DISCUSSION PAPER

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The EU's New Era of
"Fair Company Taxation":
The Impact of DEBRA and
Pillar Two on the EU Member
States' Effective Tax Rates

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The EU's New Era of "Fair Company Taxation": The Impact of DEBRA and Pillar Two on the EU Member States' Effective Tax Rates[*]

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This version: 7 March 2024

Abstract: The European Commission recently implemented the minimum tax directive (Pillar Two) to ensure that corporate profits are at least taxed at 15%. At the same time, it proposed a legislative initiative aimed at reducing the tax-induced distortions between debt and equity financing (debt-equity bias reduction allowance directive, DEBRA). In our simulation analysis, we evaluate how the two measures and their interplay influence the EU Member States' effective tax levels and thus their location attractiveness. We find that DEBRA, on average, leads to a substantial reduction of the effective tax levels for equity-financed companies. In countries with a combined profit tax rate below 15%, Pillar Two increases the effective average tax burden. The simulation of the interaction of both regulations shows that the effect of Pillar Two dominates that of DEBRA. In addition, the results hold under a common tax base in accordance with the recently proposed "Business in Europe: Framework for Income Taxation" directive (BEFIT).

JEL Classification: F23, H25, K34

Keywords: Business in Europe: Framework for Income Taxation, BEFIT, Effective tax rates, Debt-Equity Bias Reduction Allowance, DEBRA, Debt-equity bias, Devereux/Griffith Methodology, Global minimum tax, Pillar Two

1. Introduction

The European Commission aims at moving towards a fair, efficient and growth-friendly taxation by eradicating tax distortions caused by non-harmonised tax systems in the Member States of the European Union (EU). Although the European Commission has no direct mandate in collecting taxes or setting tax rates, it can address various issues by introducing initiatives resulting in directives, which the EU Member States must implement in their national tax law. Three such initiatives are the debt-equity bias reduction allowance directive (European Commission, 2022; in the following referred to as "DEBRA"), the minimum tax directive (Council of the European Union, 2022; in the following referred to as "Pillar Two") and the "Business in Europe: Framework for Income Taxation" directive (European Commission, 2023; in the following referred to as "BEFIT").

One essential cause for tax distortions is the disparate tax handling of debt and equity financing for companies, which prevents the attainment of financing neutrality. To abolish the debt-equity distortion, the European Commission proposed DEBRA in May 2022. The proposed directive comprises two measures. First, it provides for an allowance on equity (ACE) to mirror the tax deductibility of interest payments. Second, it tightens the deductibility of actual interest expenses. Consequently, DEBRA leads to a promotion of equity financing for companies.

While DEBRA is still a proposal, Pillar Two was already enacted in December 2022. The directive requires EU Member States to adjust their national tax law in a way that they impose a 15% minimum effective tax rate (ETR) on large companies. Pillar Two especially affects multinational enterprises (MNEs). Still, it is open for discussion, if this milestone[1] is an effective measure in tackling the race to the bottom in ETRs, and whether it is in line with EU law.[2]

Besides DEBRA and Pillar Two, the EU proposed BEFIT in September 2023, which, among other aspects, is a new attempt to introduce EU-wide harmonised rules for the calculation of the corporate tax base, succeeding the formerly failed Common Corporate Tax Base (CCTB) and Common Consolidated Corporate Tax Base (CCCTB) proposals (European Commission, 2011, 2016a, 2016b). All proposals aim at a reduction of disparities in tax burdens, complexity in cross-border operations, and opportunities for tax planning within the EU.

In this article, we describe the functioning of DEBRA and Pillar Two as well as the interaction of both directives. Moreover, we conduct a simulation study to determine the extent to which

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[1] See https://web-archive.oecd.org/2021-10-20/612898-international-community-strikes-a-ground-breaking-tax-deal-for-the-digital-age.htm (04.08.2023).
[2] Pending case before the General Court of the EU, General Court of the EU (2023).

DEBRA and Pillar Two distort firms' investment decisions in the EU and, therefore, influence the EU Member States' tax location attractiveness. In addition, we assess the impact of the two measures under harmonised corporate tax base rules as proposed by BEFIT. Thus, we can eliminate the impact of varying tax bases of the EU Member States. Our article builds on the Devereux/Griffith (Devereux & Griffith, 1999, 2003) methodology to measure the impact of policy reforms on effective tax levels.

DEBRA, Pillar Two, and harmonised corporate tax base rules are all highly relevant policy approaches, which is why they are already addressed in the literature. The literature on DEBRA published so far puts a focus on technical and conceptual aspects of the proposal (Gaut & McDonnell, 2022; Heckemeyer & Nippel, 2023; Hohlwegler et al., 2023; Ismer, 2022; Kemmeren, 2023; Schnitger & Schäfer, 2022). Bettens (2022) assesses not only DEBRA but also its legislative interactions with Pillar Two. Closely connected, there is a wide range of empirical studies that confirm the effectiveness of ACE regimes (Bernasconi et al., 2005; Branzoli & Caiumi, 2020; Hebous & Ruf, 2017; Panier et al., 2015; Panteghini et al., 2012; Princen, 2012; Schepens, 2016; Van Campenhout & Van Caneghem, 2013) and interest deduction limitation rules (Buettner et al., 2012, 2016; De Mooij & Hebous, 2018; Overesch & Wamser, 2010), which are combined under DEBRA, in combating the tax debt-equity bias. Beyond this, a wide range of literature critically evaluates the conceptual opportunities and challenges of Pillar Two (Bammens & Bettens, 2023; Devereux, 2023; Dourado, 2022; Eberhartinger & Winkler, 2023). Johannesen (2022) assesses the net welfare effect of Pillar Two using a theoretical model. Moreover, fiscal revenue estimates for Pillar Two have been published by several authors (Devereux et al., 2020; Janeba & Schjelderup, 2023; Tørsløv et al., 2023). Meanwhile, the literature on BEFIT is still scarce as the European Commission has only recently released the directive proposal. Avi-Yonah (2023) and Prinz (2023) critically evaluate the proposed regulations. However, there are several studies assessing the former CCCTB and CCTB proposals. Nicolay & Spengel (2017) provide a critical policy evaluation of the 2016 CCCTB proposal, while Stutzenberger et al. (2019) use a model-based approach to assess the impact of each element of the harmonised tax base as described in the 2016 CCTB proposal.

A broad range of studies documents the effect of taxes on location decisions for economic activities of firms (Barrios et al., 2012; De Mooij & Ederveen, 2006; Devereux & Maffini, 2007; Hebous et al., 2011). A meta-study by Feld & Heckemeyer (2011) synthesizes the empirical evidence documenting that foreign direct investment is indeed sensitive to international tax rate

differentials.[3] Furthermore, our approach to measure countries' tax-related location attractiveness using the Devereux/Griffith methodology is well established in scientific literature (Bräutigam et al., 2017; Devereux & Griffith, 2003; Müller et al., 2022; Pfeiffer & Spengel, 2017; Spengel et al., 2018).

The research most closely associated with our study are the publications by Hanappi & González Cabral (2022) and Bares et al. (2021). Hanappi & González Cabral (2022) use forward-looking ETR metrics to demonstrate the impact of Pillar Two on MNE group-specific investment decisions in the context of profit shifting. In contrast, we apply a different modelling approach and concentrate on the per country investment implications of Pillar Two. The simulation study by Bares et al. (2021) focuses on the dispersion of effective average tax rates across countries by including a proxy for profit shifting of an MNE resident in the OECD countries. Instead of analysing the tax planning behaviour of firms in a worldwide cross-border setting, we focus on the effect of the interaction between Pillar Two and DEBRA on the domestic effective tax levels in the EU Member States.

Overall, our article contributes to the existing research in two ways. First, we provide a comprehensive policy evaluation of the (proposed) directives for the EU Member States in terms of location decisions for investments by applying a simulation study. A simulation study is particularly valuable, as empirical studies cannot yet be performed due to the lack of post-implementation periods. Second, to the best of our knowledge, we are the first to examine the interaction effects of DEBRA and Pillar Two in terms of effective tax levels including several sensitivity tests to incorporate recent economic developments as well as BEFIT's harmonised rules for depreciation and inventory valuation (in the following referred to as the "common tax base").

The article is organised as follows: In Chapter 2, we provide a theoretical overview on DEBRA and Pillar Two, focusing on the relevant parameters for the following simulation study. In Chapter 3, we introduce the Devereux/Griffith methodology used for the simulation. Chapter 4 presents our main results on the effect of DEBRA, Pillar Two, and their interaction on effective tax levels. Chapter 5 concludes.

2. Overview of the Directives

2.1. DEBRA

In May 2022, the European Commission presented the proposal for DEBRA, a legislative initiative aimed at reducing the tax-induced distortions between debt and equity financing through

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[3] For further empirical evidence, see Becker et al. (2012).

two measures that apply independently of each other: an ACE and a limitation to interest deduction. According to the proposal, DEBRA will apply to all taxpayers subject to corporate tax in an EU Member State, including non-EU tax residents with a permanent establishment in the EU. However, financial undertakings are excluded from the scope of the directive. Under the proposal, Member States are expected to adopt DEBRA into national law by 31 December 2023 and to apply its provisions from 1 January 2024.[4] In addition, a grandfathering rule has been included, allowing Member States that already apply a domestic ACE under national law to defer the application of DEBRA's provisions.

The ACE aims to equalise the tax treatment of debt and equity by allowing companies to deduct a notional interest rate for equity, providing a tax benefit comparable to that of interest payments on debt. The proposed directive stipulates that the ACE is equal to the allowance base multiplied by the notional interest rate (Article 4 DEBRA). The allowance base consists of the annual increase in equity, which is defined as the difference between the level of net equity at the end of the current and the previous tax period. In this context, net equity means the company's equity less participations in the capital of associated enterprises[5] and own shares. The notional interest rate consists of two components, a risk-free interest rate and a risk premium. The risk-free interest rate is currency-specific and reflects a maturity of 10 years as of 31 December of the year preceding the relevant tax period. The proposed directive refers to the corresponding interest rate published by the European Insurance and Occupational Pensions Authority (EIOPA). A risk premium of 1% is added to the risk-free interest rate to calculate the notional interest rate.

According to the proposed directive, the ACE is deductible from the tax base in the tax period in which the net increase in equity occurs and in the nine consecutive tax periods. This approximates the tax treatment and the maturity of debt. To prevent abuse, the deduction is limited to 30% of the company's annual earnings before interest, tax, depreciation and amortisation (EBITDA). If, in a given year, the ACE exceeds the 30% EBITDA threshold, the excess may be carried forward for a maximum of five years. If the ACE exceeds the company's net taxable income in a given year, DEBRA provides for an unlimited carryforward of the excess allowance.

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[4] The EU has not yet adopted the directive or published a new timetable for implementing and enforcing the directive.

[5] An associated enterprise as defined in Article 3 (1) DEBRA is deemed to exist, in particular, if the taxpayer holds a participation of more than 25% in the voting rights, capital or profit of the enterprise.

Prior to the DEBRA proposal, several EU Member States already introduced an ACE to mitigate the debt-equity bias. As of 2022, Belgium, Cyprus, Italy, Malta, Poland, and Portugal offer an ACE. These regimes contain the same features as DEBRA, namely a definition of the allowance base, a notional interest rate, deduction limits for the notional interest and carryforwards of excess notional interest. However, the specific design of these features, e.g., the amount of the notional interest rate, deviates in most countries from DEBRA.[6]

Besides addressing the debt-equity bias from the equity side, DEBRA also considers the debt side by limiting the interest deductibility to 85% of the exceeding borrowing costs, which are defined as the difference between tax-deductible interest paid and taxable interest received (Article 6 DEBRA). The restriction of the deductibility of interest payments for tax purposes discourages excessive debt financing and reduces the directive's impact on Member States' tax revenues.

In addition to DEBRA, the already implemented Anti-Tax Avoidance Directive (Council of the European Union, 2016; in the following referred to as "ATAD") limits the deduction of excess borrowing costs to 30% of the company's EBITDA through the interest deduction limitation rule.[7] This rule differs from DEBRA in two regards. First, the exceeding borrowing costs that are not deductible under ATAD can be carried back or forward, whereas those that are not deductible under DEBRA are lost for tax purposes (Article 4 ATAD, Article 6 DEBRA). Second, in contrast to DEBRA, the objective of the interest deduction limitation rule under ATAD is to prevent profit shifting through excessive debt financing of multinational groups. The Member States' implementations are in line with ATAD but differ across countries (KPMG EU Tax Center, 2022), as there is some leeway for the transposition into national law. In cases where both the ATAD and DEBRA interest deduction limitation rules apply, DEBRA sets out the priority of the rules. The rule that results in the lower deductible amount of exceeding borrowing costs prevails (Article 6 DEBRA).

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[6] See Appendix A.1. Table 4 for an overview of national ACE legislations.
[7] For exceptions from this rule, see Article 4 (1), (3) and (5) of Council of the European Union (2016).

2.2. Pillar Two

The mandate for the EU Member States to implement a global minimum tax became effective by the enactment of the directive in late 2022. This directive has to be transposed into the Member States' national laws by the end of 2023. Pillar Two aims at fighting aggressive tax planning by levying an effective minimum tax rate of 15% on profits generated by large companies. The minimum tax directive applies to affiliates of multinational and domestic groups having annual consolidated revenues above 750 million EUR (Article 2 Pillar Two).

If a company is effectively taxed at a rate below 15%, under Pillar Two it has to pay a so-called top-up tax amounting to the difference between 15% and its ETR. To calculate the top-up tax, a company's ETR is determined under a jurisdictional blending approach, i.e., all constituent entities in a jurisdiction are aggregated. The ETR is defined as the ratio between the adjusted covered taxes of all entities in one jurisdiction and their net qualifying income in this jurisdiction. First, the net qualifying income is derived from the net income used for the preparation of the consolidated financial statements (Article 15 Pillar Two), which must be prepared on the basis of an acceptable accounting standard.[8] The financial accounting net income has to be adjusted for various items (Article 16 Pillar Two). Second, the covered taxes are derived by adjusting the current tax expenses according to external accounting standards for temporary differences, e.g., for deferred taxes.

To collect the top-up tax, Pillar Two builds on three different main mechanisms. First, under the income inclusion rule (IIR), the residence country of the parent company imposes a top-up tax on all low-taxed subsidiaries within the group (Article 5 Pillar Two). The top-up tax increases the ETR up to the 15% threshold. Second, the undertaxed profits rule (UTPR) is applied as a backstop if the IIR is not implemented in the ultimate or intermediate parent company's residence country (Article 12 Pillar Two). Member States can implement one of the two following UTPR mechanisms: Either certain intra-group payments are no longer tax deductible or a top-up tax is imposed on the EU subsidiaries of the group, which leads to an increase in the effective tax burden. Under both mechanisms, the tax liability is equal to the top-up tax that would have been due if an IIR was in place. Besides the IIR and UTPR, the third mechanism to collect the top-up tax is the qualified domestic minimum top-up tax (QDMTT, Article 11 Pillar Two). Low-tax countries can electively introduce the QDMTT and thereby directly impose a top-up tax on companies that are resident in their territory. Thus, the low-tax countries can increase the tax burden for entities belonging to large groups to the 15% threshold, while

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[8] Acceptable accounting standards include e.g. IFRS and US GAAP.

maintaining their low-tax benefits for any other resident company. The QDMTT takes precedence over the IIR and the UTPR and is credited against the international minimum tax.

To reach the final top-up tax, the substance-based income exclusion must be considered (Article 28 Pillar Two). Under this provision, the so-called routine profit from substantial economic activity (i.e., tangible assets and costs associated with employees) is exempt from the top-up tax. In the year of introduction, the substance-based income exclusion amounts to 8% of the carrying value of the eligible tangible assets and 10% of the costs associated with employees. Both percentage levels are reduced continuously to 5% within 10 years (Articles 27 and 46 Pillar Two).

2.3. Potential Interactions

In addition to their stand-alone implementation, our analysis examines the interaction effect of DEBRA and Pillar Two. The measures affect the effective tax burden through two channels, namely the tax base for DEBRA and the tax rate for Pillar Two. DEBRA mitigates the debt-equity bias on the one hand by broadening the tax base through the interest deduction limitation and on the other hand by tightening it through the introduction of the ACE. The overall impact of DEBRA on a company's tax base therefore depends on the company's financing structure and existing policies in the EU Member States. If the effect of the ACE outweighs that of the interest deduction limitation, the tax base will shrink and with it the effective tax burden of companies under DEBRA. The reverse is true if the effects of the interest deduction limitation outweigh the effects of the ACE. For countries that already have an ACE in their national legislation, the impact of introducing DEBRA's ACE on companies' effective tax burden depends on the specific design of the national ACE and, thus, can be negative as well as positive.

Pillar Two is concerned with topping up the tax rate of large companies with the intention to limit the race to the bottom in corporate tax rates. The overall effect of Pillar Two depends on the ETR and the size of the company. We expect Pillar Two to apply in a limited number of countries but where it does apply it will increase the tax rate to 15% and thereby the effective tax burden.

Comparing our expectations, the two policies have opposite effects on the effective tax burden of affected companies. In contrast to DEBRA, the scope of Pillar Two is limited to companies with annual consolidated revenues above 750 million EUR. Thus, the interaction of both provisions is only relevant for large companies, i.e., companies within the scope of Pillar Two. Correspondingly, companies below the Pillar Two threshold are only affected by DEBRA. In the case of an interaction between DEBRA and Pillar Two, the first step is to calculate the tax

base considering the limitation on interest deductibility, the ACE and the substance-based income exclusion. In the second step, the ETR is determined to calculate the top-up tax. Thus, DEBRA affects the company's tax base and consequently its ETR. If DEBRA reduces the tax base, the resulting top-up tax increases compared to the scenario without DEBRA. As a result, Pillar Two could immediately eliminate the reduction in the effective tax burden induced by DEBRA, except for profits for which the substance-based income exclusion applies. However, if DEBRA increases the tax base, the resulting top-up tax decreases compared to the scenario without DEBRA, but the effective tax burden will still be around 15%.[9]

In summary, we have more precise expectations for the impact on the effective tax burden of Pillar Two than of DEBRA. Given an interaction of both regulations, we expect Pillar Two to largely offset the impact of DEBRA. However, we expect Pillar Two, and hence an interaction of the two policies, to occur only for a few companies in a limited number of countries, which is why DEBRA is likely to dominate Pillar Two in terms of the number of companies affected in the EU.

3. Methodology

To measure the impact of the introduction of Pillar Two and DEBRA on the location attractiveness for capital investments, we rely on the Mannheim Tax Index.[10] The Mannheim Tax Index is based on the well-established forward-looking effective tax measures developed by Devereux & Griffith (1999, 2003).[11] This methodology allows for an in-depth policy evaluation as it incorporates several country-specific factors like the type of the tax system, tax base regulations and tax rates of profit and non-profit taxes at the corporate level (Spengel et al., 2020). The impact of these tax parameters is measured in terms of after-tax returns of corporate investments. Thus, we are able to measure the influence of taxes on the location attractiveness of countries for investments as well as the extent of tax distortions (Lammersen, 2005), both caused by the introduction of DEBRA and Pillar Two.

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[9] We acknowledge that there may be cases where changes in the effective tax rate caused by a limitation of interest deductibility or an ACE may lead to the application or non-application of Pillar Two. We exclude such cases from our analysis as they are likely to be rare borderline cases.

[10] For more details see Spengel et al. (2024).

[11] Regarding our applied methodology, it must be taken into account that the interpretation of the results has its limitation due to the usage of a stylized simulation company. However, the scientifically broadly accepted Devereux/Griffith methodology still provides an opportunity to measure the effects of these new tax regulations.

Figure 1: Schematic Illustration of the Devereux/Griffith Methodology
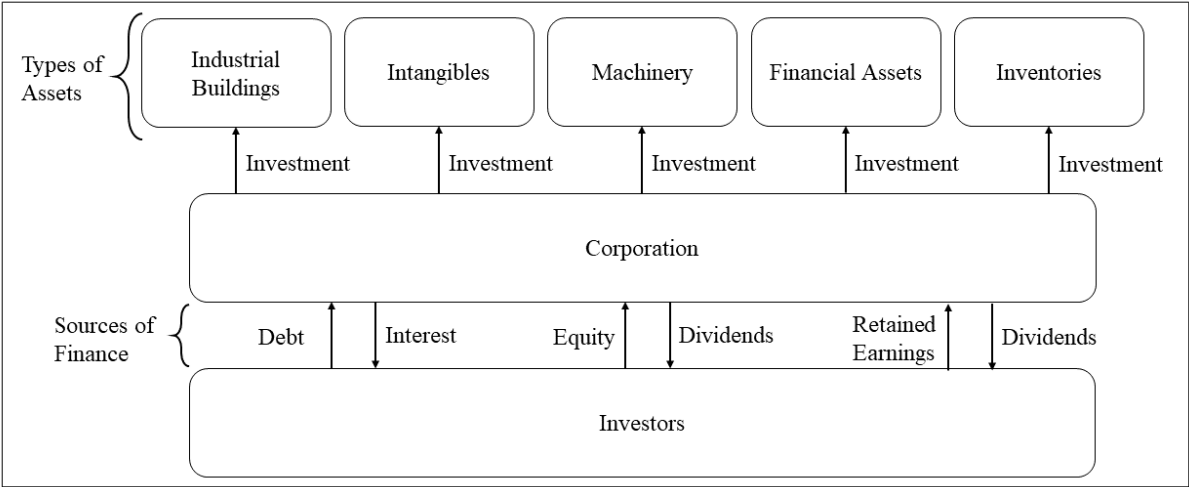
Notes: The figure displays the considered investment setting of a domestic corporation that is financed by an investor. The latter undertakes an investment in the corporation by debt, equity, retained earnings or a mix of these sources. The domestic corporation decides to pass the additional capital to invest in five different assets: intangibles, buildings, machinery, financial assets, and inventory (20% each). The taxation of the investor is not considered in our setting as DEBRA and Pillar Two intend to impact solely the corporation level.
Source: Authors' illustration.

In general, the methodology is based on the neoclassical investment theory and assumes a discrete, hypothetical investment decision of a profit-maximizing manufacturing company. The company invests in five different assets: industrial buildings, intangibles, machinery, financial assets and inventories. Moreover, it differentiates between three ways of financing: debt, new equity and retained earnings (see Figure 1). The investment is one-periodic, and we only observe a domestic case meaning that no cross-border transactions are considered. We assume that the company generates sufficient income from other investment projects to fully deduct the ACE in the first period.[12] Therefore, no carryforwards arise. In addition, the ATAD's interest deduction limitation rule has no effect, as the excess borrowing costs do not exceed 30% of the company's EBITDA.

Two types of investment are distinguished on the basis of their outcome: marginal investments, which earn a return equal to their cost of capital (CoC), and profitable investments (i.e., an assumed positive pre-tax return), where the location attractiveness of the investment is expressed by the effective average tax rate (EATR). The CoC demonstrates how taxation affects both the level of investment and a country's attractiveness for investment expansion, relative to other potential investment destinations. The CoC is interpreted relative to the real market interest rate: if the CoC is lower (higher) than the real market interest rate, the corporate investment

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[12] The assumption of no tax exhaustion is particularly applicable in the context of well-established, large companies that derive income from diverse investment projects, see Devereux et al. (2002).

is more (less) attractive than the alternative investment as a consequence of taxation (Fischer et al., 2023). Hence, the CoC shows the impact of taxation on the scale of investments. However, when companies have to make investment location decisions that involve determining the geographical allocation of economic returns, the EATR serves as the appropriate metric. A lower (higher) EATR signals a higher (lower) attractiveness of the location for the investment, and hence, indicates where to (not) allocate economic returns (Devereux & Griffith, 1998, 2003). For a comprehensive analysis, we use both indicators, with tax base regulations and non-income taxes being the main drivers of the CoC and corporate income tax rates being the main drivers of the EATR (Spengel et al., 2018).

To measure the impact of the new tax regulations, we compare the CoC and the EATRs before and after a fictitious implementation of DEBRA and Pillar Two in the tax year 2022. The tax parameters are taken from the Mannheim Tax Index and modified to simulate the effect of DEBRA and Pillar Two. In Table 1, the economic parameters for the Devereux/Griffith methodology are displayed. For most parameters we rely on the well-established assumptions of previous work (Spengel et al., 2020). However, we have adjusted the nominal interest rate to the current economic situation as it has a high impact on measuring the effects of DEBRA. Thus, we use the 10-year risk-free interest rate published by EIOPA as of 31 December 2022 as our nominal interest rate. Our sample includes all EU Member States, except Estonia and Latvia, as they have a fundamentally different corporate income tax system to which DEBRA cannot be applied.[13] In Malta, although the statutory corporate tax rate amounts to 35%, the system of tax refunds effectively reduces the tax rate to 5% upon profit distribution (Cassar Torregiani, 2023).In our analysis, we consider two different tax base scenarios. In the "baseline scenario" we take into account the national regulations on the tax base. In addition, we implement a common tax base across all countries, which we refer to as the "common tax base scenario" in the following. The latter offers two valuable pieces of insight. First, a harmonised corporate tax base was envisioned several times by the EU (Nicolay & Spengel, 2017), most recently by BEFIT. The implementation of the BEFIT tax base regulations in our simulation study allows us to examine the potential impact of a harmonised tax base on effective tax levels. Second, by including an EU-wide harmonised tax base calculation, we eliminate potential distortions from differing tax bases and show the pure tax rate effects of DEBRA and Pillar Two. Thus, the

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[13] Moreover, Estonia officially claims that the country will introduce Pillar Two earliest in 2030. See https://news.err.ee/1608556165/minister-estonia-can-postpone-minimum-corporate-tax-until-2030 (04.07.2023).

harmonised tax base allows us to better compare the effects of the two directives across the EU Member States.

Table 1: Economic Assumptions of the Devereux/Griffith Methodology

Assumptions on types of taxes and tax base elements			
Company level	Corporate income tax including surcharges, local business taxes, and non-profit taxes		
Tax base	Depreciation, inventory valuation, deductibility of interest expenses, tax allowances		
Assumptions on assets and financing			
Types of assets	Intangibles, buildings, machinery, financial assets, inventory (20% each)		
Types of financing	Debt (35%), retained earnings (55%), new equity (10%)		
Assumptions on depreciation, inflation, interest rate and pre-tax rate of return			
Economic depreciation (degressive)	Intangibles 15.35%	Buildings 3.10%	Machinery 17.50%
Inflation rate	2%		
Real interest	1.071%		
Nominal interest	3.092%		
Pre-tax return rate	20%		

Notes: The table displays the economic assumptions of the Devereux/Griffith methodology. To incorporate Pillar Two, DEBRA, and BEFIT's common tax base or to display sensitivity analyses, we adjust certain parameters as outlined in the text.
Source: Devereux et al. (2008); Spengel (2003)

For the tax base regulations in our model, we follow BEFIT applying a straight-line depreciation over 28 years for buildings, and over 5 years for intangibles (Article 22 BEFIT). For other tangible assets, BEFIT refers to the useful life in accordance with either IFRS or national GAAP (Article 7 BEFIT). Hence, we follow previous work and assume a useful life of 7 years as depreciation period (Spengel et al., 2020). For inventories, we choose the weighted average cost method (Article 29 BEFIT).

4. Results

4.1. DEBRA

4.1.1. Baseline Scenario

In modelling DEBRA, we assume a notional interest rate of 4.092%, comprising the nominal interest rate of 3.092% and a risk premium of 1%. Moreover, we limit the interest deductibility to 85%. We assume that the investment is financed using the financing mix described in Table 1. As DEBRA has an impact on the tax base rather than the tax rate, we first investigate the effect on the CoC. Figure 2 shows the comparison of the CoC under current national tax law (in the following "status quo") and under DEBRA. Under the status quo of each country's national legislation, the CoC ranges from -1.13% in Malta to 2.01% in Spain. DEBRA reduces the spread of the CoC, resulting in a range from 0.32% in Malta to 1.23% in Hungary.

For the majority of EU Member States, the CoC is lower after the implementation of DEBRA than under the status quo. The reduction caused by DEBRA ranges from 0.16 pp. in Poland to 1.43 pp. in Spain.[14] This net negative effect consists of two contradictory effects. First, DEBRA's interest deduction limitation rule increases the CoC by limiting the ability to deduct interest payments from the tax base. Second, DEBRA's ACE reduces the CoC due to the additional deduction of notional interest from the tax base. The latter effect dominates the former, resulting in a net negative effect of DEBRA on the CoC for most countries.[15] A net negative effect on the CoC suggests that DEBRA increases the optimal level of corporate investment.

In contrast, we find a net positive effect on the CoC for those countries that already have an ACE in their national legislation which is more generous than the ACE under DEBRA.[16] Cyprus, Malta, and Portugal grant notional interest rates of 5.629%, 8.04% and 7%, respectively, under their tax laws from 2022. The ACE under DEBRA, with its notional interest rate of 4.092%, provides for a lower deduction from the tax base, resulting in a net positive impact of DEBRA on the CoC in the aforementioned countries. This implies that DEBRA reduces the optimal level of corporate investment. For countries whose national tax law provides for a less generous ACE than DEBRA, we find a net negative effect of the proposed directive on the CoC.

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[14] In countries with high tax rates, such as Spain or Germany, the additional deduction from the ACE is worth more than in countries with lower tax rates, resulting in larger relative net negative effects in the former countries.

[15] The composition of the net negative effect of DEBRA on the CoC is shown in Appendix A.2. Table 6. The columns "ACE Only" and "Interest Deduction Limitation Only" show the effect of implementing the two parts of DEBRA separately.

[16] See Appendix A.1. Table 4 for an overview of the already existing allowances on equity in the EU.

For Belgium, Italy and Poland, DEBRA decreases the CoC because the currently existing national laws provide for notional interest rates of 0%, 1.3% and 2.75%, respectively, which are lower than the 4.092% granted under DEBRA.

Figure 2: CoC under Status Quo and under DEBRA
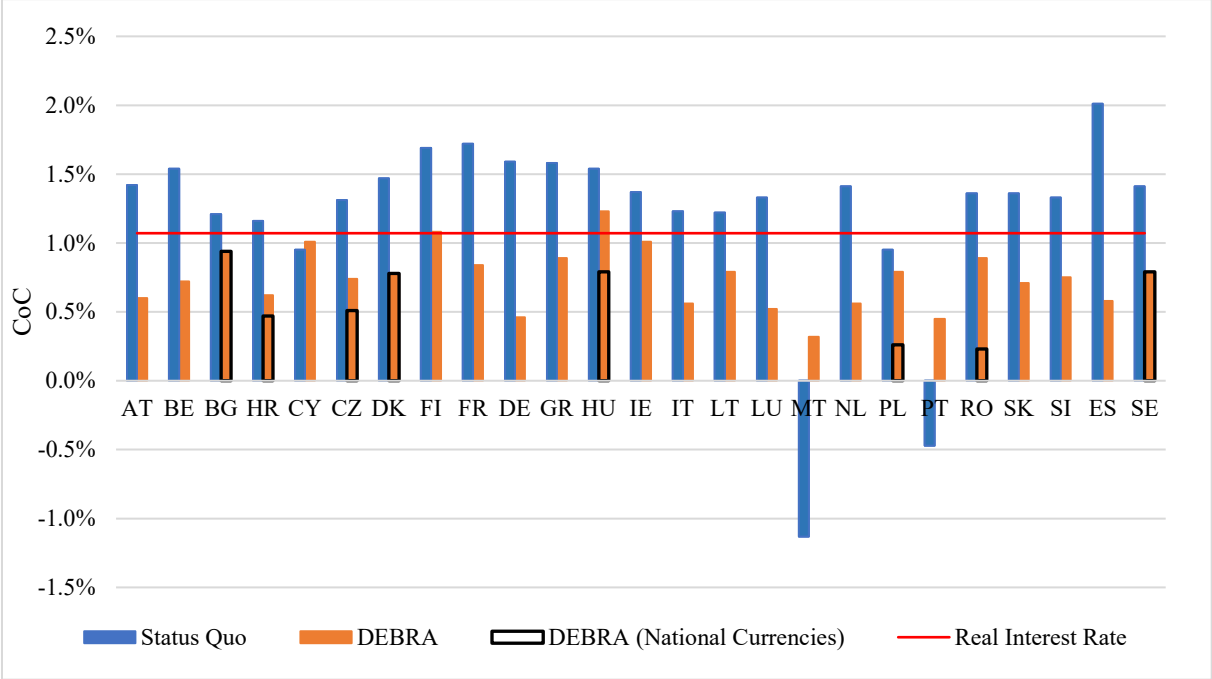
Notes: The figure compares the CoC under the sample countries' status quo (blue bars) and under application of DEBRA with a notional interest rate of 4.092% and a limitation of interest deductibility to 85% (orange bars). Moreover, the national currency scenario for DEBRA is included (black frames on the orange bars), where the notional interest rates amount to 4.032% (BG), 5.151% (HR), 5.602% (CZ), 4.082% (DK), 9.609% (HU), 7.648% (PL), 9.556% (RO) and 4.01% (SE). The real interest rate is 1.071% and indicated by the horizontal red line. *Source:* Authors' illustration.

Comparing the CoC under the status quo of the countries' national tax laws with the real interest rate of 1.071%, Figure 2 shows that in almost all countries the CoC is higher than the real interest rate. Thus, an alternative investment on the capital market is more attractive than the corporate investment. Exceptions are Cyprus, Malta, Poland, and Portugal, where the CoC under the status quo is below the real interest rate due to the ACE implemented in their national law.

As noted above, the implementation of DEBRA has a net negative effect on the CoC for all countries except the ones with a more advantageous ACE in their national laws. As a result, for the majority of countries the CoC falls below the real interest rate under DEBRA. Hence, DEBRA makes corporate investment more attractive than the alternative of investing in the capital market. Exceptions are Finland and Hungary whose CoC remains above the real interest rate even under DEBRA.

For simplicity, we assumed so far the same notional interest rate for all countries based on the euro-specific risk-free interest rate. However, according to DEBRA, the notional interest rate should be based on the national currency-specific interest rate (Article 4 DEBRA). The effect of DEBRA on the CoC when introducing currency-specific notional interest rates for the non-euro countries is shown by the black solid lines in Figure 2.[17] For Bulgaria, Denmark, and Sweden, the currency-specific interest rate is very close to the euro rate. Accordingly, the CoC under DEBRA remains almost the same regardless of which interest rate is used. In contrast, for countries where the currency-specific interest rate is higher than the euro rate (Croatia, Czech Republic, Hungary, Poland, and Romania), we observe a decrease in the CoC when implementing DEBRA based on the currency-specific interest rate. The decrease in the CoC can be explained by the fact that the notional interest rate increases when using the higher currency-specific interest rate, resulting in higher deductions from the tax base.

The impact of DEBRA on countries' EATR is shown in Figure 3. Under the status quo, the EATR ranges from 5.53% in Malta to 31.64% in Germany, while under DEBRA, it ranges from 6.86% in Malta to 27.74% in Germany. The implementation of DEBRA has a net negative impact on the EATR for the majority of countries, which is in line with the effects found for the CoC. The decrease in the EATR ranges from 0.66 pp. in Poland to 3.90 pp. in Germany. As the EATR reflects the countries' tax location attractiveness, a decrease in the EATR due to DEBRA implies that the proposed directive makes countries more attractive from a tax perspective. Exceptions are those countries with a more favourable ACE in their national tax laws. Due to the less generous notional interest rate of DEBRA, the EATRs increase in Cyprus, Malta and Portugal (by 0.29 pp., 1.33 pp. and 3.17 pp., respectively), making these countries less attractive as investment locations.

The impact of DEBRA on the CoC and the EATR is highly dependent on the nominal interest rate assumed in the model. The interest rate is used not only to discount future cash flows but also to determine the notional interest rate under DEBRA. We therefore conduct an interest rate sensitivity analysis with a low, medium and high interest rate scenario for the CoC and the EATR.[18] The CoC and EATRs develop almost linearly across the different interest rates, proving that our results are largely robust to interest rate changes.[19]

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[17] See Appendix A.1. Table 5 for an overview of the relevant currency-specific risk-free interest rates.
[18] See Appendix A.2. Figure 10 to Figure 13.
[19] See Appendix A.2. Figure 14 and Figure 15.

Figure 3: EATRs under Status Quo and under DEBRA
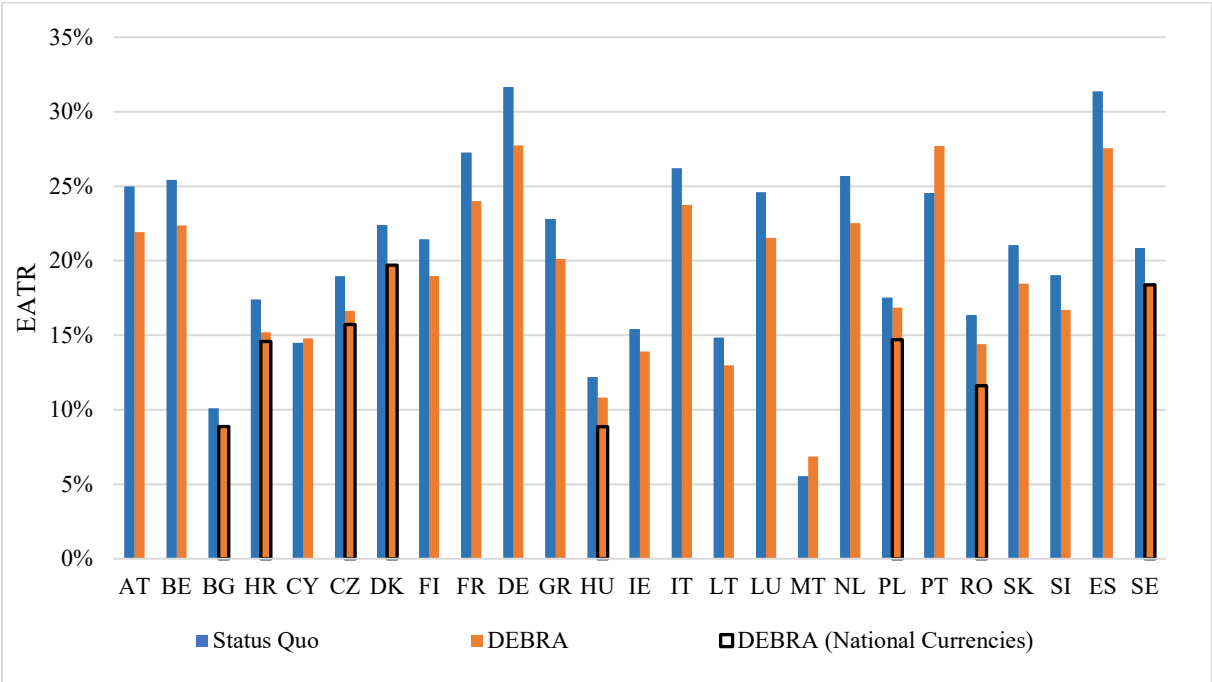
Notes: The figure compares the EATRs under the sample countries' status quo (blue bars) and under application of DEBRA with a notional interest rate of 4.092% and a limitation of interest deductibility to 85% (orange bars). Moreover, the national currency scenario for DEBRA is included (black frames on the orange bars), where the notional interest rates amount to 4.032% (BG), 5.151% (HR), 5.602% (CZ), 4.082% (DK), 9.609% (HU), 7.648% (PL), 9.556% (RO) and 4.01% (SE).
*Source:* Authors' illustration.

4.1.2. Common Tax Base Scenario

Our common tax base scenario is adapted from BEFIT as outlined in Chapter 3. First, we compare EU Member States' CoC shown in Figure 4 under their national tax base and under the application of the common tax base. For the common tax base, the CoC ranges from -1.33% in Malta to 1.90% in Spain, while for the national tax base it lies between -1.13% in Malta and 2.01% in Spain. Portugal and Malta have a negative CoC due to their generous national ACE regimes. Overall, the common tax base leads in comparison to the national tax base to an increased CoC for 13 countries, decreased CoC for ten countries, and no change for two countries. Thereby, the increases range from 0.01 pp. in Austria and Bulgaria to 0.23 pp. in Belgium, while the decreases lie between 0.01 pp. in Portugal and 0.20 pp. in Malta. The attractiveness of the corporate relative to an alternative investment does not change, as the introduction of the common tax base does not cause the CoC to exceed or fall below the real interest rate.

Second, we compare EU Member States' CoC under DEBRA, using either the national tax base or the common tax base. The results are also shown in Figure 4. Overall, DEBRA has a negative effect on the CoC of roughly the same size under the common tax base and under the national tax base. Thus, all findings of Chapter 4.1.1 still hold. The combined reduction in the CoC

resulting from the interaction of the common tax base and DEBRA only changes the attractiveness of the corporate investment in Finland as the CoC falls below the real interest rate.

Figure 4: CoC under Status Quo and under DEBRA (Common Tax Base Scenario)
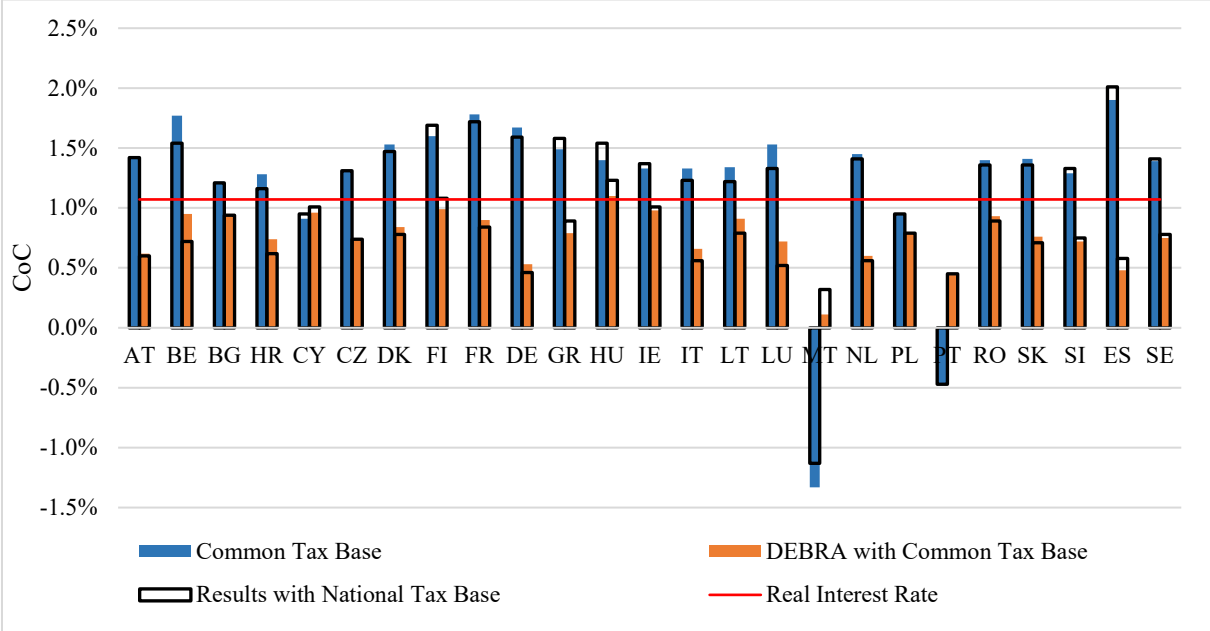
Notes: The figure compares the sample countries' CoC under a common tax base (blue bars) and under a joint application of a common tax base and DEBRA (orange bars). Moreover, to compare the common tax base scenario with the national tax base scenario, the CoC of the sample countries under the national tax base (black frames on the blue bars) and under a joint application of the national tax base and DEBRA (black frames on the orange bars) are included. Under DEBRA, the notional interest rate is 4.092% and deductibility of interest is limited to 85%. In the common tax base scenario, straight-line depreciation of buildings (28 years), machinery (7 years) and intangibles (5 years) is assumed. For inventories, the weighted average cost method is applied. The real interest rate is 1.071% and indicated by the horizontal red line.
*Source:* Authors' illustration.

Figure 5 shows similar effects for the EATRs. Under the common tax base, the EATRs range from 4.57% in Malta to 31.89% in Germany, whereas under the national tax base they lie between 5.53% in Malta and 31.64% in Germany. Compared to the national tax base, the implementation of the common tax base leads to an increase in the EATR and thus to a slightly lower location attractiveness for 13 sample countries, to a decrease in the EATR and hence to a slightly higher location attractiveness for eleven sample countries, and to no change for one country. The smallest increase occurs in Austria and Bulgaria (0.06 pp.) and the largest in Belgium (0.86 pp.), while the smallest decrease takes place in Poland (0.02 pp.) and the largest in Malta (0.96 pp.).

Next, we compare EU Member States' EATRs under DEBRA, using either the national tax base or the common tax base. Again, we find a negative effect of DEBRA on the EATRs of roughly the same size under the common tax base and under the national tax base, which is why also

here all findings of Chapter 4.1.1 still hold. Thus, the joint application of DEBRA and the common tax base only marginally increases or decreases the location attractiveness for all countries in comparison to the application of DEBRA under the national tax base.

Figure 5: EATRs under Status Quo and under DEBRA (Common Tax Base Scenario)
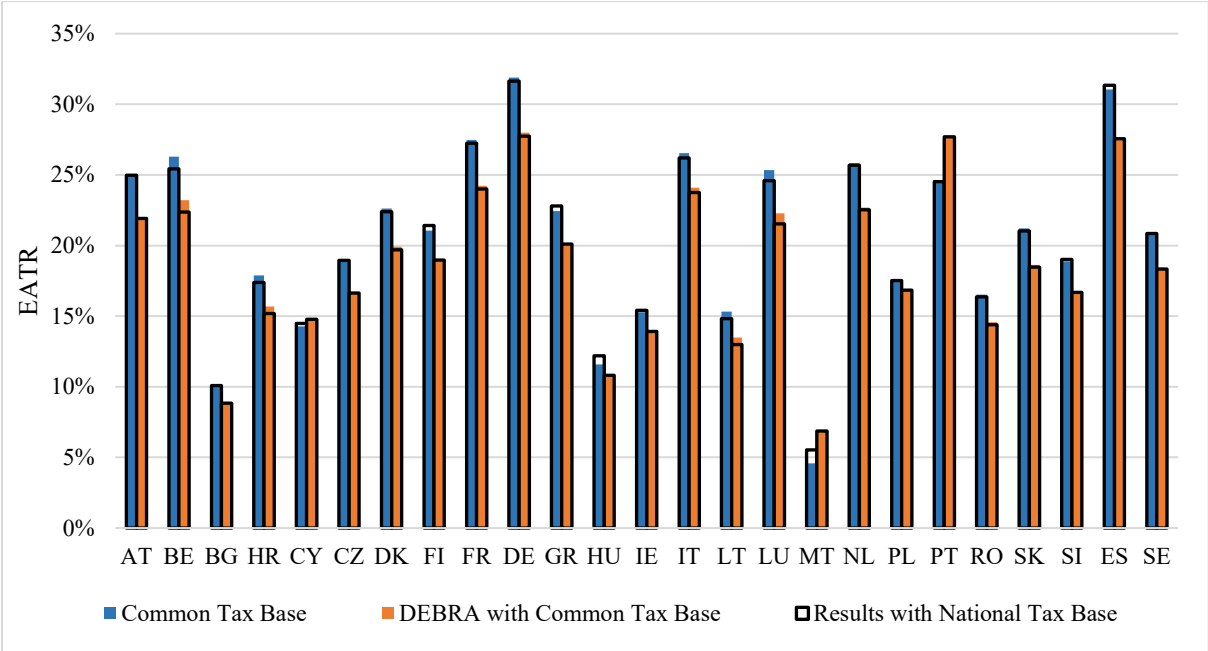
Notes: The figure compares the sample countries' EATRs under a common tax base (blue bars) and under a joint application of a common tax base and DEBRA (orange bars). Moreover, to compare the common tax base scenario with the national tax base scenario, the EATRs of the sample countries under the national tax base (black frames on the blue bars) and under a joint application of the national tax base and DEBRA (black frames on orange bars) are included. Under DEBRA, the notional interest rate is 4.092% and deductibility of interest is limited to 85%. In the common tax base scenario, straight-line depreciation of buildings (28 years), machinery (7 years) and intangibles (5 years) is assumed. For inventories, the weighted average cost method is applied.
Source: Authors' illustration.

The country-specific reactions to the common tax base can be explained by two factors. First, the magnitude of the tax rate determines the depreciation value. The higher the tax rate, the higher is the effect on the CoC and EATRs caused by non-neutral depreciation. Second, the effect size depends on how similar the depreciation rules are between the national and the common tax base. The impact of depreciation schemes on the effective tax burden is determined by the Present Value (PV) of deductible depreciation allowances. If straight-line depreciation is applied, an extended depreciation period under the common tax base as compared to the national tax base will result in a lower PV of depreciation allowances and therefore in a higher CoC and EATR. In addition, accelerated depreciation schemes frontload depreciation allowances to the early years of an asset's useful life and thus generally feature a high PV relative to straight-line depreciation, resulting in lower CoC and EATR. Finally, the valuation method of inventories determines to what extent the effective tax burden differs under a common tax base compared to the national tax base. In general, assuming inflation, the valuation of inventories

is most favourable under the LIFO method and least favourable under the FIFO method. The weighted average cost method lies between the two aforementioned methods. Therefore, the application of the weighted average cost method under BEFIT can increase, or decrease the CoC and EATRs depending on the national inventory valuation rules in place.

For the majority of countries in the sample, the depreciation of buildings, intangible assets and inventories is unchanged or more favourable under the common tax base compared to their national tax base. On the contrary, the depreciation of machinery under the common tax base is unchanged or less favourable compared to the national tax base of most countries. Overall, the resulting impact of the common tax base on the CoC and EATRs is marginal as both measures change by less than 1 pp. with and without considering DEBRA.[20]

4.2. Pillar Two
4.2.1. Baseline Scenario

For the application of Pillar Two, an ETR below 15% is required. To identify EU Member States that fulfil this requirement, we build on the combined profit tax rate, which includes the statutory corporate income tax with surcharges as well as local business taxes and takes into account the deductibility of the taxes from the tax base. We acknowledge that the companies' actual ETRs might differ due to additional aspects like other taxes paid, loss carryforwards, or tax credits.[21] Nevertheless, we consider the combined profit tax rate a good proxy. Thus, we simulate Pillar Two for Bulgaria, Cyprus, Ireland, and Malta, as they have a combined profit tax rate below 15%.[22] For the following simulation study, we focus on the implementation of the IIR[23] including the substance-based income exclusion[24]. In the baseline scenario, we assume that the investment is either financed by the debt-equity mix as outlined in Table 1 or by 100% new equity.

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[20] It should be noted that the effects derived for the common tax base are dependent on the design of the common tax base, but the size of the negative effect of DEBRA is independent from the tax base design.

[21] The number of countries most probably affected by Pillar Two does not change when also taking into account non-profit taxes and existing allowances on equity.

[22] Hungary levies a business tax on revenues in addition to its corporate income tax on profits. According to our calculation approach and assumptions on the impact of the business tax, the combined profit tax rate in Hungary is around 11%. However, the Hungarian government expects the effective tax burden to exceed 15%. See https://abouthungary.hu/news-in-brief/navracsics-hungary-s-adoption-of-global-minimum-tax-does-not-mean-taxes-will-increase (19.01.2024). We therefore exclude Hungary from our analysis.

[23] We assume that the model company represents the headquarters which is located in a low-tax country and therefore applies the IIR. Alternatively, it can be assumed that the model company is a subsidiary in a low-tax country which chooses to implement a QDMTT. The effective tax burden is the same in both scenarios.

[24] As our model does not take into account employment expenses, we solely include the 8% asset-based carve-out.

Our main measure in this chapter is the EATR, which is mainly driven by the corporate income tax rate. Since the global minimum tax leads to an increase in the tax rate, this measure is the most suitable to interpret the effects of Pillar Two.[25] Figure 6 displays the EATRs in the afore-mentioned countries under the status quo as well as after the introduction of Pillar Two. Under the status quo, the EATRs in the sample countries range from 0.94% in Malta to 16.21% in Ireland assuming pure equity financing. For the financing mix scenario, the EATRs lie between 5.53% in Malta and 15.42% in Ireland. In Bulgaria and Ireland, the EATR under the financing mix is lower than the one under new equity financing, as interest payments are tax-deductible for debt-financed investments. In contrast, the EATR in Cyprus and Malta under the financing mix is higher than in the pure equity financing case. This is due to very generous ACE regimes in these two countries.

Figure 6: EATRs under Status Quo and under Pillar Two
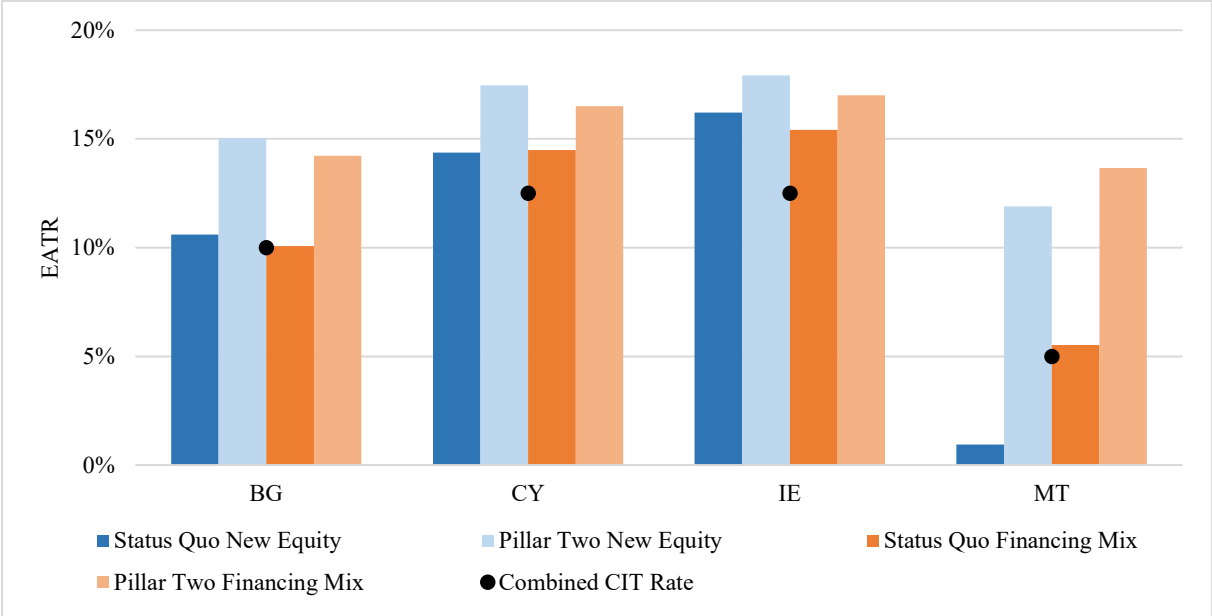
Notes: The figure compares the EATRs under the status quo (dark coloured bars) and under the application of Pillar Two (light coloured bars). Moreover, it distinguishes between different sources of financing, either 100% new equity financing (blue bars) or mixed financing sources according to Table 1 (orange bars). The black dots indicate the combined corporate income tax rate that triggers the application of Pillar Two in the displayed EU Member States.
*Source:* Authors' illustration.

Figure 6 shows that after the implementation of Pillar Two, the EATRs increase in all sample countries under both financing cases. The increases range from 1.59 pp. in Ireland to 8.14 pp. in Malta under the financing mix. However, the effect of Pillar Two on the EATR is larger under new equity financing. In this case, the increases in the EATR through the implementation of

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[25] As the CoC is primarily driven by income tax base regulations and non-income taxes, this metric is not as meaningful as the EATR for the analysis of the effect of Pillar Two. Nevertheless, the results for the effect on the CoC are shown in Appendix A.3. Figure 16.

Pillar Two range from 1.71 pp. in Ireland to 10.96 pp. in Malta. Due to the very low EATR under the status quo in Malta, Pillar Two increases the effective tax burden significantly. In contrast, the EATRs in the remaining countries increase only moderately, since their combined corporate income tax rates are relatively close to the threshold of 15%.

Overall, the increase in the EATR leads to a decrease in the location attractiveness of the sample countries relative to their status quo. Figure 7 shows that the EATRs of low-tax countries under Pillar Two (displayed by the dark-orange bars) approach the effective tax burden in countries not affected by Pillar Two. Although Malta still has the lowest EATR in our country sample, the spread between the highest EATR (i.e., Germany) and the lowest EATR (i.e., Malta) is reduced from 32.17 pp. under the status quo to 21.21 pp. when Pillar Two applies. Bulgaria, Cyprus, and Ireland become slightly less attractive from a tax perspective compared to the status quo, but they are still among the eight countries with the lowest EATRs in our country sample.

Figure 7: Ranking of EATRs after Introduction of Pillar Two
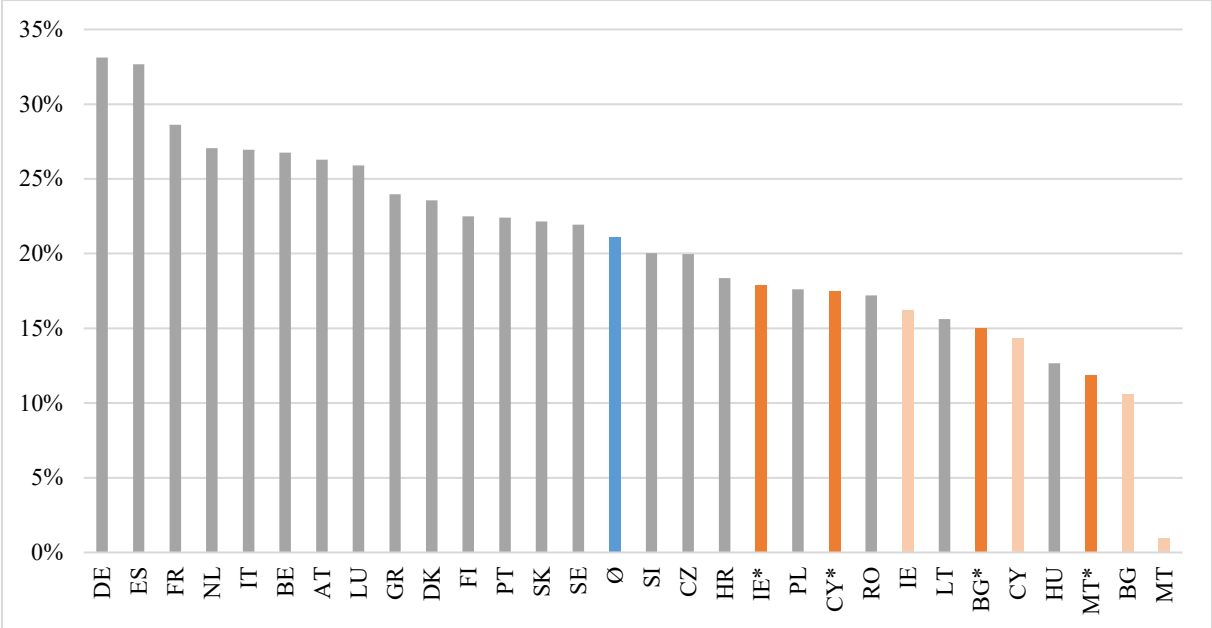
Notes: The figure displays the sample countries' EATRs after the introduction of Pillar Two, assuming 100% new equity financing. In case Pillar Two is not applicable in a country, the EATR under the status quo is displayed (grey bars). The light-orange bars display the EATRs of countries affected by Pillar Two before the application of the directive (status quo). The EATRs of countries marked with an asterisk (dark-orange bars) incorporate the Pillar Two provisions. The blue bar represents the unweighted average EATR in the sample countries under the status quo.
Source: Authors' illustration.

In the previous analysis, we considered a carve-out for tangible assets (machinery and buildings) of 8%. However, the substance-based carve-out is continuously reduced to 5% within 10 years after the implementation of Pillar Two. Thus, we apply a reduced substance-based income exclusion of 5% in a sensitivity analysis.

Considering the results displayed in Figure 8, the EATRs increase for both financing scenarios in all four sample countries, when the reduced carve-out of 5% compared to the 8% carve-out is applied. While Ireland has the lowest EATR in the 8% carve-out scenario, in the 5% carve-out scenario Bulgaria has the lowest EATR assuming a financing mix. The increases of the EATRs range from 0.15 pp. in Ireland to 1.16 pp. in Malta under the financing mix, while under new equity financing, the EATR increases lie between 0.14 pp. in Ireland and 1.16 pp. in Malta.

Figure 8: EATRs under Pillar Two with 8% vs. 5% Carve-Out
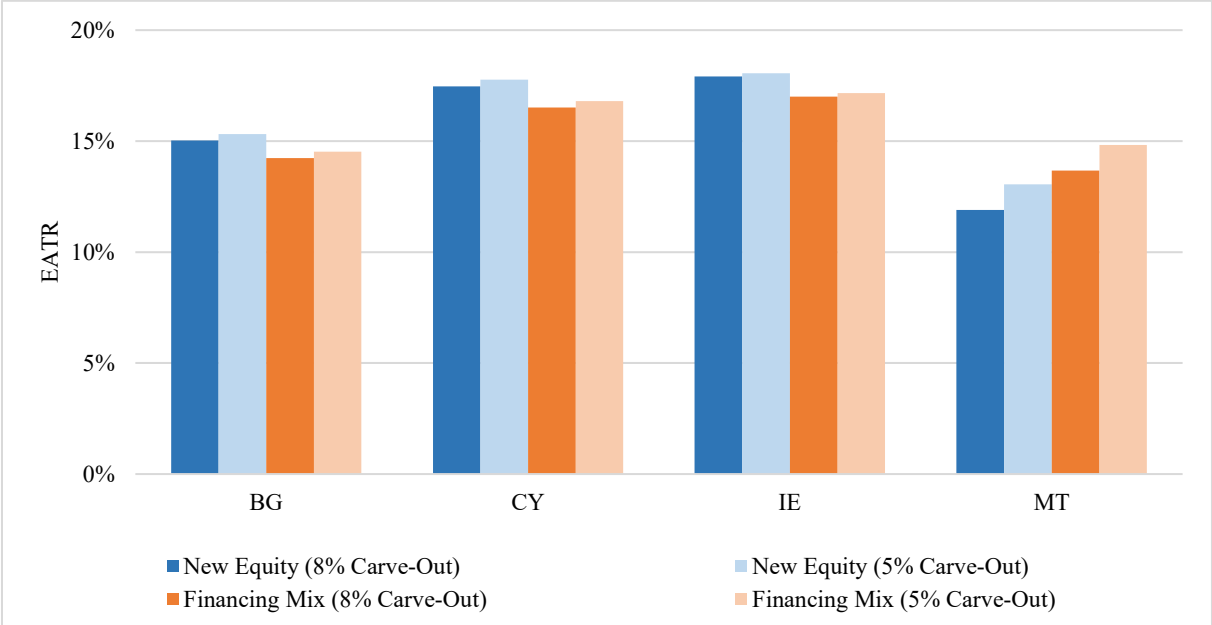
Notes: The figure compares the EATRs under the application of Pillar Two including the 8% carve-out (dark coloured bars) vs. the 5% carve-out (light coloured bars). Moreover, it distinguishes between different sources of financing, either 100% new equity financing (blue bars) or mixed financing sources according to Table 1 (orange bars).
*Source:* Authors' illustration.

The heterogeneous effect sizes can be explained by the differential between the minimum tax rate of 15% and the current tax rates, which continue to apply for the carve-out: the larger this differential, the higher is the value of the carve-out. While the tax rate in Ireland is relatively close to the minimum tax rate, the tax burden in Malta is very low. Thus, the carve-out is more valuable in Malta than in Ireland. However, when the carve-out is reduced from 8% to 5%, the EATR increases more strongly in countries with very low tax rates (i.e., Malta). As the substance-based carve-out is not dependent on the source of financing, the EATR increases throughout all financing scenarios when reducing the income exclusion from 8% to 5%. The increase is triggered as the carve-out intends to exclude certain income from the scope of the minimum tax. Thus, a smaller relative amount of income is taxed under the regular low-tax regime in the specific country. Hence, the decreasing effect of the carve-out is reduced resulting in a higher EATR.

4.2.2. Common Tax Base Scenario

In the following, we incorporate the common tax base for the Pillar Two sample countries based on the assumptions outlined in Chapter 3.As the pure effect of a common tax base on the CoC and EATRs has already been investigated in Chapter 4.1.2, we focus on the interaction effect of a common tax base and Pillar Two on the EU Member States' EATRs. Figure 9 presents the EATRs after the application of Pillar Two and compares the results under the national tax base with those under the common tax base.[26]

Figure 9: EATRs under Pillar Two (Common Tax Base Scenario)
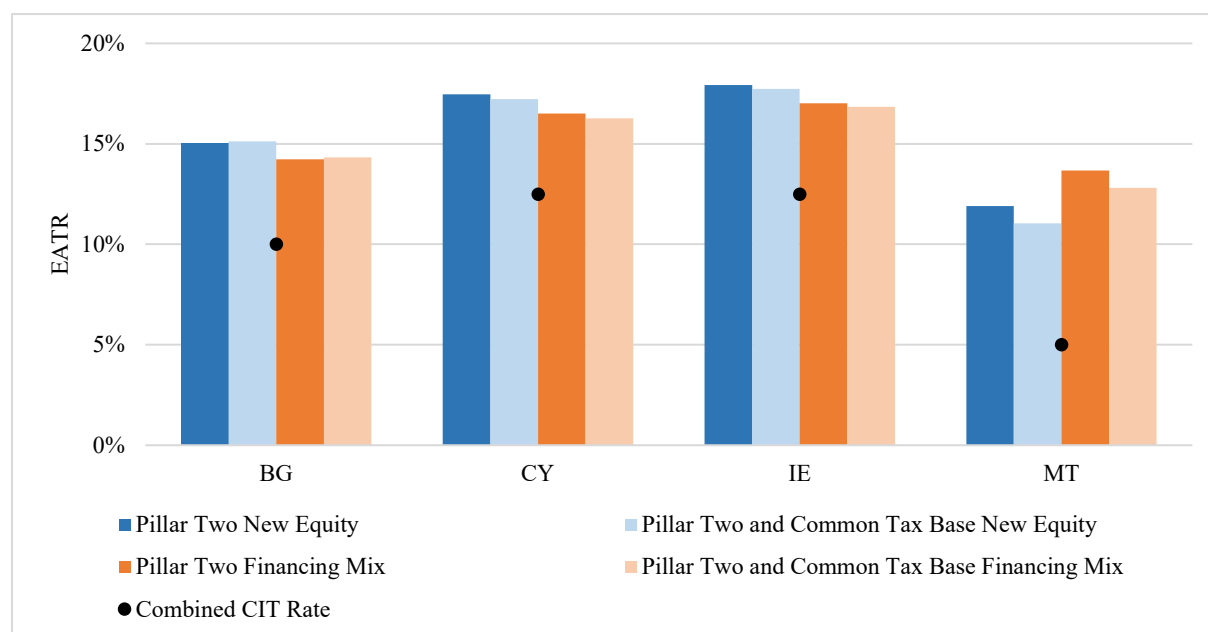
Notes: The figure compares the EATRs under the application of Pillar Two (dark coloured bars) and under additional introduction of a common tax base (light coloured bars). Moreover, it distinguishes between different sources of financing, either 100% new equity financing (blue bars) or mixed financing sources according to Table 1 (orange bars). In the common tax base scenario, straight-line depreciation of buildings (28 years), machinery (7 years), and intangibles (5 years) is assumed. For inventories, the weighted average cost method is applied. The black dots indicate the combined corporate income tax rate that triggers the application of Pillar Two in the displayed EU Member States.
Source: Authors' illustration.

As the EATR is primarily driven by income tax rates, the introduction of the common tax base only has minor impact. Thus, the EATRs after the implementation of Pillar Two are similar under the national tax base and the common tax base. As displayed in Figure 9, the application of the common tax base results in marginally lower EATRs in all sample countries except for Bulgaria. The change in EATRs by including the common tax base ranges from -0.86 pp. in Malta to 0.09 pp. in Bulgaria for the new equity scenario. The changes for the financing mix scenario are almost identical. Overall, the effect of implementing Pillar Two is very similar under both tax base definitions: Under the common tax base (national tax base), the increase in

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[26] For the CoC results see Appendix A.4. Figure 17.

EATRs ranges from 1.68 pp. (1.71 pp.) in Ireland to 11.06 pp. (10.96 pp.) in Malta for the new equity scenario. For the financing mix scenario, the increase in EATRs ranges from 1.57 pp. (1.59 pp.) in Ireland to 8.24 pp. (8.14 pp.) in Malta.

4.3. Interaction of DEBRA and Pillar Two

After examining the effects of DEBRA and Pillar Two separately, we consider the interaction effect of both regulations measured by the EATR[27]. For reasons of comparability, we assume 100% new equity financing for all calculations.[28] The sample of the interaction analysis consists of the four countries for which the combined income tax rate is below 15% (see Chapter 4.2).[29]

Table 2 shows the results for the interaction between Pillar Two and DEBRA. It includes the EATRs under the status quo, DEBRA, Pillar Two and the interaction of both regulations. In addition, the table displays the differences between the EATRs under each regulation and the status quo. As shown in Chapter 4.1, under DEBRA, the EATRs in Cyprus and Malta (Bulgaria and Ireland) are higher (lower) than under the status quo. The increase in the tax burden in Cyprus and Malta is due to their generous national ACE regimes. In contrast, and as shown in Chapter 4.2, Pillar Two increases the EATR in all four countries. The simultaneous application of DEBRA and Pillar Two is shown in the last column of Table 2. For Bulgaria and Ireland, the interaction of both measures leads to EATRs that lie between the sole application of DEBRA and Pillar Two. However, for Cyprus and Malta, the EATRs are higher in the interaction scenario than in the Pillar Two scenario, as both DEBRA's ACE and the top-up tax increase the effective tax burden. The EATRs in the scenario with both regulations range from 12.40% in Malta to 17.85% in Cyprus.

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[27] For the CoC results see Appendix A.5. Table 7 and Table 8.

[28] The change from a financing mix to 100% new equity financing under DEBRA strengthens the effect of the ACE and eliminates the effect of the interest deduction limitation. As a result, the EATRs under DEBRA are lower for the 100% equity financing case than for the financing mix used in Chapter 4.2.1.

[29] It should be noted that in countries which have nominal tax rates just above 15%, e.g., Croatia (18%), Lithuania (15%), or Romania (16%), the introduction of DEBRA could result in an ETR below 15% triggering the application of Pillar Two. As this case is very specific, we do not model this scenario in our study.

Table 2: Interaction Effect of DEBRA and Pillar Two (EATRs)

Country	*Status Quo* *EATR*	*DEBRA*		*Pillar Two*		*Interaction*	
		EATR	*Δ in pp.*	*EATR*	*Δ in pp.*	*EATR*	*Δ in pp.*
BG	10.61%	8.60%	-2.01	15.03%	4.42	14.22%	3.61
CY	14.37%	14.62%	0.25	17.47%	3.10	17.85%	3.48
IE	16.21%	13.70%	-2.51	17.92%	1.71	16.91%	0.70
MT	0.94%	2.36%	1.42	11.90%	10.96	12.40%	11.46

Notes: The table displays the EATRs under the status quo, under application of DEBRA, Pillar Two, and the interaction, i.e., simultaneous application of DEBRA and Pillar Two. For all scenarios, 100% new equity financing is assumed to ensure comparability. The columns named "Δ in pp." show the difference between the countries' EATR of the column-specific scenario and the respective EATR under the status quo.
Source: Authors' illustration.

Overall, the effect of Pillar Two predominates since the EATRs in the interaction scenario are much closer to the Pillar Two scenario than to the DEBRA scenario. Thus, the effect of DEBRA is reversed to a certain extent by the application of Pillar Two. Compared to the status quo, under the two new regulations the effective tax burden increases in all sample countries. However, if we also consider countries with a combined corporate income tax rate of more than 15%, the overall impact of Pillar Two on all sample countries is limited in comparison to DEBRA. While DEBRA reduces the effective tax burden in most of the sample countries, Pillar Two increases it in only four countries. Thus, on average the effective tax burden in the EU would be reduced compared to the status quo.[30]

In Table 3, we implement the common tax base instead of the national tax bases in the sample countries. In line with the findings in Chapters 4.1.2 and 4.2.2, the common tax base results in slightly lower EATRs in Cyprus, Ireland, and Malta, and in a marginally higher EATR in Bulgaria under all scenarios (status quo, DEBRA, Pillar Two) compared to the cases with national tax bases. Moreover, when comparing the differences in EATRs between the status quo and each regulation in Table 3, the direction and the magnitude of the effects are similar to those under non-harmonised tax bases shown in Table 2. Accordingly, the EATRs in the interaction scenario, which range from 11.54% in Malta to 17.41% in Cyprus, are very close to those in Table 2. Thus, the common tax base only marginally affects the interaction between DEBRA and Pillar Two. Therefore, when only looking at Bulgaria, Cyprus, Ireland, and Malta again Pillar Two's top-up tax outweighs the tax-reducing effect of DEBRA's ACE, but when considering all 25 EU Member States in the sample, the average EATR across countries is reduced compared to the status quo.[31]

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[30] See Appendix A.6. Table 9.
[31] See Appendix A.6. Table 9.

Table 3: Interaction Effect of DEBRA and Pillar Two Including Common Tax Base (EATRs)

Country	Status Quo EATR	DEBRA		Pillar Two		Interaction	
		EATR	Δ in pp.	EATR	Δ in pp.	EATR	Δ in pp.
BG	10.67%	8.67%	-2.00	15.12%	4.45	14.51%	3.84
CY	14.17%	14.42%	0.25	17.22%	3.05	17.41%	3.24
IE	16.06%	13.56%	-2.50	17.74%	1.68	16.73%	0.67
MT	-0.02%	1.39%	1.41	11.04%	11.06	11.54%	11.56

Notes: The table displays the EATRs under the status quo, under application of DEBRA, Pillar Two, and the interaction, i.e., simultaneous application of DEBRA and Pillar Two. For all scenarios, 100% new equity financing and the application of a common tax base are assumed. In the common tax base scenario, straight-line depreciation of buildings (28 years), machinery (7 years) and intangibles (5 years) is assumed. For inventories, the weighted average cost method is applied. The columns named "Δ in pp." show the difference between the countries' EATR of the column-specific scenario and the respective EATR under the status quo.
Source: Authors' illustration.

5. Conclusion

In this simulation study, we examine the effects of DEBRA and Pillar Two on the effective tax levels of EU Member States. Moreover, we analyse the interaction effects of both directives and investigate the impact of a common tax base reflecting the BEFIT initiative by the EU Commission. To measure the effects, we apply the well-established Devereux/Griffith methodology and calculate the CoC and EATRs before and after a (potential) implementation of DEBRA and Pillar Two.

First, our analysis of DEBRA shows that, on average, the policy leads to a reduction of the CoC and EATRs. In most sample countries, the CoC and EATRs are increased by the limitation of interest deductibility and reduced by the ACE. The resulting net decrease in CoC indicates a higher attractiveness of corporate investment compared to an alternative investment. Correspondingly, the net decline in EATRs suggests a higher location attractiveness from a tax perspective. Our results are robust to variations in the interest rate level as well as the application of currency-specific interest rates in EU Member States. Implementing the common tax base results in marginal changes in the CoC and EATRs in comparison to those under the national tax bases.

Second, considering the implementation of Pillar Two in our simulation study, only four EU Member States, i.e., Bulgaria, Cyprus, Ireland, and Malta, have a combined corporate tax rate below 15% and thus are included in our sample. Pillar Two increases the EATRs for all sample countries through the top-up tax. This effect holds for both the pure new equity financing case and the financing mix scenario, whereas the average effect is larger for the first scenario. When replacing the national tax bases with the common tax base, the EATRs under Pillar Two only

marginally change in all sample countries. Hence, the effect of implementing Pillar Two is comparable under both tax base definitions. Overall, the increase of EATRs under Pillar Two results in a reduced location attractiveness of the sample countries from a tax perspective.

Finally, in the interaction scenario, we examine the effective tax burden under a simultaneous application of DEBRA and Pillar Two for Bulgaria, Cyprus, Ireland, and Malta. The EATRs for the interaction are relatively close to those obtained under the sole application of Pillar Two, but are significantly higher than under the sole application of DEBRA. Thus, our analysis indicates that the effect of Pillar Two dominates the impact of DEBRA. However, when looking at all 25 sample countries, the average EATR across EU Member States decreases, as DEBRA reduces the effective tax burden in most of the sample countries, while Pillar Two reverses the reduction in only four countries. The findings for the interaction of DEBRA and Pillar Two also hold when the national tax bases are replaced by the common tax base.

While the empirical literature on this topic is still emerging, our study contributes policy-relevant insights based on forward-looking effective tax rates. We show that both DEBRA and Pillar Two, when applied in isolation, influence corporate taxation as intended by the directives. However, when interacted, the two measures partly counteract each other. Therefore, our results emphasise that policy makers need to carefully consider not only the isolated effects of policy measures, but also the overall impact within a tax system.

Appendix

Appendix A.1. EU Member States' Selected Economic and Tax Parameters

Table 4: National Allowances on Equity in the EU Member States

Country	Legislation since	Base of Allowance on Equity	Determination of Notional Interest Rate	Notional Interest Rate of 2022	Deduction Limitations and Carryforwards
DEBRA	Forthcoming	Difference between equity at end of tax year and equity at end of previous tax year	Risk-free interest rate with maturity of 10 years, as laid down in implementing acts to Article 77e(2) of Directive 2009/138/EC plus 1% risk premium	1.205% (+ 0.5% for SMEs)[38]	30% of EBITDA, 9 years carryforward
Belgium	2006	One fifth of positive difference between equity at end of taxable period and fifth preceding taxable period	Applicable rate is equal to the average of the benchmark indices (10-year linear bonds) published monthly by the Pension Fund	0% (+ 0.5% for SMEs)	No limitation for taxable income below 1 Mio EUR, above deduction cannot exceed 70% of taxable income; no carryforward
Cyprus	2015	New equity, which has been brought into business on or after 31.12.2014, but which does not include amounts from capitalization of pre-existing reserves	10-year government bond yield rate of the country where new equity is employed/ invested increased by 5 percentage points	5.629%	Amount of deduction cannot exceed 80% of taxable income; no carryforward
Italy	2011	Increase in equity defined as equity contributions and retained earnings (except profits allocated to a non-disposable reserve) less reductions of the net equity, investments in controlled companies and certain intra-group business acquisitions and transactions after 31.12.2010	Rate determined by decree of Minister of the Economy and Finance on 31 January of each year, considering returns of public bonds, which can be increased by a further 3 percentage points	1.3%	Deduction cannot exceed 90% of taxable income; unlimited carryforward
Malta	2018	Equity for accounting period ending in year preceding year of assessment less any equity directly employed in form of non-Maltese securities, interest in a partnership, contributions and any other loans or debts	Risk free rate set by reference to yield to maturity on Malta Government Stocks with remaining term of approximately 20 years plus a premium of 5%	8.04%	Amount of deduction cannot exceed 90% of the taxable income; unlimited carryforward

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[38] The notional interest rate of 1.205% is derived following Article 4(2) of European Commission (2022) and Article 77e(2) of European Parliament & Council of the European Union (2009) and is therefore the correct notional interest rate for 2022. In order to provide more relevant results given the current rising interest rates in the EU, our analysis is based on a notional interest rate of 4.092%, which is the correct notional interest rate for 2023. However, we conduct sensitivity analyses with low (1.205%) and high (8.1%) notional interest rates (see Appendix A.2. Figure 10 to Figure 15).

Poland	2019	Equity as additional payments made to company in manner and on terms specified in separate regulations or profits transferred to company's reserve or supplementary capital	Reference rate of National Bank of Poland applicable on last working day of year preceding tax year, increased by 1 percentage point	2.75%	Deductible amount capped at 250,000 PLN (55,000 EUR) and limited to 3 consecutive years; unlimited carryforward
Portugal	2008	Equity as amount of contributions made by cash payments or through conversion of shareholders' equity or loans, within scope of incorporation of a company or an increase in share capital	Fixed rate	7%	Deductible amount capped at 140,000 EUR; carryforward limited to 5 consecutive years

Notes: The table displays key elements of the national allowances on equity implemented in the EU Member States as of 2022 and the same key elements of DEBRA for comparison. The information was obtained from Council of the European Union (2018), Deloitte (2022), European Commission (2022), Hohlwegler et al (2023), PwC (2024), https://www.centralbankmalta.org/malta-government-stocks (03.08.2023), https://research.ibfd.org/#/ (03.08.2023), and https://nbp.pl/en/historic-interest-rates/ (03.08.2023).

Table 5: National Risk-Free Interest Rates

Currency (country)	10-year currency-specific risk-free interest rate as at 31.12.2022
Euro	3.092%
Lev (BG)	3.042%
Kuna (HR)	4.151%
Koruna (CZ)	4.602%
Krone (DK)	3.082%
Forint (HU)	8.609%
Złoty (PL)	6.648%
Leu (RO)	8.556%
Krona (SE)	3.010%

Notes: The table displays the 10-year currency-specific risk-free interest rates published by EIOPA as at 31.12.2022.
Source: https://www.eiopa.europa.eu/tools-and-data/risk-free-interest-rate-term-structures_en#risk-free-rates-previous-releases-and-preparatory-phase (03.08.2023).

Appendix A.2. DEBRA (Baseline Scenario)

Table 6: Overview of Effective Tax Burden before and after DEBRA

Country	Status Quo		DEBRA		ACE Only		Interest Deduction Limitation Only	
	CoC	EATR	CoC	EATR	CoC	EATR	CoC	EATR
AT	1.42%	24.97%	0.60%	21.91%	0.55%	21.71%	1.47%	25.17%
BE	1.54%	25.43%	0.72%	22.36%	0.67%	22.16%	1.60%	25.63%
BG	1.21%	10.08%	0.94% [0.94%]	8.85% [8.87%]	0.92%	8.78%	1.22%	10.16%
HR	1.16%	17.39%	0.62% [0.47%]	15.19% [14.58%]	0.58%	15.04%	1.19%	17.53%
CY	0.95%	14.49%	1.01%	14.78%	0.97%	14.65%	0.99%	14.62%
CZ	1.31%	18.96%	0.74% [0.51%]	16.63% [15.72%]	0.70%	16.48%	1.35%	19.11%
DK	1.47%	22.39%	0.78% [0.78%]	19.69% [19.7%]	0.74%	19.51%	1.52%	22.56%
FI	1.69%	21.42%	1.08%	18.97%	1.04%	18.81%	1.73%	21.58%
FR	1.72%	27.25%	0.84%	24.01%	0.78%	23.80%	1.77%	27.46%
DE	1.59%	31.64%	0.46%	27.74%	0.39%	27.52%	1.66%	31.86%
GR	1.58%	22.80%	0.89%	20.11%	0.84%	19.93%	1.62%	22.98%
HU	1.54%	12.19%	1.23% [0.79%]	10.81% [8.86%]	1.21%	10.74%	1.55%	12.26%
IE	1.37%	15.42%	1.01%	13.91%	0.98%	13.79%	1.40%	15.54%
IT	1.23%	26.20%	0.56%	23.75%	0.51%	23.57%	1.29%	26.39%
LT	1.22%	14.82%	0.79%	12.99%	0.76%	12.87%	1.25%	14.94%
LU	1.33%	24.59%	0.52%	21.53%	0.47%	21.33%	1.39%	24.79%
MT	-1.13%	5.53%	0.32%	6.86%	0,23%	6.45%	-1.04%	5.94%
NL	1.41%	25.68%	0.56%	22.53%	0.50%	22.32%	1.47%	25.89%
PL	0.95%	17.51%	0.79% [0.26%]	16.85% [14.70%]	0.75%	16.70%	0.99%	17.66%
PT	-0.47%	24.53%	0.45%	27.70%	0.38%	27.45%	-0.40%	24.78%
RO	1.36%	16.36%	0.89% [0.23%]	14.40% [11.61%]	0.86%	14.27%	1.39%	16.49%
SK	1.36%	21.04%	0.71%	18.47%	0.67%	18.30%	1.41%	21.21%
SI	1.33%	19.02%	0.75%	16.69%	0.71%	16.54%	1.36%	19.17%
ES	2.01%	31.35%	0.58%	27.55%	0.52%	27.35%	2.07%	31.55%
SE	1.41%	20.85%	0.78% [0.79%]	18.33% [18.38%]	0.73%	18.16%	1.45%	21.02%

Notes: The table displays the sample countries' CoC and EATRs under the status quo and under application of DEBRA using a notional interest rate of 4.092% and a limitation of interest deductibility to 85%. Moreover, the table provides the sample countries' CoC and EATRs under separate application of DEBRA's ACE and interest deduction limitation. In the national currency scenario, the notional interest rates are 4.032% (BG), 5.151% (HR), 5.602% (CZ), 4.082% (DK), 9.609% (HU), 7.648% (PL), 9.556% (RO) and 4.01% (SE). The results of the national currency scenario are given in square brackets in the DEBRA columns.
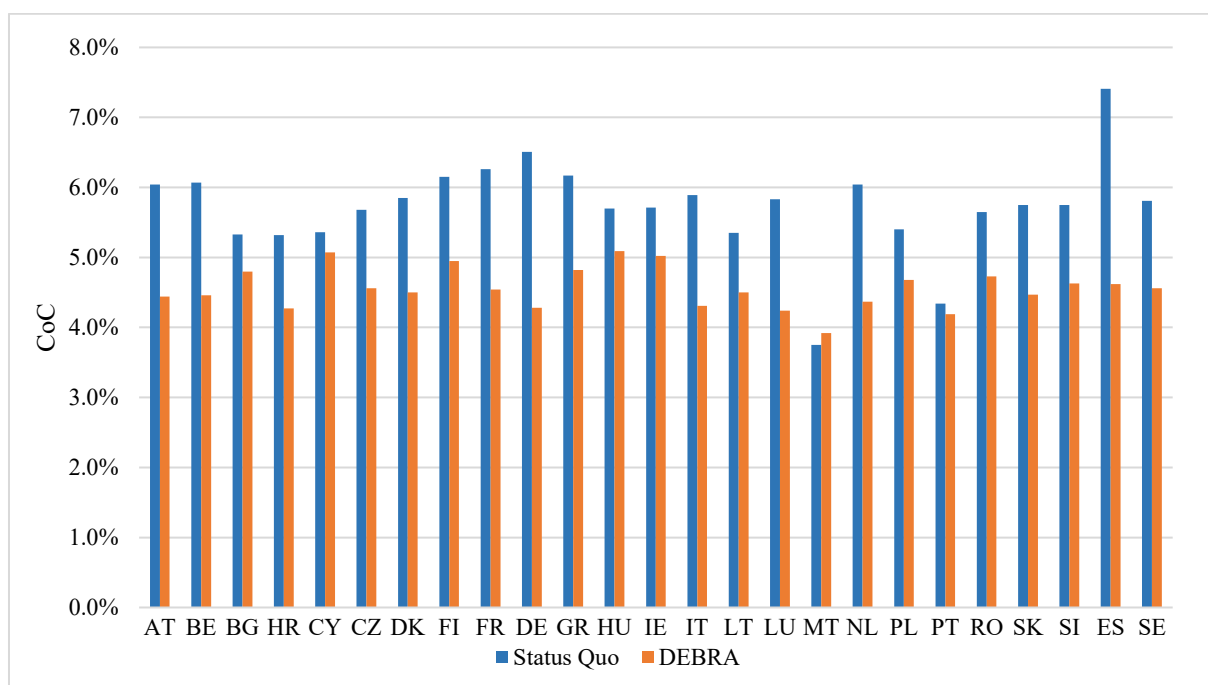*Source:* Authors' illustration.

Figure 10: Comparison of CoC under Status Quo and under DEBRA (Low Interest Rate)
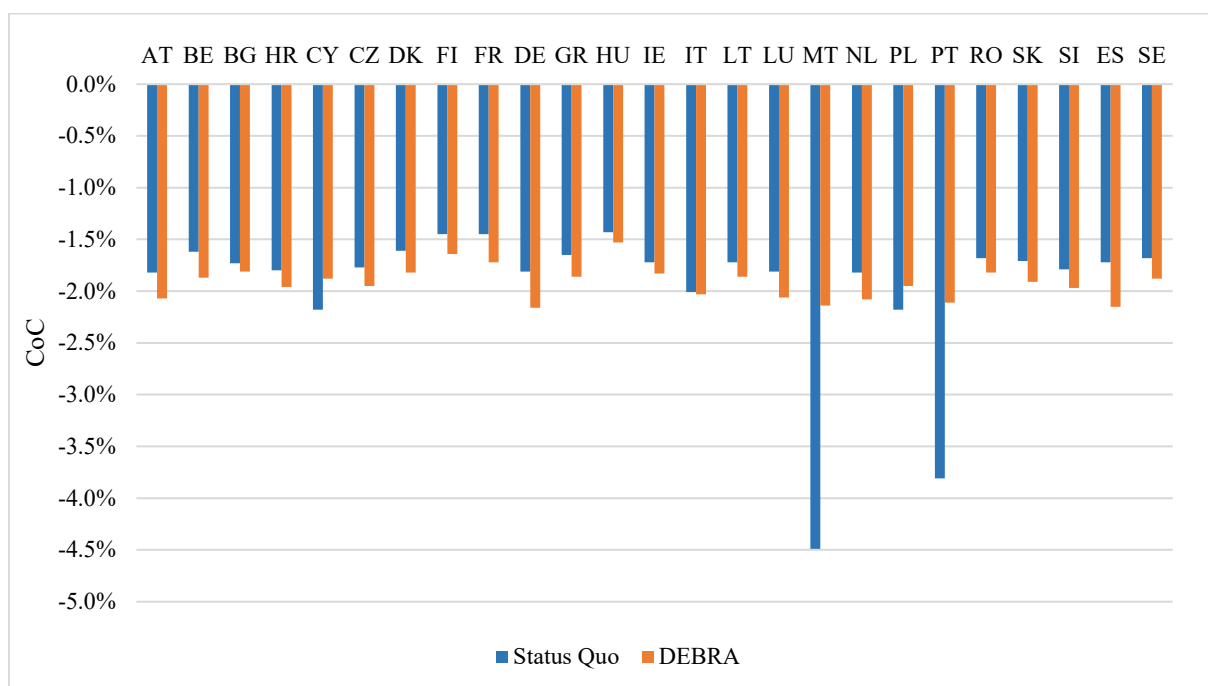
Notes: The figure compares the CoC under the sample countries' status quo (blue bars) and under application of DEBRA (orange bars) in a low interest rate scenario. The nominal (notional) interest rate amounts to 0.205% (1.205%). Only the euro-specific notional interest rate is considered here. Under DEBRA, the deductibility of interest is limited to 85%.
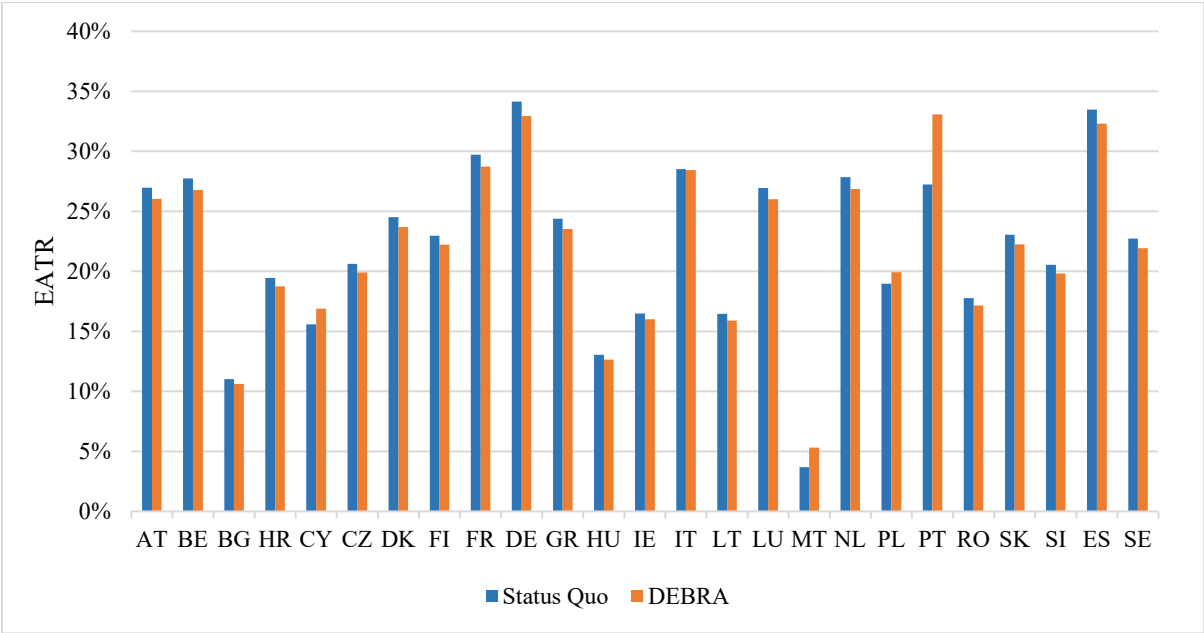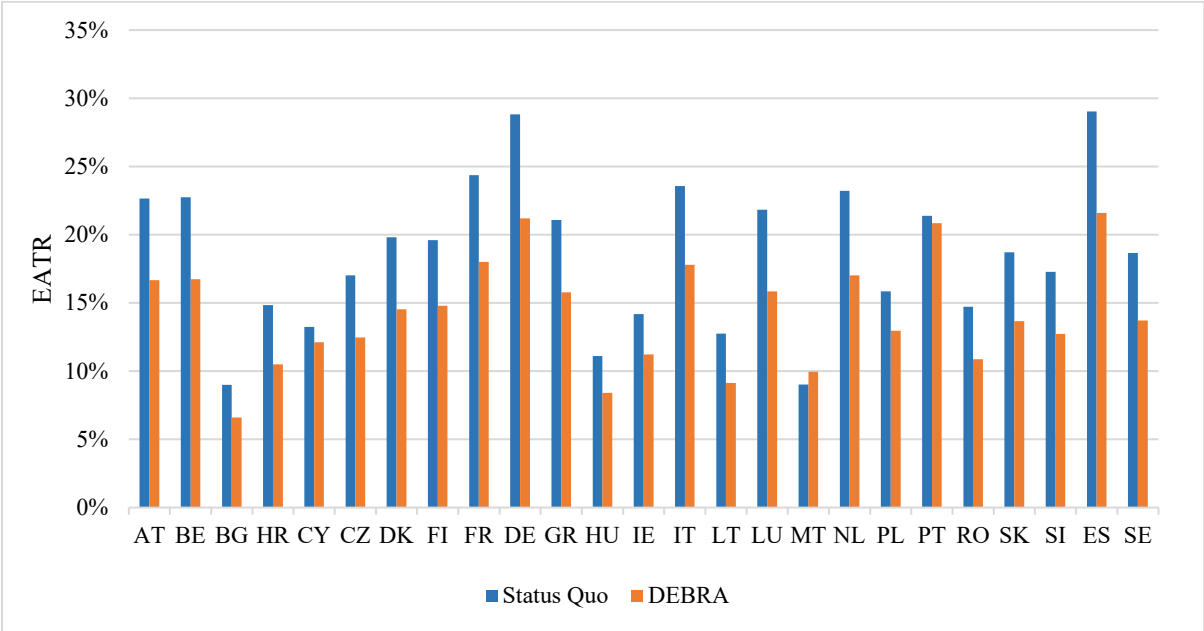*Source:* Authors' illustration.

Figure 11: CoC under Status Quo and under DEBRA (High Interest Rate)

Notes: The figure compares the CoC under the sample countries' status quo (blue bars) and under application of DEBRA (orange bars) in a high interest rate scenario. The nominal (notional) interest rate amounts to 7.1% (8.1%). Only the euro-specific notional interest rate is considered here. Under DEBRA, the deductibility of interest is limited to 85%.
Source: Authors' illustration.

Figure 12: EATRs under Status Quo and under DEBRA (Low Interest Rate)

Notes: The figure compares the EATRs under the sample countries' status quo (blue bars) and under application of DEBRA (orange bars) in a low interest rate scenario. The nominal (notional) interest rate amounts to 0.205% (1.205%). Only the euro-specific notional interest rate is considered here. Under DEBRA, the deductibility of interest is limited to 85%.
*Source:* Authors' illustration.

Figure 13: EATRs under Status Quo and under DEBRA (High Interest Rate)

Notes: The figure compares the EATRs under the sample countries' status quo (blue bars) and under application of DEBRA (orange bars) in a high interest rate scenario. The nominal (notional) interest rate amounts to 7.1% (8.1%). Only the euro-specific notional interest rate is considered here. Under DEBRA, the deductibility of interest is limited to 85%.
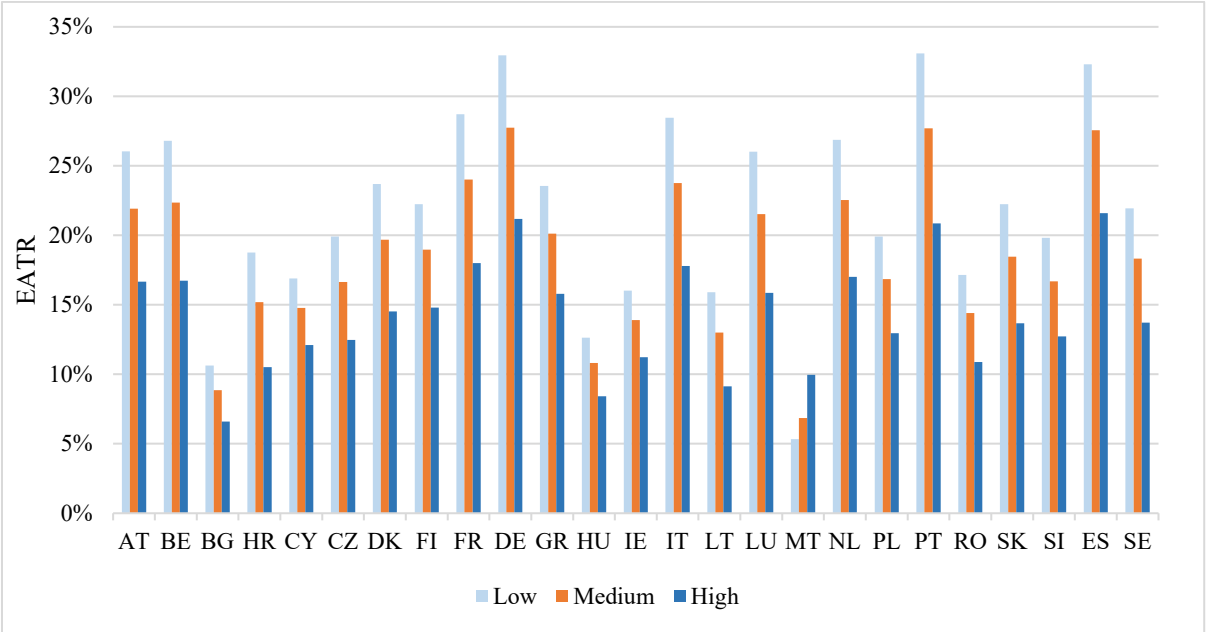*Source:* Authors' illustration.

Figure 14: CoC under DEBRA (Different Interest Rate Scenarios)
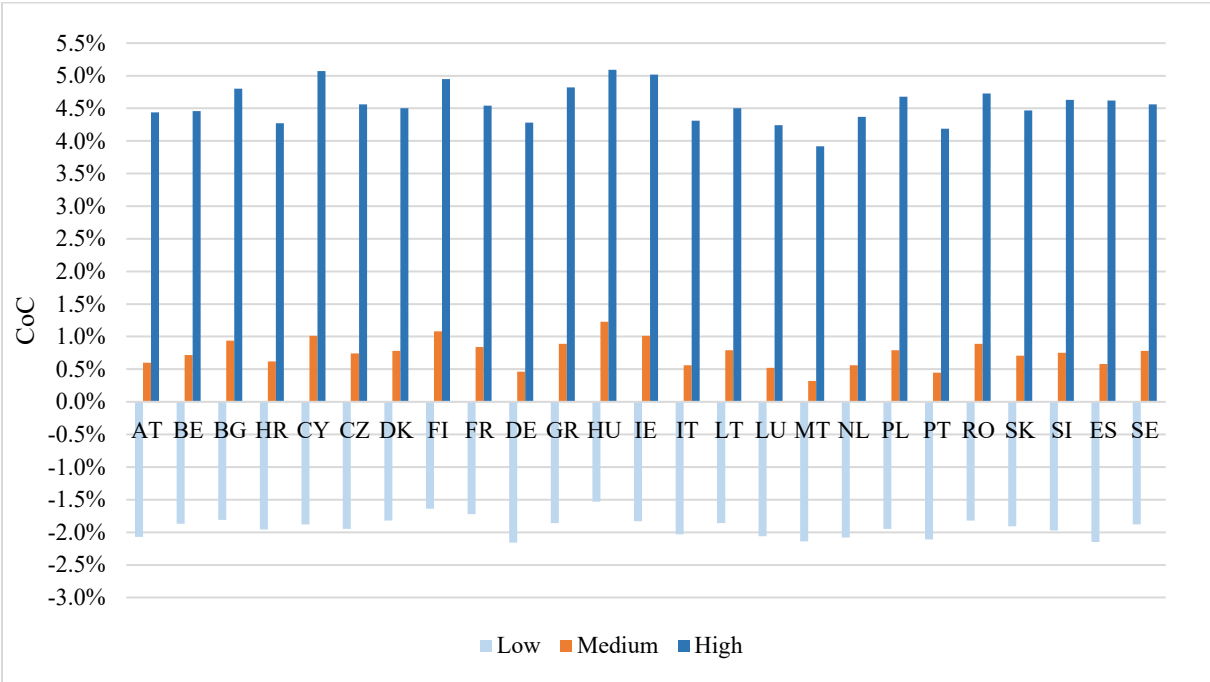
Notes: The figure compares the sample countries' CoC under application of DEBRA in different interest rate scenarios. The nominal (notional) interest rate amounts to 0.205% (1.205%) in the low interest rate scenario (light-blue bars), to 3.092% (4.092%) in the medium interest rate scenario (orange bars) and to 7.1% (8.1%) in the high interest rate scenario (dark-blue bars). Only the euro-specific notional interest rate is considered here. In all scenarios, the deductibility of interest is limited to 85%.
Source: Authors' illustration.

Figure 15: EATRs under DEBRA (Different Interest Rate Scenarios)

Notes: The figure compares the sample countries' EATRs under application of DEBRA in different interest rate scenarios. The nominal (notional) interest rate amounts to 0.205% (1.205%) in the low interest rate scenario (light-blue bars), to 3.092% (4.092%) in the medium interest rate scenario (orange bars) and to 7.1% (8.1%) in the high interest rate scenario (dark-blue bars). Only the euro-specific notional interest rate is considered here. In all scenarios, the deductibility of interest is limited to 85%.
Source: Authors' illustration.

Appendix A.3. Pillar Two (Baseline Scenario)

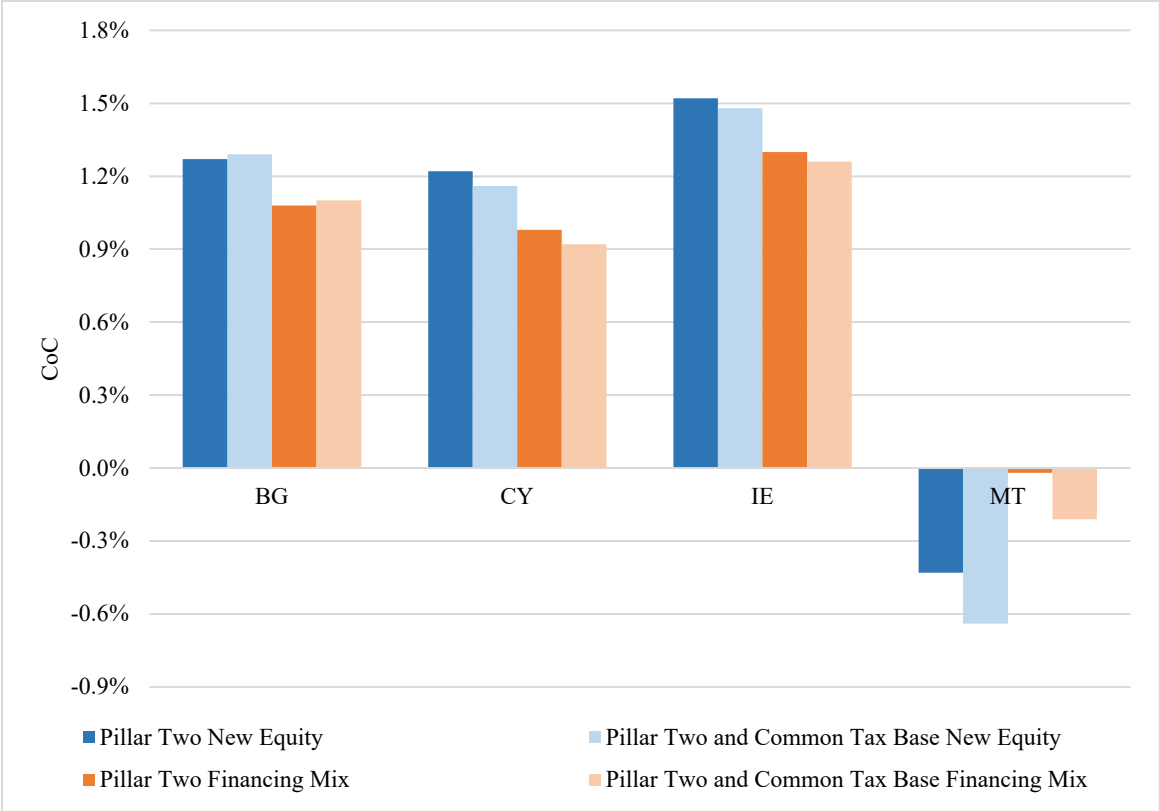Figure 16: CoC under Status Quo and under Pillar Two

Notes: The figure compares the CoC under the status quo (dark coloured bars) and under the application of Pillar Two (light coloured bars). Moreover, it distinguishes between different sources of financing, either 100% new equity financing (blue bars) or mixed financing sources according to Table 1 (orange bars).
Source: Authors' illustration.

Appendix A.4. Pillar Two (Common Tax Base Scenario)

Figure 17: CoC under Pillar Two

Notes: The figure compares the CoC under the application of Pillar Two (dark coloured bars) and under additional introduction of a common tax base (light coloured bars). Moreover, it distinguishes between different sources of financing, either 100% new equity financing (blue bars) or mixed financing sources according to Table 1 (orange bars). In the common tax base scenario, straight-line depreciation of buildings (28 years), machinery (7 years), and intangibles (5 years) is assumed. For inventories, the weighted average cost method is applied.
Source: Authors' illustration.

Appendix A.5. Interaction of DEBRA and Pillar Two

Table 7: CoC under DEBRA and Pillar Two

Country	Status Quo	DEBRA		Pillar Two		Interaction	
	CoC	CoC	Δ in pp.	CoC	Δ in pp.	CoC	Δ in pp.
BG	1.33%	0.88%	-0.45	1.27%	-0.06	1.08%	-0.25
CY	0.95%	0.98%	0.03	1.22%	0.27	1.31%	0.36
IE	1.56%	0.97%	-0.59	1.52%	-0.04	1.29%	-0.27
MT	-3.36%	-1.28%	2.08	-0.43%	2.93	-0.32%	3.04

Notes: The table displays the CoC under the status quo, under application of DEBRA and Pillar Two, and the interaction, i.e., simultaneous application of DEBRA and Pillar Two. For all scenarios, 100% new equity financing is assumed. The columns named "Δ in pp." show the difference between the countries' CoC of the column-specific scenario and the respective CoC under the status quo.
Source: Authors' illustration.

Table 8: CoC under DEBRA and Pillar Two (Common Tax Base Scenario)

Country	Status Quo	DEBRA		Pillar Two		Interaction	
	CoC	CoC	Δ in pp.	CoC	Δ in pp.	CoC	Δ in pp.
BG	1.34%	0.89%	-0.45	1.29%	-0.05	1.14%	-0.20
CY	0.90%	0.93%	0.03	1.16%	0.26	1.20%	0.30
IE	1.53%	0.93%	-0.60	1.48%	-0.05	1.25%	-0.28
MT	-3.57%	-1.48%	2.09	-0.64%	2.93	-0.52%	3.05

Notes: The table displays the CoC under the status quo, under application of DEBRA and Pillar Two, and the interaction, i.e., simultaneous application of DEBRA and Pillar Two. For all scenarios, 100% new equity financing and the application of a common tax base are assumed. In the common tax base scenario, straight-line depreciation of buildings (28 years), machinery (7 years), and intangibles (5 years) is assumed. For inventories, the weighted average cost method is applied. The columns named "Δ in pp." show the difference between the countries' CoC of the column-specific scenario and the respective CoC under the status quo.
Source: Authors' illustration.

Appendix A.6. Summary Statistics

Table 9: Summary Statistics (EATR)

Scenario	*Status Quo*		*DEBRA*		*Pillar Two*		*Interaction*	
	Baseline	*Common Tax Base*	*Baseline*	*Common Tax Base*	*Baseline*	*Common Tax Base*	*Baseline*	*Common Tax Base*
Mean	21.10%	21.14%	17.80%	17.84%	21.91%	21.95%	18.68%	18.73%
Standard Deviation	7.16%	7.36%	5.84%	6.02%	5.68%	5.84%	4.52%	4.64%

Notes: The table displays the mean and standard deviation of all sample countries' EATRs for the specific scenario. For all scenarios, 100% new equity financing is assumed.
Source: Authors' illustration.

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