany

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule	30% EBITDA	30% EBITDA	YES
Threshold EUR 3 million	Carry-forward YES unlimited		

In Germany, net interest expenses are deductible up to 30% of EBITDA and apply for related and third party debt. Germany grants an forward for non-deductible interest as well as an EBITDA carry forward. The carry-forward for non-deductible interest expenses can be used to in the future indefinitely. If a corporation does not require the full amount of 30% EBITDA in one year, the unused EBITDA can be also carried forward. This increases the limit for interest deductions in later years. Any EBITDA carry-forward has to be used in the following five fiscal years.

The interest deduction limitation rule does not apply if the net interest expenses amount is lower than EUR 3 million. Moreover, the interest deduction limitation rules does not apply to stand-alone corporations. For an affiliated group of corporations, the rule does also not apply if it can be proven that the debtor`s equity ratio is not lower than 2%-points of the group`s equity ratio.

Greece

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule	50% EBITDA	50% EBITDA	YES
Threshold EUR 5 million	Carry-forward YES unlimited		

In Greece, an earning-stripping rule applies. If the net interest expenses of a company exceed a threshold of EUR 5 million (EUR 3 million from 2016 on) they will be deductible only up to an amount of 50% (40% in 2016 and 30% from 2017 onwards) of EBITDA of the financial year. In case there are net interest expenses exceeding the EBITDA-percentage they can be carried forward in the future indefinitely.

The interest deduction limitation is not applicable for Greek financial institutions.

Hungary

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	

Fixed Ratio Approach	D/E 3:1	D/E 3:1	YES
Condition -	Carry-forward NO		

Except for bank loans, interest on debt is not deductible in Hungary if the debt exceeds three times the equity. This applies for related and third-party debt. For the calculation of the relevant debt figure, net debt should be considered which means that the total amount of debt is decreased by certain cash receivables.

Ireland

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
Arm`s Length	...Third Party	...Related Party	NO
-	-	-	
Condition -	Carry-forward -		NO

Ireland does not apply any specific interest deduction limitation rules.

Nevertheless, interest paid to a non-resident, a non-EU resident or a non-treaty parent owning at least 75% of the company will be characterized as dividend.

Italy

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
Earnings Stripping Rule	...Third Party	...Related Party	YES
-	30% EBITDA	30% EBITDA	
Threshold -	Carry-forward YES unlimited		YES

Italy applies an interest deduction limitation rule of 30% EBITDA for net interest expenses payable to related and unrelated parties.

In case that debt cannot be deducted due to this limitation in the current financial year the exceeding amount can be carried forward into future financial years indefinitely. The interest deduction limitation rule in Italy has no threshold in place.

Financial institutions are not targeted by this interest deduction limitation rule.

Latvia

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
Fixed Ratio Approach	...Third Party	...Related Party	YES
-	D/E 4:1	D/E 4:1	
Condition Interest Expense < Liabilities*1.57*Short-term Interest Rate	Carry-forward NO -		YES

In Latvia, two interest deduction limitation rules are in place for third and related parties as well as for resident and non-resident parties excluding certain financial institutions and all Europeans ones.

First, excessive interest deduction in general shall be avoided. Therefore, interest expenses are not deductible if the interest expenses in the profit and loss account exceed the amount of allowable interest deduction. The maximum amount of allowable interest deduction is determined by the amount of liabilities multiplied by 1.57 times a short-term interest rate determined by the tax authorities.

According to the second rule, debt exceeding four times the company's equity less any revaluation reserve and other reserves that have not been established out of distributable profits is not allowed for deduction.

The greater amount of non-deductible interest resulting from the two rules will be taken to increase taxable income. A carry-forward for excessive interest is not available.

Lithuania

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Fixed Ratio Approach	-	D/E 4:1	NO
Condition	Carry-forward		
-	NO		

The interest deduction limitation rule in Lithuania belongs to the fixed ratio approach and only concerns loans provided by a controlling entity. Controlling entity here refers to a member of the group, a party (directly or indirectly) holding more than 50% of shares or rights to receive dividends and a party holding at least 10% its own while holding more than 50% of shares or rights together with related parties.

Under this rule only a debt amount of up to four times the company's equity is deductible for tax purposes while excessive debt cannot be deducted or carried forward. Generally, shareholder loans' interest rates must not be excessive meaning not exceeding the effective average bank interest rate of the creditor's location. In case the debtor is able to prove the possibility to access the loan from a third party under equal conditions this limitation rule will not apply.

Furthermore, these interest deduction limitation rules do not apply for financial institutions conducting financial lease services.

Luxembourg

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Arm`s Length	-	-	NO
Condition	Carry-forward		
-	-	-	

Luxembourg does not apply any specific interest deduction limitation rules.

For loans from shareholders, though, a debt to equity ratio of 85:15 is applied in practice and the excessive interest will be treated as dividend.

Malta

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Arm`s Length	-	-	NO
Condition	Carry-forward		
-	-	-	

Malta does not apply any specific interest deduction limitation rules and follows rather the arm's length principle for related party debt.

The Netherlands

Approach	Limit or Interest Deductibility for...	Inclusion in
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Arm`s Length	...Third Party	...Related Party	DG-Model
-	-	-	
Condition	Carry-forward		NO
-	-	-	

The Netherlands do not apply any specific interest deduction limitation rules.

Nevertheless, there are certain rules in order to avoid deduction of excessive debt. These rules for example include the cases of acquiring a participation taking up debt or exchanging equity for intragroup debt without a sound business reason.

Poland

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Fixed Ratio Approach	Tax Assets* Reference Rate + 1.5%	D/E 1:1	
Condition	Carry-forward		YES
-	YES	limited	

Polish tax regime differentiates between interest deduction limitation rules for related parties only and an alternative method applying for third and related parties.

The rule applicable for related debt allows interest deductibility for a debt to equity ratio of 1:1. The ratio of 1:1 is calculated for each related party separately. A related party is defined as a (direct or indirect) shareholder or a group of shareholders or holding at least 25% of capital share. Excessive debt is not deductible.

Tax payers can also choose to follow another interest deduction limitation rule which is applicable to all debt (third and related party). Under this optional rule, the deduction of interest is allowed up to the tax value of the company`s assets (excluding intangibles) multiplied by the National Bank of Poland`s reference rate on the final day of the preceding tax year plus an add-on of 1.25% points. But this alternative is only applicable if interest expenses do not exceed 50% of the EBIT. Furthermore, excessive interest can be carried forward and deducted in the following 5 tax years.

Portugal

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule	50% EBITDA	50% EBITDA	
Threshold	Carry-forward		YES
EUR 1 million	YES	limited	

In Portugal, an earnings stripping rule applies for third party and related debt.

If the net interest expenses of a company exceed a threshold of EUR 1 million they will be deductible only up to an amount of 50% (40% in 2016 and 30% from 2017 onwards) of for tax purposes adjusted EBITDA of the financial year. In case there are excessive net interest expenses they can be carried forward for the following five tax years.

Romania

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Fixed Ratio Approach	D/E 3:1	D/E 3:1	YES

Condition	Carry-forward	
	Interest Rate < Reference Rate	YES unlimited

Interest deduction limitation rules are effective in Romania for third as well as related parties as long as the creditor is no financial institution.

Generally, interest on a loan in local currency must not exceed the reference rate of the National Bank of Romania whereas interest on a loan in foreign currency is limited to 6%. For interest expenses above these limits there is a disallowance of deduction.

Additionally, a debt to equity ratio of 3:1 is applied. If interest expenses cannot be deducted in one period, an indefinite carry-forward for non-deductible interest expenses is granted.

Slovakia

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule	-	25% EBITDA	NO
Threshold	Carry-forward		
-	NO		

The interest deduction limitation rules in Slovakia only concern loans between (resident or non-resident) related parties unless financial institutions.

According to the earning-stripping rule in force, interest expenses are only deductible only up to 25% of EBITDA.

Slovenia

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Fixed Ratio Approach	-	D/E 4:1	NO
Condition	Carry-forward		
-	NO		

In Slovenia, interest deduction limitation rules only apply to related parties.

If a loan is granted by a direct or indirect shareholder owning at least 25% of the share or voting rights or by a sister company a debt to equity ratio of 4:1 applies where the net income of the fiscal year is excluded from equity.

In case the debtor is able to prove the possibility to access the loan from a third party under equal conditions this limitation rule will not apply.

Spain

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Earnings Stripping Rule	30% EBITDA	30% EBITDA	YES
Threshold	Carry-forward		
EUR 1 million	YES	unlimited	

In Spain earnings stripping rules apply for third party and related party loans whereas loans taken up for an acquisition of share or equity contributions within a group are not deductible unless an economic reason can be demonstrated.

If net interest expenses exceed a general threshold of EUR 1 million, they are only deductible up to 30% of tax-adjusted EBITDA. In case that debt cannot be deducted due to this limitation in the current financial year the exceeding amount can be carried forward into future financial years indefinitely. Additionally, in case that net interest falls below the 30% EBITDA limit in the current financial year an EBITDA carry-forward exists. This increases the amount of deductible interest expenses in later years. In contrast to the carry-forward for non-deductible interest expenses, the EBITDA carry-forward has to be used in the following five financial years.

Sweden

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
Arm`s Length	...Third Party	...Related Party	
	-	-	NO
Condition	Carry-forward		
-	-	-	

Sweden applies interest deduction limitation rules only to loans from affiliated companies.

Interest expenses on loans to affiliates are not deductible unless it can be demonstrated that the recipient`s interest income is taxed at a minimum rate of 10% or that the debt structuring had a sound business reason.

United Kingdom

Approach	Limit or Interest Deductibility for...		Inclusion in DG-Model
	...Third Party	...Related Party	
Arm`s Length	-	-	NO
Condition	Carry-forward		
-	-	-	

United Kingdom does not apply any specific interest deduction limitation rules. Nevertheless, the arm`s length principle applies to loans from related parties.

The detailed calculation results are available online at the following link:

http://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/gen_info/economic_analysis/tax_papers/taxation_paper_65.pdf

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