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# Firm-wide Effects of Earnings Stripping Rules

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**Abstract**

This paper estimates the impact of the earnings stripping rule reform by the ATAD Directive on the firm-wide external debt ratio of large multinational firms in the European Union in 2019. The analysis is based on the consolidated financial statements of STOXX Europe 600 constituents in 12 different Member States between 2014 and 2022. Firms that were not subject to a limitation of total interest expenses before the reform reduced their external debt ratio by 2.1 percentage points on average, which indicates an 8.3 percent decrease based on the pre-reform average external debt ratio of treated firms. The effect is lower at 1.3 percentage points but equally significant upon variations in the control group. The estimation results indicate that firms restricted in only internal interest expenses before the reform, firms in sink tax havens, and firms in industries with naturally higher net-interest-to-EBITDA ratios were particularly strongly affected by the reform. The findings suggest that the earnings stripping rule reform in the European Union significantly affected the external tax-related debt bias of large multinational firms.

*Keywords:* capital structure; earnings stripping rule; interest limitation; tax avoidance

## 1 Introduction

In most countries, interest expenses resulting from a loan are usually deductible from the taxable income at the corporate level, whereas dividends must be paid out of after-tax corporate income. Therefore, debt has systematic tax advantages in comparison to equity in most corporate taxation systems, incentivizing companies to increase their leverage (DeAngelo and Masulis, 1980, p. 21; Modigliani and Miller, 1958, p. 293; Modigliani and Miller, 1963, p. 434). For multinational firms, the incentive to manipulate their capital structure is increased due to their ability to exploit international tax differentials by giving internal loans from affiliates in countries with a relatively low tax burden to affiliates in countries with a relatively high tax burden (Desai et al., 2004, p. 2484; Huizinga et al., 2008, p. 1165).

International debt shifting is one of the main channels, besides transfer pricing and the allocation of intangibles, of corporate tax avoidance (Heckemeyer and Overesch, 2017, p. 986; Tørsløv et al., 2023, p. 1518). Due to the mobility of capital, debt-shifting between controlled entities is arguably one of the simplest methods of international profit-shifting (OECD, 2015a, p. 11). One prominent legislative answer to prevent excessive interest deductions that could erode tax revenues is interest limitation rules (ILR). Interest limitation rules aim to protect the domestic tax base by denying interest expense deductibility for tax purposes above a certain threshold.

In 1971, Canada was the first OECD country to implement an interest limitation rule, followed by Australia (1987) and the U. S. (1989) (Buettner et al., 2012, p. 930). Similar regulations became increasingly popular, and by 2005, around two-thirds of OECD members and more than half of EU Member States had implemented some form of interest limitation rule (Blouin et al., 2014, pp. 23 f. Buettner et al., 2012, p. 931; Ruf and Schindler, 2015, p. 19). This "first generation" of interest limitation rules is called thin capitalization rules (TCR) and limits interest expenses, usually only on internal loans from foreign affiliates, if the entity exceeds a certain debt-to-equity ratio (Blouin et al., 2014, p. 8; Buettner et al., 2012, p. 931).

The empirical studies by Blouin et al. (2014) and Buettner et al. (2012, pp. 935 f.) suggest that thin capitalization rules are successful at reducing the internal leverage of affected affiliates, which generally implies their effectiveness against debt-shifting (see also: Overesch and Wamser, 2010, p. 572; Weichenrieder and Windischbauer, 2008, p. 29). However, theoretical literature expresses concerns that thin capitalization rules may adversely affect investment due to an increase in the cost of capital (Mardan, 2017, pp. 3 ff.) and fuel tax competition (Haufler & Runkel, 2012, p. 1094). Both Buettner et al. (2018, p. 16) and De Mooij and Liu (2021, p. 5) find adverse effects on investment upon the implementation of thin capitalization rules. The

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results by Buettner et al. (2012, p. 935), Blouin et al. (2014, p. 16) and Wamser (2014, p. 18) indicate that firms partly substitute external debt for internal debt as an answer to a restriction on only internal interest expenses. Additionally, a simple debt-to-equity ratio is susceptible to manipulation, as corporations may specifically increase the equity of affiliates to avoid an interest limitation (Goyvaerts and Roggeman, 2020, p. 43; OECD, 2015a, p. 97; Weichenrieder and Windischbauer, 2008, p. 14).

The weak points mentioned, as well as the increased awareness of the risk of excessive corporate debt levels through the global financial crisis in 2008, contributed to the popularity of the "second generation" of interest limitation rules (Bachmann et al., 2015, p. 2; IMF, 2009, p. 12). These so-called earnings stripping rules (ESR) generally[1] limit internal and external interest expenses if the net interest expenses of an entity exceed a specific ratio of its adjusted income for tax purposes (OECD, 2017, pp. 198 ff.). Germany was the first[2] country to replace its existing thin capitalization rule with a standalone earnings stripping rule in 2008, followed by a variety of European countries that either instituted an earnings stripping rule standalone or on top of an existing thin capitalization rule (for an overview see: Gresik et al., 2017, p. 69).

Theoretical literature tends to favor earnings stripping rules over thin capitalization rules as welfare optimal, especially in developed high-tax countries (Gresik et al., 2017, p. 74; Kalamov, 2020, p. 61; Mardan, 2017, p. 10). Both Buslei and Simmler (2012, p. 20) and Alberternst and Sureth-Sloane (2016, p. 27) find a significant reduction in the debt-to-asset ratios of affected firms upon the implementation of the German earnings stripping rule in 2008 (see also: Dreßler & Scheuering, 2012, pp. 20 ff.). Buslei and Simmler (2012, p. 25) found no adverse effects on investment in the context of the German earnings stripping rule reform in 2008. Carrizosa et al. (2023) analyze the tightening of the existing regulation in America in 2017 and find that affected firms decreased their leverage significantly. Nonetheless, concerns about tax competition due to heterogeneity in interest limitation rules remained, and a growing voice called for a coordinated supranational approach to interest limitation rules (European Commission, 2007, p. 9; G20, 2012, p. 8; OECD, 1998, p. 9).

The first multilateral initiative to standardize interest limitation rules was launched by the G20/OECD (2013, p. 17) in 2013 as part of their action plan on Base Erosion and Profit Shifting (BEPS). In 2016, the European Commission issued the EU Anti-Tax Avoidance Directive 2016/1164 (ATAD I), which adopts the OECD's suggestion for an earnings stripping rule for its Member States as a mandatory adaptation until 2019. By analyzing the effect of the earnings stripping rule reform in the European Union in 2019 on the consolidated capital structure of the largest listed European corporations, I want to add to the existing literature in two main aspects. Firstly, no prior study estimates the effects of earnings stripping rules on the consolidated capital structure of large multinational firms. Prior studies on earnings stripping rules relied on individual financial statements (Alberternst and Sureth-Sloane, 2016, p. 14; Buslei and Simmler, 2012, p. 14; Dreßler and Scheuering, 2012, p. 14). I argue that the effectiveness of earnings stripping rules can only be thoroughly evaluated at the group level since adjustment effects due to tax restructuring may not be apparent at an individual firm level. De Mooij and Hebous (2018, p. 374) found a significant decrease in the external debt ratio of consolidated firms upon a restriction of total interest expenses, but do not specifically focus on multinational firms or earnings stripping rules. Secondly, as of November 2023, more than 140 countries committed to the implementation of the BEPS framework (OECD, 2023a). Empirical findings on the first multilateral implementation of the OECD's earnings stripping rule recommendation are relevant for policymakers to address existing deficiencies, understand intra-EU tax competition, and support policymakers in countries that plan to adopt the BEPS best practice approach into national law.

My analysis is based on the consolidated financial statements of the STOXX Europe 600 constituents from 2014 to 2022 and focuses on EU Member States. The firm-level financial data is augmented with data I collected on the European Union's pre- and post-reform country-level characteristics of interest limitation rules. The research design is based on a fixed-effects difference-in-difference (DID) approach. The control group consists of firms in those Member States with an equally effective interest limitation rule prior to the reform, as determined by the European Commission (2018, p. 1). I find a 2.1 percentage point reduction in the external debt-to-asset ratio of firms that were not limited in total interest expenses before the reform, which indicates an 8.3 percent decrease based on the pre-reform average external debt ratio of treated firms. The effect is lower at 1.3 percentage points but equally significant if I exclude French firms from the control group. I find a particularly consistent and strong reaction from firms that were only restricted in their internal interest expenses before the reform, which may indicate the "reversal" of the substitution effect between external and internal debt found in prior studies (Buettner et al., 2012, p. 936; Wamser, 2014, p. 22). I expect tax havens to act as net creditors in the context of debt shifting. I postulate that sink tax havens depend on external debt to fund the transfer of intangible assets. Consistent with my hypothesis, sink tax havens experienced a notable decrease of 4.3 percentage points in their external debt ratio following the reform. Lastly, the results indicate that firms operating in industries with inherently higher net-interest-to-EBITDA ratios are affected more strongly on average by the reform. How-

[1] Finland, Norway and Slovakia temporarily had earnings stripping rules in place that only limited internal interest expenses (De Mooij & Hebous, 2018, p. 370).

[2] The U. S. combined a thin capitalization rule with a variant of an earnings stripping rule back in 1989 (Umbrecht & Llewellyn, 1994, pp. 650 f.). The combined rule only restricted internal interest expenses of foreign affiliates and only if both the debt-to-equity and net-interest-to-adjusted-income ratios were exceeded. It can therefore not be directly compared to a modern standalone earnings stripping rule.

ever, outliers suggest potential variations in the availability of escape clauses across different industries. My results indicate that the earnings stripping rule reform in the European Union significantly affected the external debt bias of large multinational firms.

Section 2 of this paper starts with the institutional background of interest limitation rules. Section 3 provides a literature review on both thin capitalization and earnings stripping rules. Section 4 explains the best practice approach as recommended by the OECD. Section 5 gives an overview of the national implementation of the earnings stripping rule reform in the European Member States and their pre-reform interest limitation rules. Section 6 presents my four main hypotheses. Sections 7 and 8 outline the research design and descriptive statistics, respectively. Section 9 presents my empirical results, followed by robustness tests and extensions in Section 10. Lastly, Section 11 concludes and outlines potential avenues for future research.

## 2 Institutional Background of Interest Limitation Rules

Prior research largely categorizes earnings stripping rules as a subcategory of thin capitalization rules. Some authors refer to debt-to-equity ratio-based rules as "safe harbour" (Gresik et al., 2017; Ruf and Schindler, 2015) or "safe haven" rules (Mardan, 2017) and to earnings-related restrictions as "earnings stripping" rules. The majority of the literature on the German earnings stripping rule in 2008 uses the literal German translation "interest barrier" as a subcategory of thin capitalization rules (Alberternst and Sureth-Sloane, 2016; Buslei and Simmler, 2012; Dreßler and Scheuering, 2012). Ruf and Schindler (2015, p. 19) argue that the "differentiation [between thin capitalization rules and earnings stripping rules] is too semantic". This argument may have been sufficient when earnings stripping rules were still of secondary importance, but it is no longer appropriate for the current state of development. I would like to address three points that illustrate the deficiencies of the previous nomenclature.

Firstly, both terms "safe haven rule" and "safe harbor rule" for debt-to-equity rules are misleading. It is not apparent why a net-interest-to-earnings ratio would be less of a safe harbor than a debt-to-equity ratio, except that one might argue that a debt-to-equity ratio is easier to control. However, earnings stripping rules usually include additional net-interest safe harbors, which makes the terminology inconsistent. The standalone term "safe haven/harbor rule" is also very impractical for potential future discussions in the context of other tax legislation, for example, the safe harbor rules of Pillar II (OECD, 2022a). Secondly, both rules are inherently different in their technical design and target different categories of financial ratios. Thin capitalization rules are based on balance sheet information, and firms need to consider their balance sheet figures to avoid interest limitations. Earnings stripping rules rely on information from the profit-and-loss statement, and companies must consider their operating figures to avoid interest limitations. Thirdly, Ruf and Schindler (2015, p. 19) state that "both set of [...] rules have analogous effects". Earlier empirical studies (Alberternst and Sureth-Sloane, 2016, p. 27; Buslei and Simmler, 2012, p. 29; Carrizosa et al., 2023, pp. 13 ff. Dreßler and Scheuering, 2012, pp. 20 ff.) and theoretical literature (Gresik et al., 2017, p. 75; Mardan, 2017, p. 13) suggest that earnings stripping rules entail different adjustment effects than thin capitalization rules. Furthermore, thin capitalization rules tend to restrict internal interest expenses only, whereas earnings stripping rules tend to limit total interest expenses. Unfortunately, this is not a reliable distinction as some countries deviate from this classification (see Section 2.2). I specifically differentiate between thin capitalization and earnings stripping rules as two separate categories of interest limitation rules. This is consistent with the OECD's (2017, p. 202) updated final report on debt shifting.

### 2.1 Debt and Taxes

In a purely domestic scenario, the (corrected) seminal theoretical work by Modigliani and Miller (1958, p. 293) and Modigliani and Miller (1963, p. 434) states that tax advantages of debt are the only permanent advantages resulting from variation in corporate finance structure. Further developed extensions of the traditional static trade-off theory suggest that a firm finds its optimal capital structure when the marginal benefit (e. g. tax savings)[3] equals the associated marginal cost (e. g. bankruptcy and/or agency costs) of an increase in the share of debt (Bradley et al., 1984, p. 858; DeAngelo and Masulis, 1980, p. 21; Kraus and Litzenberger, 1973, p. 915; S. C. Myers, 1977, p. 172; Stiglitz, 1969, p. 788).[4] While the theories vary in assumptions and specifications, most stress that taxes are likely to be one of the driving determinants of optimal financing structure (Barclay and Smith, 2005, p. 9; Marsh, 1982, p. 122).

It has been particularly difficult to empirically prove the corporate debt sensitivity to tax incentives in a domestic setup and earlier studies found no significant (Mayer, 1990, p. 320) or ambiguous (Rajan & Zingales, 1995, p. 1444) results. However, studies employing a more sophisticated identification approach did find significant and economically strong effects of tax rates on corporate debt (Graham, 1996, p. 71; MacKie-Mason, 1990, p. 1483). Studies that employ a refined research method with the correct control variables, excluding multinational subsidiaries, find a substantial tax effect with a 2.3 percentage point increase in debt-to-assets ratios on average if the marginal tax rate increases by 10 percentage points (Feld et al., 2013, p. 2857). Heider and Ljungqvist (2015, p. 708) show that taxes have a first-order effect on capital structure. The inherent tax advantage of debt over equity is commonly referred to as debt bias

[3] Notably, more recent literature suggests that there are other benefits to debt, e. g. it can discipline overspending managers (Huizinga et al., 2008, p. 81).

[4] There are other theories on corporate finance which do not identify tax rates as first order decision relevant, see e. g. Pecking Order theory (Donaldson, 1961; S. C. Myers and Majluf, 1984).

(De Mooij and Hebous, 2018, p. 369; Heckemeyer and de Mooij, 2017, p. 53).

Apart from Miller (1977, p. 262), who hints in a footnote that multinational companies seem to face different debt-related tax incentives than domestic companies, early theoretical literature has largely excluded the special position of multinationals. To understand the aggravated tax incentives for multinationals, one needs to differentiate between the two general types of debt financing, external and internal debt. In this context, external debt is defined as loans borrowed from the external capital market. External debt constitutes a liability generating interest expenses at a consolidated corporate group level. Internal debt is defined as loans between related affiliates, thus a mere redistribution of cash within the group (Desai et al., 2004; Huizinga et al., 2008). Generally, intercompany loans on a national level do not generate tax advantages since the interest expense deductible at one affiliate is taxed at the same tax rate as interest income at the other.[5] This is different for cross-border intercompany financing since the tax rates between the different affiliates might differ significantly due to different national corporate tax regimes. Therefore, internal debt can be used to exploit the same tax advantage as external debt, only without the disadvantage of interest payments to third parties. It was Hodder and Senbet (1990, p. 1513) who extended the Miller equilibrium to an international setting and state that in equilibrium, multinational companies exploit international tax differentials by taking on debt in the most tax-advantageous jurisdictions.

The empirical research provides strong evidence on international tax arbitrage. Desai et al. (2004, p. 2452) and Huizinga et al. (2008, p. 81) find that a 10 percentage points higher local tax rate indicates a higher debt ratio of that affiliate on average between 2.4 and 2.8 percentage points (see also: Buettner et al., 2009, p. 310; Mintz and Weichenrieder, 2005, p. 10). Feld et al. (2013, p. 2852) analyze 46 prior empirical studies and find that the average marginal tax effects on debt for multinational companies are almost twice as strong compared to purely national firms. The results by Desai et al. (2004, p. 2452) suggest that internal leverage is especially sensitive to tax differentials, indicating that the incentive to use internal loans is strongly tax-influenced. The exploitation of international tax differentials through a corporate group's capital structure is commonly referred to as debt shifting (De Mooij and Hebous, 2018, p. 369; Heckemeyer and de Mooij, 2017, p. 53).

### 2.2 Thin Capitalization Rules and Earnings Stripping Rules

A far-reaching reform of tax law and equalization of debt and equity has often been sought after but has not yet been successful, mainly due to the complexity of a reform and budgetary constraints (De Mooij, 2012, p. 489).[6] Instead, countries have opted for various interest limitation rules to adapt to their existing tax system. Limiting existing systematic tax-related advantages of debt can arguably be seen as the second-best solution to combat excessive debt financing. The most prominent interest limitation rules are thin capitalization rules and earnings stripping rules.

Most thin capitalization rules determine a debt-to-equity ratio up to which all interest is deductible without restrictions.[7] The threshold is usually defined by the ratio of total or internal debt to equity. Above that ratio, the deduction of interest expenses is denied. Generally, only interest payments to related parties are restricted, regardless of whether the ratio is determined by internal or total debt. However, some countries restrict total interest expenses based on thin capitalization rules which has not been considered in earlier literature except by De Mooij and Hebous (2018, p. 370). One must be especially cautious when interpreting earlier studies on this matter, as some differentiate between the chosen debt ratio (total or internal debt) and some between the form of interest affected by the restriction (total or internal interest). Certain countries reclassify excess interest as dividends, which can entail additional withholding taxes. Originally, most thin capitalization rules only limited internal interest expenses to foreign affiliates and did not apply to internal finance by domestic investors (Blouin et al., 2014, p. 23; Buettner et al., 2012, p. 932).[8] This is intuitive, given that thin capitalization rules were specifically designed to curb international tax avoidance and should not restrict national firms.

However, the exclusive restriction of internal interest expenses to foreign subsidiaries has led to a groundbreaking legal dispute in Europe. In December 2002, the European Court of Justice (ECJ) ruled in the "Lankhorst-Hohorst case" (2002, C-324/00) that the German thin capitalization rule (prior to 2004) infringed upon the principle of "freedom of establishment" since it discriminated against investors from other EU countries. Hence, most EU members had to adjust their existing thin capitalization rules to comply with the internal market principles (for details, see: Ruf & Schindler, 2015, p. 20). Thin capitalization rules still play an important role in many jurisdictions. The last official report from the OECD (2020, p. 50) on this matter states that out of 134 members of the OECD's Inclusive Framework, 67 juris-

[5] In certain scenarios purely national intercompany loans can lower a group's effective tax rate if there are differences in the affiliates effective tax rates, e. g. differences in the legal forms of the two companies, the existence of loss carryforwards or differences in provincial/territorial income taxes.

[6] The most recent approaches to (partially) harmonize the treatment of equity and debt are the DEBRA (European Commission, 2022) project in Europe, which is currently suspended, and the blueprint "A Better Way for Tax Reform" (Ways and Means Committee, 2016) in the United States. A working group around Michael P. Devereux (Devereux et al., 2021) currently elaborates the details of a Destination-Based Cash Flow Taxation (DBCFT) system which would also ensure neutral treatment of debt and equity.

[7] New Zealand as an exception still employs a thin capitalization rule that relies on a debt-to-asset ratio (PwC, 2024a).

[8] De la Feria and Dourado (2008) provide an in-depth overview on thin capitalization rules in the European Union around 2007.

dictions employ an interest limitation rule and around two-thirds still solely rely on a thin capitalization rule.

> "Given the large potential macroeconomic damage from excess leverage [. . .], it is hard to see why – as now is often the case – debt finance should be systematically tax favored." – (IMF, 2009, p. 12)

While earlier tax policy mainly focused on debt-shifting via internal debt, the global financial crisis around 2008 increased the awareness of general systematic risks of external debt (Bachmann et al., 2015, p. 2; Heckemeyer and de Mooij, 2017, p. 500; IMF, 2009, p. 12). A high level of debt within a firm increases the likelihood of bankruptcy due to the consistent cash outflow of interest payments (Auerbach, 2002, p. 1267; Stiglitz, 1972, pp. 459 f.). General overborrowing in an economy significantly increases the probability and severity of a financial crisis (Bianchi, 2011, p. 3400). While tax-related debt bias is not the only reason for overborrowing, it certainly contributes to it (De Mooij, 2012, p. 498). Hence, jurisdictions aimed to address both debt bias and debt-shifting in future policies, contributing to the popularity of the so-called earnings stripping rules. Earnings stripping rules target interest expenses directly and deny interest expense deductibility above a certain net-interest-to-profitability ratio, usually a firm's earnings before interest, taxes, depreciation, and amortization (EBITDA). Even though the initial goal of Earnings stripping rules was to target total interest expenses, some countries apply a restriction on internal interest expenses only (see Table 15 in the Appendix). Currently, all European Member States (see Table 6) and around 60 percent of the G20 states apply an earnings stripping rule (see Table 15 in the Appendix).

### 2.3 Interest Limitation Rules – an Overview

So far, I have emphasized thin capitalization and earnings stripping rules as the main tools to limit excessive interest expenses. Even though those are the most prominent, they are not the only interest limitation rules countries apply to restrict debt shifting. Most countries combine multiple limitations to close loopholes or to address certain country-specific tax risks (OECD, 2017, pp. 23-26). I want to briefly highlight the most common regulations and why they are usually insufficient as standalone measures to prevent debt shifting. Table 1 gives an overview of the outlined regulations and their effect on debt bias and debt shifting.

Most jurisdictions (OECD, 2023b) apply the OECD transfer pricing guidelines, which state that any intra-group transaction must be priced at the arm's length principle, hence priced as it would have been between unrelated third parties. The often subjective and difficult estimation of a correct transfer price leaves leeway to set the most tax-advantageous transfer price in a range of acceptable prices. Scandals like the Luxembourg Leaks and their multinational companies' very accommodating Advanced Pricing Agreements (APA), as well as academic studies (Heckemeyer & Overesch, 2017; Sikka & Willmott, 2010; Swenson, 2001), have shown that manipulating transfer prices is one of the most prominent channels for international tax avoidance. Furthermore, even if a correct transfer price on interest is set, a tax advantage from debt shifting is only restricted but not fully prevented. Transfer pricing regulations do not limit the general debt bias regarding third-party debt.

**Table 1:** Categories of Interest Limitation Rules

Notes: Table 1 gives an overview of the most prominent anti-tax avoidance regulations countries employ to safeguard their tax base concerning debt bias and debt shifting. Source: own presentation, see text.

| | Aimed at | |
|---|---|---|
| | Debt bias | Debt shifting |
| 1. Arm's length principle | x | Yes |
| 2. Withholding taxes | x | Yes |
| 3. CFC-Rules | x | Yes |
| 4. Thin Capitalization Rules | usually not | Yes |
| 5. Earnings stripping rules | usually yes | Yes |

Withholding taxes are, in theory, very well suited to curb tax incentives for cross-border intragroup financing, as they reallocate taxing rights to the source country. Therefore, interest income from internal loans is taxed at the same tax rate as interest expenses, preventing tax arbitrage. In reality, most bilateral tax treaties assign tax rights to the country of residency of the foreign bondholder and reduce or abolish the withholding taxes, which leaves them insufficient to prevent debt shifting fully (Buettner et al., 2009, p. 931). Multinational firms have been shown to specifically set up affiliates in countries with the most favorable tax treaty networks to avoid withholding taxes, so-called "treaty shopping" (Weyzig, 2013, p. 911). Like transfer pricing regulations, withholding taxes do not affect the general debt bias.

Lastly, many countries employ some form of Controlled Foreign Company (CFC) regulations (OECD, 2024a). Firms may establish affiliates in low-tax countries to reallocate mobile or passive activities. The OECD specifically lists financial and banking services as activities with a high risk for base erosion and profit shifting (OECD, 2015b, p. 43). CFC rules apply in the context of controlled foreign entities and usually only if the host country is below a certain effective or nominal tax rate. Consequently, the taxing rights on profits generated by the foreign-controlled company are (partly) reallocated to the parent company's country. Again, CFC rules do not address the general debt bias and may be circumvented through the interposition of conduit tax havens (Lejour, 2021, p. 2).

## 3 Literature Review

The heterogeneity of interest limitation rules makes consistent and correct categorization extremely challenging. Earlier literature partly relied on insufficient distinctions between types of interest limitation rules or even incorrect assumptions. Mardan (2017, p. 1) states that interest limitation rules generally restrict only internal interest expenses

and only vary in their threshold based on debt-to-equity or net-interest-to-EBITDA ratios. The author lists Germany and Spain as examples of internal interest restrictions through an earnings stripping rule, even though both countries restricted total interest expenses at the time of his study. Gresik et al. (2017, p. 69) state that earnings stripping rules restrict interest payments on internal debt, which is again incorrect or at least insufficient in detail, as most rules they list restrict internal and external interest expenses. Only Kalamov (2020, p. 39) acknowledges that earnings stripping rules vary in their scope of interest restriction. All of these studies assume that thin capitalization rules (or safe harbor rules, as some authors call them) only limit internal interest expenses, which is again not universally true (De Mooij & Hebous, 2018, p. 370). Therefore, all further outlined theoretical studies only consider a limitation of internal interest expenses in their model and only compare the effect of different threshold ratios.

Haufler and Runkel (2012, p. 1094) show that thin capitalization rules are inefficiently lax under tax competition since they can be used to attract foreign investment at a lower cost than changes in the statutory tax rate. Furthermore, multinational companies are tax-favored over national firms in a non-cooperative tax equilibrium, as national firms can not exploit the inefficiently lax allowance on internal debt. Thin capitalization rules are vulnerable to transfer price manipulation on interest rates as they do not directly consider interest payments under their threshold. Under an earnings stripping rule, a manipulation of transfer prices that leads to excessive interest payments is potentially restricted by the net-interest-to-EBITDA ratio.[9] The theoretical literature concludes that earnings stripping rules are more effective at curbing transfer price manipulations while thin capitalization rules incentivize transfer pricing manipulation (Gresik et al., 2017, p. 75; Kalamov, 2020, p. 55; Mardan, 2017, p. 9). Gresik et al. (2017, p. 74) argue that earnings stripping rules are superior to thin capitalization rules for any regime with a positive tax rate because the adverse effect on investment is only a second-order effect. Countries must be financially developed enough that a higher effective tax rate does not significantly lower investment (Mardan, 2017, p. 10). A multilateral coordination of interest limitation rules could reduce the adverse effects of tax competition and could reduce incentives for debt shifting more effectively (Haufler & Runkel, 2012, p. 1099). The theoretical literature deems earnings stripping rules to be welfare-optimal over thin capitalization rules as a tool to restrict internal interest expenses, especially in developed high-tax countries (Gresik et al., 2017, p. 75; Kalamov, 2020, p. 61; Mardan, 2017, p. 13).

[9] A recently published draft law by the German government contained an attempt to restrict transfer pricing regulations with regard to internal interest payments explicitly by law (German Parliament, 2023b, p. 133). This indicates that transfer price manipulation is still of relevance in an earnings stripping rule regime.

### 3.1 Thin Capitalization Rules

Table 2 provides an overview of key empirical results from prior studies on thin capitalization rules and their sample and time horizon. The table focuses on the effect on internal leverage ratios, which is the main emphasis of most studies, and therefore only shows a selection of the results. Most empirical studies were conducted before European Countries adapted their legislation due to the ECJ ruling. All studies only consider restrictions on internal interest expenses. The empirical research on thin capitalization rules has been heavily focused on Germany due to its comprehensive data collection on foreign direct investment (FDI) by the German Bundesbank and its role as a pioneer regarding interest limitation rules.

Both Overesch and Wamser (2010) and Weichenrieder and Windischbauer (2008, p. 14) examine German inbound FDI and find a significant reduction in internal leverage ratios upon the initial implementation of the German thin capitalization rule as well as its reforms in 2001 and 2004, which only restricted interest on internal debt. Overesch and Wamser (2010, p. 570) find that holding corporations react particularly quickly and strongly, with a decrease in internal debt of 10 percentage points, which is approximately a one-third reduction of the pre-reform mean of inter-company debt to capital. This indicates that holdings might have been more frequently used as a tax-planning entity. Buslei and Simmler (2012, p. 2) note that differentiation between external and internal debt may not be as easy in reality, especially in complex corporate groups that can potentially manipulate their shareholding structures. Wamser (2014, p. 22) analyses German inbound FDI around the thin capitalization rule reform in 2001 and finds a 5 percentage point decrease in a firm's internal debt ratio. Furthermore, the results indicate that around 55 percent of the reduction in internal debt is substituted by an increase in external debt (Wamser, 2014, p. 22).

The substitutability between internal and external debt is confirmed by Buettner et al. (2012, p. 935), who analyze the effect of thin capitalization rules on the capital structure of subsidiaries of German multinationals in 36 countries. Buettner et al. (2012, p. 936) consider the heterogeneity of thin capitalization rules between different jurisdictions and find that their effectiveness varies strongly with their specifications. The authors conclude that thin capitalization rules, which rely on a total-debt-to-equity ratio seem to reduce tax incentives for internal debt more successfully (Buettner et al., 2012, p. 937). I argue that the causality of this observation is not necessarily that total debt ratios are more efficient than internal debt ratios but rather that internal debt ratios are too lax in relative comparison, which becomes apparent based on their overview of thin capitalization rules (Buettner et al., 2012, p. 932). Naturally, a 3:1 debt-to-equity ratio is stricter if defined by total debt instead of only internal debt, as the total debt ratio is inherently at least as high as the internal debt ratio. The measure for the strictness of a rule employed by the authors does not consider the difference in baseline levels of total and internal debt (Buettner et al., 2012, p. 932).

**Table 2:** Overview of Empirical Studies on Thin Capitalization Rules

Notes: Table 2 gives an overview of the empirical research on thin capitalization rules, focusing on their effect on the internal leverage ratio and investment. Information on the sample, observation period, and other notable results is also included. Source: own presentation.

| Study | internal leverage ratio | | Investment | Sample | Timeframe | Other results |
|---|---|---|---|---|---|---|
| Buettner et al. (2012) | D/C | decreases | - | German outbound FDI in 36 countries | 1996–2004 | substitution effects |
| Blouin et al. (2014) | D/E | -6.3 percentage points | - | US outbound FDI in 54 countries | 1982–2004 | decrease in consolidated firm value |
| Overesch and Wamser (2010) | D/C | decreases | - | German inbound FDI | 1996–2004 | - |
| Buettner et al. (2018) | - | - | decreases | German outbound FDI in 39 countries | 1996–2007 | decrease in employement |
| Weichenrieder and Windischbauer (2008) | D/E | decreases | no effect | German inbound FDI | 1989–2003 | increase in equity |
| Wamser (2014) | D/C | -5 percentage points | - | German inbound FDI | around 2001 | substitution effects |
| De Mooij and Liu (2021) | - | - | decreases | MNE affiliates in 34 countries | 2006–2014 | - |
| Buettner et al. (2016) | D/C | decreases | - | German outbound FDI in 36 countries | 1996–2004 | capital structure becomes insensitive to tax rate change above threshold |
| Goyvaerts and Roggeman (2020) | D | decreases | - | non-listed Belgium firms | 2008–2014 | increase in equity |

Buettner et al. (2012, p. 936) only observe significant substitution effects of external for internal debt under total debt thresholds. This is counterintuitive, as an increase in external debt under a total debt threshold restricts internal interest expenses indirectly. Again, I argue that this effect is driven by the fact that total debt thresholds are stricter than internal debt thresholds relative to the underlying financial ratio, not because they focus on total debt.

Buettner et al. (2016, 2018) use the data sample on German outbound FDI in two additional studies focusing on the specific effects of thin capitalization rules. In their first follow-up study, the authors analyze the tax sensitivity of capital structures under a thin capitalization regime (Buettner et al., 2016, p. 787). They find that the capital structure of firms restricted in their interest expenses is insensitive to changes in the statutory tax rate (Buettner et al., 2016, p. 793). This aligns with the theoretical implication that thin capitalization rules remove the tax incentive to use internal debt for firms above the threshold. The second follow-up study by Buettner et al. (2018, pp. 565, 568) indicates that thin capitalization rules adversely affect investment and slightly decrease employment, especially in high-tax countries. Furthermore, the authors find that FDI is about twice as sensitive to tax rate changes under a strict thin capitalization regime than an unrestricted regime (Buettner et al., 2018, p. 566). This is consistent with the theoretical reasoning that companies cannot or only partly use increased debt financing to mitigate the impact of a tax rate increase if they are restricted in their interest expenses. De Mooij and Liu (2021, p. 4) find that multinational affiliates reduce their investment by 20.8 percent based on the mean asset level upon the implementation of thin capitalization rules in countries with a 27 percent statutory corporate tax rate. Weichenrieder and Windischbauer (2008, p. 29) find no adverse effects on investment upon the tightening of the German thin capitalization rule in 2001 on German inbound FDI, which may indicate that the reaction of investment differs between highly developed and other countries, in line with the theoretical by Mardan (2017, p. 10).

The study by Blouin et al. (2014, p. 29) suggests that both total-debt and internal-debt-ratio-based thin capitalization rules effectively decreased individual US affiliates' targeted leverage ratios in 54 countries. They do not find a significant reaction of the firm-wide debt-to-asset ratios upon implementation of thin capitalization rules. This is unsurprising, given that the authors focus on thin capitalization rules that restrict internal interest expenses only and, therefore, do not directly affect the external debt ratio of the consolidated group. Even though the consolidated leverage ratios were not affected, the consolidated interest expenses decreased. This could indicate that the adjustment of the firm's financial structure led to less creditor risk, for example through higher equity financing of affiliates, thus lowering interest rates (Blouin et al., 2014, p. 19). Furthermore, Blouin et al. (2014, p. 19) find a significant negative effect on consolidated firm value based on Tobin's q. This aligns with the theoretical implication that a reduced tax advantage of debt finance adversely affects investment and, therefore, firm valuation (Summers et al., 1981, p. 69).

### 3.2 Earnings Stripping Rules

Table 3 provides an overview of key empirical results from prior studies on earnings stripping rules, as well as their sample and time horizon. Empirical studies are few and suffer from little diversity in research design. There are five empirical studies on the effect of earnings stripping rules, four of which analyze the implementation of the German "interest barrier" in 2008 (Alberternst and Sureth-Sloane, 2016;

**Table 3:** Overview of Empirical Studies on Earnings Stripping Rules

Notes: Table 3 gives an overview of the empirical research on earnings stripping rules, focusing on their effect on the total leverage ratio and investment. Information on the sample, observation period, and other notable results is also included. Source: own presentation.

| Study | Debt-to-asset ratio | Investment | Sample | Timeframe | Other results |
|---|---|---|---|---|---|
| Buslei and Simmler (2012) | -5.3 percentage points | no effect | German firms | 2004–2008 | firms split up their assets |
| Carrizosa et al. (2023) | -2.9% | - | U. S. firms | 2014–2018 | firms predominantly decrease long-term debt |
| Dreßler and Scheuering (2012) | No robust effect | - | German limited liability corporations | 2005–2010 | Only above-average leveraged firms react |
| Alberternst and Sureth-Sloane (2016) | -4.7 percentage points | - | German Firms | 2006, 2008 | Companies without liquidity constraints react more strongly |
| Knauer and Sommer (2012) | - | - | 26 leveraged buyouts in Germany | 1997–2008 | Significant reduction of tax shield in leveraged buyouts |
| De Mooij and Hebous (2018) | -5 percentage points | - | consolidated firms in 60 countries | 2005–2016 | restrictions on total interest expenses are more effective |

Buslei and Simmler, 2012; Dreßler and Scheuering, 2012; Knauer and Sommer, 2012) and one which examines the tightening of the existing earnings stripping rule through the Tax Cuts and Jobs Act (TCJA) in the U. S. in 2017 (Carrizosa et al., 2023). All five studies are based on individual firm financial statements. Empirical results on the German earnings stripping rule in 2008 should be treated with caution since those coincided with both a major corporate tax reform and the aftermath of the financial crisis, potentially diluting causal effects (Dreßler & Scheuering, 2012, p. 1).

Nevertheless, results on the German earnings stripping rule are of particular interest since the OECD recommended a best-practice approach based on the German role model (OECD, 2017, p. 29). Germany already had a thin capitalization rule prior to the reform. Therefore, the studies estimate the effect of a switch from a thin capitalization rule to an earnings stripping rule but do not cover the full impact of an earnings stripping rule from an "unregulated" regime.

Buslei and Simmler (2012, p. 24) find that in the unrestricted sample, German firms reduce their debt-to-asset ratio by 2 percentage points on average upon introduction of the earnings stripping rule in 2008. Another specification based on restricted control and treatment groups around the exemption limit indicates a significantly stronger reduction in the debt ratio of around 6 percentage points. This is in line with the expectation that the reform is only relevant for firms threatened by an application of the threshold. Furthermore, Buslei and Simmler (2012, p. 24) find suggestive evidence that firms try to bypass the interest restriction by splitting up their assets to make repeated use of the exemption limit. The study does not show any significant effects on investment levels in the short run. The authors conclude that firms either have low substitution cost of equity for debt, that firms find ways to avoid the interest limitation in the long term or that most affected firms do not shift profits.

Dreßler and Scheuering (2012) only find a significant effect on the debt ratio of German firms upon the reform in 2008 if the treatment group showed a higher average debt ratio pre-reform than the control group. The authors conclude that highly indebted firms generally try to lower their debt ratio or that the cut in the corporate income tax causes the adjustment in capital structure (Dreßler & Scheuering, 2012, p. 28). Only Dreßler and Scheuering (2012, p. 12) differentiate between the reaction of external and internal debt and find that the reaction is driven by a decrease in external debt. This is conclusive, given that the pre-reform thin capitalization rule had already restricted internal interest expenses. Alberternst and Sureth-Sloan find that treated German firms reduced their debt ratio by 4.7 percentage points upon the earnings stripping rule reform in 2008. Alberternst and Sureth-Sloane (2016, p. 11) define their treatment group as firms that cannot use escape clauses and are above the net-interest-to-EBITDA threshold based on their pre-reform characteristics in 2006. Unfortunately, the authors do not report whether their treatment group had a significantly higher absolute debt ratio before the reform, which could result in a similar bias as observed by Dreßler and Scheuering (2012).

Knauer and Sommer (2012, p. 209) analyze the effects of the German earnings stripping rule reform on the tax shield in the context of leveraged buyouts. The tax shield consists of the present value of all tax-induced savings from debt financing. The authors find that around 78 percent of buyouts should be affected by the new earnings stripping rule in the first year after the reform, significantly weakening the incentive for excessive debt-financed buyouts (Knauer & Sommer, 2012, p. 223). Concerning a change in tax revenues upon the earnings stripping rule reform in Germany, Broer (2009, p. 411) estimates an increase between EUR 809m and EUR 2,537m and Bach and Buslei (2009) an increase of around EUR 800m based on microsimulation models. Broer (2009, p. 411) concludes that after the reform, there is no tax incentive for parent companies in other EU Member States to favor debt over equity financing for affiliates in Germany, except for Estonia and Cyprus. Carrizosa et al. (2023) are the only authors to study the effects of earnings stripping rules outside of Germany. They find that affected U.S. firms decreased their leverage by 2.9 percent of assets upon tightening of the existing earnings stripping rule, which was implemented as part

of the Tax Cuts & Jobs Act in 2017.

Lastly, I want to highlight the study by De Mooij and Hebous (2018), which is the only study to include both earnings stripping and thin capitalization rules in its analysis based on consolidated firms in 60 countries between 2005 and 2016. Contrary to prior literature, they do not differentiate between earnings stripping and thin capitalization rules but rather between a restriction of internal or total interest expenses. Therefore, the observed firm-wide effects cannot be attributed to the type of interest limitation rule but only to the type of interest that is limited. De Mooij and Hebous (2018, p. 374) find a 5 percentage point decrease in the firm-wide debt ratio on average upon a restriction of total interest expenses. The results suggest that a limitation on total interest expenses is highly effective at reducing the debt bias of firms, even at the consolidated group level.

All prior empirical studies on earnings stripping rules coincide with major tax law reforms and, in the case of Germany, the global financial crisis around 2008. The only study that considers firm-wide effects of a restriction of total interest expenses does not focus on earnings stripping rules in particular and does not differentiate between national and multinational firms (De Mooij & Hebous, 2018, p. 11). We know surprisingly little about the impact of earnings stripping rules on the capital structure of large multinational groups, which are at least the focus of earnings stripping rules in aspects of debt shifting. As such, this paper aims to extend our knowledge of the firm-wide effects of earnings stripping rules based on the earnings stripping rule reform in the European Union in 2019, which builds on the OECD's best practice approach recommendations.

## 4 The OECD's Best Practice Approach to Interest Limitation

For almost twenty years, the OECD (1987, p. 33) specifically discouraged Member States from implementing "hard and fast debt-equity" (OECD, 1979, pp. 88 f.) rules and recommended a flexible approach to judge the adequacy of interest expenses on an individual case basis. It was not until 1998 that the OECD (1998, p. 9) realized that a purely individual case basis is widely insufficient to prevent debt shifting and identified debt shifting as a harmful tax practice of significant importance. The first multilateral initiative to standardize interest limitation rules was launched by the G20/OECD (2013, p. 17) in 2013 as part of the action plan on Base Erosion and Profit Shifting (BEPS), which emphasizes 15 action points to tackle international tax avoidance. The OECD released its recommendation on limiting BEPS based on interest deductions and other financial payments in 2015 (OECD, 2015c, p. 25), followed by a more comprehensive updated version in 2017 (OECD, 2017, p. 29). The updated version is mostly identical with the addition of details on the proposed group ratio rule as well as recommendations on how to deal with banks and insurance groups (OECD, 2017, p. 117 and 169). The earnings stripping rule proposed by the OECD (2023a) is of particular interest as 145 states are members of the inclusive framework on BEPS as of November 2023.

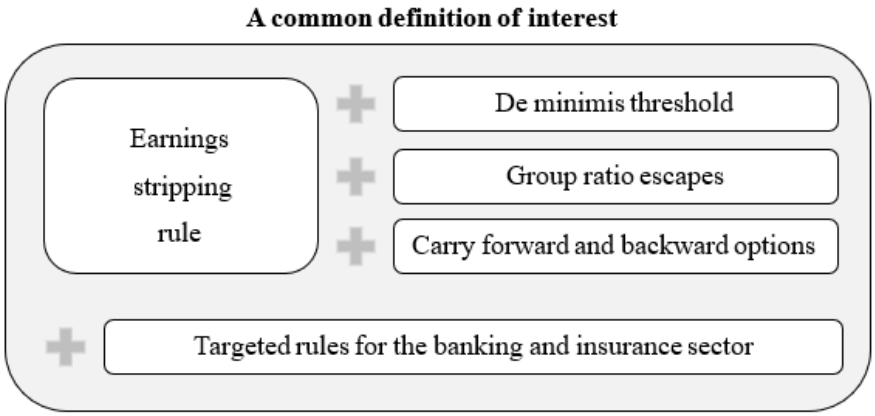
In line with prior research results and national trends, an earnings stripping rule with a fixed ratio of net-interest-to-EBITDA, very similar to the German "interest barrier", was proposed as a best practice approach by the OECD in 2015 (OECD, 2015a, p. 25). Proposals for a de minimis threshold, a group ratio escape, and certain carry forward and carry backward options amend the core fixed ratio limitation. Additionally, countries may consider a common definition of interest and implement targeted rules to address country-specific risks, as well as specific rules for the banking and insurance sectors. Table 4 gives an overview of the proposed earnings stripping rule with optional amendments. Furthermore, I aim to put previous literature into context with the recommendations of the OECD to assess whether the best practice approach aligns with theoretical and empirical results.

The OECD (2017, p. 29) encourages Member States to implement an earnings stripping rule that limits an entity's net interest deductions above a fixed percentage of its profits, measured by EBITDA based on tax numbers. Net interest expenses are interest expenses less interest income. The restriction of both external and internal interest expenses is recommended to prevent the observed substitution effects between internal and external debt in prior empirical studies that were noted earlier (Blouin et al., 2014, p. 16; Buettner et al., 2012, p. 935) and to reduce both tax avoidance and general risks of insolvency based on the German role model (German Parliament, 2007, p. 31). As the rule only restricts net interest expenses, entities can always deduct their interest expenses at least in the amount of their interest income. The advantage over the classic thin capitalization rule is that the limit is directly linked to economic activity and is not as easy to manipulate. The OECD's recommendation is in line with the general theoretical research on earnings stripping rules (Gresik et al., 2017, p. 75; Mardan, 2017, p. 12) as well as the empirical results (Alberternst and Sureth-Sloane, 2016, p. 27; Buslei and Simmler, 2012, p. 29; Dreßler and Scheuering, 2012, p. 28) and microeconomic simulations on the introduction of the German earnings stripping rule in 2008 (Bach and Buslei, 2009, p. 32; Broer, 2009, p. 411). Even though EBITDA is determined as the first measure of choice, it can also be reasonable to use Earnings Before Interest and Taxes (EBIT) or, in rare cases, based on asset values instead of earnings.[10] If a country relies on net-interest-to-EBITDA as a limitation, the OECD (2017, p. 53) recommends applying a ratio between 10% and 30%.

The OECD provides three leading suggestions meant to reduce companies' economic burden. Firstly, the OECD (2017, p. 39) recommends a de minimis threshold to relieve low-risk entities and the general administrative burden. The guidelines do not specify a specific amount for the

[10] Denmark had an earnings stripping rule relying on a debt-to-asset ratio in place until 2019, when they switched to an net-interest-to-EBITDA ratio (OECD, 2017, p. 51).

**Table 4:** The OECD's Best Practice Approach to Interest Limitation Rules




Notes: Table 4 gives an overview of the most critical aspects of the OECD's proposed earnings stripping rule. Source: own presentation based on OECD (2015a, p. 25).

exemption limit. The threshold should instead be based on an absolute monetary value of net interest expenses that reflects aspects of the local economy, such as interest rates or the tax regime. Any entity below the threshold can deduct its interest expenses without restrictions, whereas entities above the threshold must apply the earnings stripping rule to its full extent. Notably, the OECD suggests that the threshold should consider the total net interest expenses of all group entities in one country. The recommendation explicitly advises including an anti-fragmentation rule to prevent groups from establishing multiple entities and repeatedly exploiting the threshold. This recommendation aligns with empirical research by Buslei and Simmler (2012, p. 29) and a recent draft law by the German Parliament (2023b, p. 130), which confirms that entities otherwise split up their assets to exploit the threshold multiple times. Prior research also states that the effectiveness of an earnings stripping rule is highly dependent on the specific threshold amount, especially in the absence of an anti-fragmentation rule (Buslei & Simmler, 2012, p. 29). As we will see later from the actual national implementation, the EU Directive does not include such an anti-fragmentation rule, thus leaving room for tax restructuring.

Secondly, the group ratio escape is an effort to consider the circumstances of individual entities and groups and soften the effect of the blunt fixed ratio approach (OECD, 2017, p. 61). Different sectors and industries may naturally vary in leverage due to industry-specific factors unrelated to tax avoidance efforts. A group ratio option would allow entities to deduct net interest expenses up to the higher of their own or the group's overall fixed ratio, which does not necessarily have to be a net-interest-to-EBITDA ratio. For example, a new affiliate that is barely profitable with high interest expenses due to heavy initial investments could be additionally burdened by the interest limitation rule due to its low EBITDA. The regulation does not intend to restrict economic financing decisions excessively. Prior empirical research has no reliable estimates on the impact of group ratio escapes due to a lack of relevant variables (Alberternst and Sureth-Sloane, 2016, p. 17; Buslei and Simmler, 2012, p. 10; Dreßler and Scheuering, 2012, p. 10).

Thirdly, options for carrying forward and carrying back disallowed and unused interest capacity are meant to reduce the adverse effects of fluctuations in EBITDA and net interest expenses (OECD, 2017, p. 72). An unexpected slump in earnings with constant net interest expenses could additionally strain entities that are suddenly affected by an interest expense restriction. In other cases, an entity might have initial high net interest expenses due to significant investments that will be offset by additional earnings in the future. In both cases, the entity may be subject to an interest limitation in the first year simply because there is a timing mismatch between net interest expenses and EBITDA. Recurring volatility issues could lead to unwarranted double taxation since interest income is taxed at the lender while the borrower accumulates non-deductible interest expenses. Carry forward and carry backward options are an attempt to reduce distortions over the total period. While those options restrict double taxation, they also introduce the potential for debt shifting as they weaken the overall interest limitation effect. The OECD issues concerns especially over unlimited EBITDA carry forwards, which may add up to a significant tax asset and incentivize entities to increase their future net interest expenses (OECD, 2017, p. 73).

Banks and insurance groups vary significantly from other sectors in the role interest plays in their main business activities (OECD, 2017, p. 79). Due to its restriction on net interest expenses, a general earnings stripping rule is unsuitable to prevent debt shifting of business models with naturally positive net interest income, which will regularly be the case for banks and insurance groups. The OECD (2017, p. 185) recommends excluding financial institutions when

applying the fixed ratio to an overall local group, as their excessive interest income might be used to shelter the interest expenses of other group members. Financial entities are usually already restricted in their capital structure due to non-tax-related regulatory requirements.[11] Nonetheless, prior literature suggests that banks engage in profit shifting (Langenmayr & Reiter, 2022, p. 824), that their capital structure is indeed sensitive to changes in local tax rates (Heckemeyer and de Mooij, 2017, p. 73; De Mooij and Keen, 2016, p. 27) and that both banks and insurance groups could use a variety of arrangements to engage in tax avoidance (OECD, 2017, p. 79). Empirical research on interest limitation rules has so far excluded financial service providers due to their particular capital structure or because they are exempt from interest limitation rules (Alberternst and Sureth-Sloane, 2016, p. 14; Buettner et al., 2012, p. 934; Buslei and Simmler, 2012, p. 15).

The OECD (2017, p. 80) explicitly concludes that banks and insurance groups should be targeted by interest limitation rules, but does not provide a universal approach to do so. Instead, countries should implement unilateral rules harmonizing with existing national regulatory requirements for financial institutions. This inconsistent approach may leave room for tax competition and tax avoidance arrangements in the financial sector. The recommendation is especially concerning as prior studies found the cost of debt bias to be especially high in the financial industry (De Mooij, 2012, p. 500; Pazarbasioglu et al., 2010, p. 24). In 2023, 35 of the 100 largest groups were banks or insurance companies (Forbes, 2023). Given that banks and insurance companies are fundamentally important to the global economy, future research and policymakers should analyze closely whether openings for debt-shifting in the financial sector remain.

Lastly, I want to highlight Chapter 2 in the OECD's (2017, p. 33) best practice guide, which deals with the definition of interest and payments that are economically equivalent to interest. The OECD (2017, p. 34) provides some examples of essential aspects of a common interest definition but does not provide a concrete recommendation. I believe a common definition of interest expenses is one of the linchpins of any successful interest limitation rule on an international level. In jurisdictions with lax debt and interest expense definitions, companies might substitute interest expenses for economically equivalent expenses not affected by limitations on their deductibility for tax purposes, thus optimizing their overall tax burden. Different national definitions of interest expenses might be exploited to achieve interest income in one jurisdiction, which lowers net interest expenses, and non-interest expenses in another jurisdiction, which are not restricted by the earnings stripping rule. This simplified consideration suggests that, in theory, opportunities for tax arbitrage remain under an inconsistent definition of interest expenses between jurisdictions.

[11] See e. g. Basel IV for equity requirements of banks and the Solvency II Directive for requirements on risk management and equity quotas of insurance groups in the European Union.

## 5 The Earnings Stripping Rule Reform in the European Union

In the OECD's last official progress report on Action 4, out of 134 members of the Inclusive Framework, only 33 jurisdictions employed an earnings stripping rule in general, and not all of them are necessarily in line with the recommended best practice approach (OECD, 2020, p. 50). As of today, almost 10 years later, out of the 19 sovereign countries of the G20 Members, only 11 have implemented the best practice approach suggested by the OECD, or at least a similar version (see Table 15 in the Appendix). The low participation is particularly surprising as the project was carried out in cooperation with the G20 countries (OECD, 2013, p. 25).

Tørsløv et al. (2023, p. 1522) estimate that the European Union is the region most affected by profit shifting, with profit losses up to 1.5% of its GDP in 2015. The study suggests that debt shifting accounted for 15% of overall profits shifted to tax havens, not accounting for debt shifting between non-haven jurisdictions. This is significant given that most European Member States had already implemented some form of unilateral interest limitation rules at that point (De Mooij and Hebous, 2018, p. 370; OECD, 2017, p. 197). It is hardly surprising that the European Union plays a pioneering role in the implementation of the OECD's earnings stripping rule reform, in line with its announcement to take coordinated action against debt shifting already back in 2007 (European Commission, 2007, p. 9).

In 2016, the European Commission issued the EU Anti-Tax Avoidance Directive 2016/1164 (ATAD) which specifically aims to implement the action plan against BEPS by the OECD. Article 4 of the Directive contains the provisions on the earnings stripping rule that are to be transposed into national law. The Directive provides a framework for a minimum standard and Member States are free to implement stricter variants of the proposed rule wherever necessary (European Commission, 2016, p. 2). It is somewhat surprising that the EU decided to rely on the German "interest barrier rule" as template for the Directive, which is considered to be potentially in violation of Germany's constitution by the German Federal Fiscal Court (BFH) (2015, I R 20/15) and has been pending before the German Constitutional Court (BVerfGE) since 2016 (2 BvL 1/16).

I collected information on the interest limitation rules in European Member States before the reform as well as the details on the national implementation of the reform. The data stems from the International Bureau of Fiscal Documentation (IBFD), the PWC Worldwide Tax Summarize (PwC, 2024b) and the EY Worldwide Corporate Tax Guide (EY, 2023). For historical information on interest limitation rules I relied on the OECD database (OECD, 2019), KPMG EU Tax Center, and the overview provided by De Mooij and Hebous (2018, p. 370). The next section outlines the interest limitation rules in the European Union prior to the reform, followed by information on each Member State's national implementation of the Directive.

**Table 5:** Interest Limitation Rules Prior to the Reform in the European Union

Notes: Table 5 gives an overview of the interest limitation rule in place before the individual reform year of each European Member State and the United Kingdom. Source: own presentation, see text.

| Country | Date of Impl. | Prior ILR | | keep prior ILR |
|---|---|---|---|---|
| | | TCR | ESR | |
| Austria | 2021 | x | x | x |
| Belgium | 2019 | total debt | x | Yes |
| Bulgaria | 2019 | total debt | x | Yes |
| Croatia | 2019 | total debt | x | Yes |
| Cyprus | 2019 | x | x | x |
| Czech Republic | 2019 | related party debt | x | Yes |
| Denmark | 2019 | total debt | total interest | Yes |
| Estonia | 2019 | x | x | x |
| Finland | 2019 | x | related interest | x |
| France | 2019 | related party debt | related interest | Yes |
| Germany | 2024 | x | total interest | x |
| Greece | 2019 | x | total interest | x |
| Hungary | 2019 | total debt | x | x |
| Ireland | 2022 | x | x | x |
| Italy | 2019 | x | total interest | x |
| Latvia | 2018 | total debt | x | Yes |
| Lithuania | 2019 | total debt | x | Yes |
| Luxembourg | 2019 | x | x | x |
| Malta | 2019 | x | x | x |
| Netherlands | 2019 | x | x | x |
| Poland | 2018 | related party debt | x | x |
| Portugal | 2019 | x | total interest | x |
| Romania | 2018 | total debt | x | x |
| Slovak Republic | 2024 | x | related interest | x |
| Slovenia | 2024 | related party debt | x | Yes |
| Spain | 2024 | x | total interest | x |
| Sweden | 2019 | related party debt | x | x |
| United Kingdom | 2017 | x | x | x |

### 5.1 Interest Limitation Rules Before the Reform

Table 5 provides an overview of the interest limitation rules in the European Union prior to the reform. The information is based on the year before a country's individual implementation date of the reform. In line with prior research, I differentiate between thin capitalization rules with a total debt threshold and an internal debt threshold, as all of them restrict only interest expenses to related parties (Buettner et al., 2012, p. 932).[12] Earnings stripping rules are categorized by the form of interest restricted, as all of them consider total interest expenses in regard to their threshold. In this overview, I only consider interest limitation rules codified in the tax law.[13]

The interest limitation regimes prior to the reform varied greatly between Member States. Seven Member States, excluding the United Kingdom, had no interest limitation rule in place. Thin capitalization rules were the most popular form of interest limitation rules, with five Member States employing a related party debt threshold and eight Member States a total debt threshold.

Notably, most Member States maintained their existing thin capitalization rule after the reform. Three countries, namely Finland, France, and the Slovak Republic relied on an earnings stripping rule prior to the reform that only restricted internal interest expenses. France and Denmark were the only two Member States to combine a thin capitalization rule with an earnings stripping rule prior to the reform. Based on classic tax haven lists such as the one by Tørsløv et al. (2023, p. 1528) it becomes apparent that none of the EU tax havens (Belgium, Ireland, Luxembourg, Malta, Netherlands) employed any form of interest limitation rule prior to the reform except for Belgium. This is in line with the expectation that tax havens generally aim to allow an unrestricted flow of capital and rely on low effective tax rates.

### 5.2 Earnings Stripping Rules After the Reform

The next section outlines the specifics of the rule's national adaptations at the time of its implementation and the enactment schedule as outlined by the ATAD Directive. According to Article 11, paragraph 1, all Member States must apply national law, regulations, and administrative provisions in line with Article 4 of the Directive from January 1,

[12] Bulgaria's pre-reform thin capitalization rule theoretically also limits external interest expenses. However, interest expenses on loans and leases are exempt if not paid to related parties (KPMG, 2018, p. 4). Romania restricted interest only on loans from non-financial institutions above a certain threshold, hence mainly targeting internal interest expenses (KPMG, 2017, p. 3).

[13] Austria had customary debt-to-equity ratios based on administrative practice and court rulings, which I do not consider to be equally effective as a codified rule (KPMG, 2020).

**Table 6:** Earnings Stripping Rule Reform in the European Union

Notes: Table 6 illustrates the specifics of the national earnings stripping rule at the time of its implementation in European Member States and the UK. Currency conversions of the Member States are based on December 31, 2018. Notably, some Member States changed their earnings stripping rules in the years after the implementation. Source: own presentation, see text.

| | | | Escape Rules | | | | Carry Forward | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Financial Group Esc. | | | |
| Country | Date of Impl. | 30% of EBITDA Threshold | De Minimis | Stand-alone | Equity | EBITDA | Interest | EBITDA |
| Austria | 2021 | Yes | 3m | Yes | Yes | x | Indefinetly | 5 years |
| Belgium | 2019 | Yes | 3m | Yes | x | x | Indefinetly | x |
| Bulgaria | 2019 | Yes | 3m | x | x | x | Indefinetly | x |
| Croatia | 2019 | Yes | 3m | Yes | x | x | 3 years | x |
| Cyprus | 2019 | Yes | 3m | Yes | Yes | Yes | 5 years | 5 years |
| Czech Republic | 2019 | Yes | 3.2m | Yes | x | x | Indefinetly | x |
| Denmark | 2019 | Yes | 3m | x | x | Yes | Indefinetly | 5 years |
| Estonia | 2019 | Yes | 3m | Yes | Yes | Yes | x | x |
| Finland | 2019 | 25%/EBITD | 3m | Yes | Yes | x | Indefinetly | x |
| France | 2019 | Yes | 3m | Yes | Yes | Yes | Indefinetly | 5 years |
| Germany | 2024 | Yes | 3m | Yes | Yes | x | Indefinetly | 5 years |
| Greece | 2019 | Yes | 3m | x | x | x | Indefinetly | x |
| Hungary | 2019 | Yes | 2.5m | x | Yes | Yes | Indefinetly | Indefinetly |
| Ireland | 2022 | Yes | 3m | Yes | Yes | Yes | Indefinetly | 5 years |
| Italy | 2019 | Yes | x | x | x | x | Indefinetly | 5 years |
| Latvia | 2018 | Yes | 3m | x | x | x | x | x |
| Lithuania | 2019 | Yes | 3m | Yes | Yes | Yes | Indefinetly | x |
| Luxembourg | 2019 | Yes | 3m | Yes | Yes | Yes | Indefinetly | 5 years |
| Malta | 2019 | Yes | 3m | Yes | Yes | Yes | Indefinetly | 5 years |
| Netherlands | 2019 | Yes | 1m | x | x | x | Indefinetly | x |
| Poland | 2018 | Yes | 0.7m | x | x | x | 5 years | x |
| Portugal | 2019 | Yes | 1m | x | x | Yes | 5 years | 5 years |
| Romania | 2018 | Yes | 1m | Yes | x | x | Indefinetly | x |
| Slovak Republic | 2024 | Yes | 3m | x | x | x | 5 years | x |
| Slovenia | 2024 | Yes | 1m | Yes | x | x | x | x |
| Spain | 2024 | Yes | 1m | x | x | x | Indefinetly | 5 years |
| Sweden | 2019 | Yes | 0.45m | x | x | x | 6 years | x |
| United Kingdom | 2017 | Yes | 2.2m | x | x | Yes | Indefinetly | 5 years |

2019, onwards. Table 6 gives an overview of the year of implementation, the majority being 2019. However, Article 11, paragraph 6, opens the possibility of delaying national implementation until January 1, 2024, at the latest if the Member States can prove that existing regulations are at least as effective as the provisions in Article 4. A regulation was deemed as equally effective only if it had both "(1) the legal similarity and (2) the economic equivalence" (European Commission, 2018, p. 1) as the new measures proposed by the Directive. This differentiation is the basis for my categorization into treatment and control groups in my empirical analysis.

The European Commission (2018, p. 1) deemed existing measures by Greece, France, Slovakia, Slovenia, and Spain as equally effective as Article 4 of the ATAD. Germany was allowed to postpone the implementation until 2024 since their prior earnings stripping rule served as prototype for Article 4 (European Parliament, 2022, p. 21). Both France and Greece voluntarily transposed the new measure into national law already in 2019.

Austria and Ireland applied to postpone the implementation of Article 4 but the European Commission (2019, p. 9) deemed their current interest limitation rules to not comply with the requirements of Article 4. Austria and Ireland applied the new interest limitation rules in accordance with Article 4 from 2021 and 2022 onwards, respectively. Latvia, Poland, and Romania already implemented an adjusted interest limitation rule in accordance with Article 4 from 2018 onwards. The United Kingdom was the first country to adapt its national legislation in 2017. Germany, the Slovak Republic, and Spain delayed the implementation until 2024. Slovenia is currently in the legislation process and expected to apply the new earnings stripping rule retroactively starting January 1, 2024.

The core earnings stripping rule is in line with the OECD's recommendation of a best practice approach. Paragraph 1 of Article 4 outlines a fixed ratio rule in the form of an earnings stripping rule that limits net-interest expenses that exceed 30 percent of an entity's EBITDA. An entity can be an individual taxpayer, a consolidated group for tax purposes, or an entity of a group that does not consolidate its results for tax purposes. All EU Member States implemented a 30 percent EBITDA threshold except for Finland, which chose a 25 percent Earnings Before Interest, Taxes, and Depreciation (EBITD) threshold. EBITD is generally higher[14] than EBITDA, which could be offset by the 5-percentage point reduction in the fixed ratio, depending on the individual entity. Arguably, Finland's fixed ratio might be less prone to manipulation since intangible assets are excluded.

Paragraphs 3 and 5 of Article 4 include four possible escape clauses that Member States are free to adapt into na-

[14] Unless the appreciation of intangible assets outweighs the depreciation.

tional law. The Directive includes options for a "de Minimis escape" and two escape clauses based on ratios of the consolidated financial group, which can also be found in the OECD guidance. All Member States allow firms to apply the net-interest-to-EBITDA ratio at the level of the consolidated group for tax reasons. Additionally, a "standalone escape" is offered, which would allow Member States to exclude entities without any affiliated entities from the application of the earnings stripping rule.

Every Member State except Italy applies some form of "de Minimis" threshold as defined in paragraph 3(a). Eighteen Member States incorporated the recommended threshold of EUR 3m for overall net interest expenses into national law. Finland is the only country that differentiates between external and internal debt and introduced a 3-million-euro threshold for external debt, but only EUR 0.5 million for internal debt. The Netherlands, Portugal, Romania, Slovenia, and Spain set the threshold significantly lower at only EUR 1m. Sweden and Poland have the lowest threshold with only around EUR 0.45m and 0.7m, respectively. Around half of the Member States exclude entities from the application of the rule if they are not part of a consolidated group for financial reasons and have no associated enterprise or permanent establishment as defined in paragraph 3. There is some diversity regarding the financial group escape options and Member States tend to implement either both escape clauses or none. The equity escape allows an entity to avoid the application of the rule if it can demonstrate that its equity over asset ratio is not more than two percentage points lower than that of the consolidated group for financial purposes. Under the EBITDA group escape, entities can choose to test for the net-interest-to-EBITDA threshold at the consolidated financial group level instead of each entity individually. Almost all Member States allow for a carry-forward of denied interest expense deductions, most of them indefinitely. Only Estonia, Latvia, and Slovenia do not allow any form of interest expense carry-forward, possibly to avoid administrative costs for the relatively small countries. Additionally, around half of the Member States allow firms to carry forward unused EBITDA capacity, usually for five years. The only exception is Hungary, which allows for an indefinite interest as well as indefinite EBITDA capacity carry-forward.

There is certain heterogeneity between the national implementation of the reform, which already indicates that tax competition within the EU by means of interest limitation rules is not fully ruled out by the Directive. The classical tax havens Luxembourg, Ireland, and Malta implemented the most lenient versions of the rule. On the other hand, Belgium and the Netherlands, generally considered tax havens, implemented almost none of the escape rules (Tørsløv et al., 2023, p. 1506). France and Germany also offer most escape clauses, potentially to avoid the adverse effects of tax competition. The specifics of the national implementation may be dependent on a variety of factors, such as the prior interest limitation regime, other additional existing interest limitation rules, and economic conditions. Notably, many Member States adjusted the original earnings stripping rule in the years after the reform. Greece implemented an equity and EBITDA escape on the financial group level (EY, 2023, p. 678). Netherlands lowered their fixed ratio to 20 percent net-interest-expenses-to-EBITDA (EY, 2023, p. 1266). Finland restricted the equity escape clause in 2022 and again in 2023 in certain situations (PwC, 2024c).

## 6 Development of Hypotheses

In the following, I empirically investigate whether the mandatory adaptation of the earnings stripping rule in 2019 in the European Union significantly affected the capital structure of the 600 largest listed European firms at the consolidated group level. For several reasons, the earnings stripping rule reform in the European Union is a promising quasi-experimental setup for an empirical study based on a Difference-in-Differences (DID) design. Firstly, the European Commission (2018, p. 1) assigned Member States to one of two categories, dependent on their interest limitation rule prior to the reform. Only Member States that did not apply an "equally effective" interest limitation rule before the reform are expected to show a significant reaction to the Directive. Based on this classification, I consider firms with their domicile in countries that did not have an equally effective interest limitation rule prior to the reform as the treatment group and those that already had equally effective measures in their country of domicile as the control group. Secondly, even though tax law is, in principle, a state matter, the European Union has established harmonized standards between Member States in the field of corporate taxation, especially in matters of international taxation (European Union, 2024). The European single market creates a certain comparability of large companies within the EU, ensuring arguably sufficient homogeneity between the observations of treatment and control groups. Furthermore, the reform does not contain other provisions that directly affect the usage of external debt which could distort a potential treatment effect.

I assign the treatment classification based on a firm's country of domicile. The 600 largest European listed firms are all multinationals which are not exclusively affected by their domestic tax system but also by all foreign tax systems with at least one affiliate present. Therefore, identifying a multinational firm's treatment status purely based on its country of domicile is an approximation, as the initial effect of the earnings stripping rule is determined at the level of the individual affiliates. The model by Huizinga et al. (2008, p. 93) states that the capital structure of multinational firms is dependent on the relative effective tax rates of all affiliates, weighted by their share of assets to firm-wide total assets. The study by Oh (2009, p. 339) on the regional activity of the biggest multinational European firms states that around 50 percent of their assets are located in their country of domicile. Therefore, it seems reasonable to assume that changes in the tax law in a European multinational's country of domicile have the single strongest effect on average on its capital structure, as opposed to changes in the tax

law of other countries with smaller affiliates present. This approach is in line with the research approach by De Mooij and Hebous (2018, p. 371), who also assign the treatment classification of consolidated firms based on their country of domicile.

Spillover effects are not fully ruled out in this research design and must be considered in the interpretation of the results. A corporate group based in a control group Member State may have affiliates in a Member State that is treated. Upon the reform, the affiliates in treated Member States are subject to stricter interest limitation rules and may decrease their debt ratio accordingly. The corporate group can not shift excess debt to other affiliates in the European Union, as those are already subject to equally effective interest limitation rules, which act as "backstop".[15] Hence, upon the reform, the consolidated debt ratio of firms in the control group should also decrease on average. This may introduce a downward bias to the treatment coefficient. I do not see potential spillover effects as a critical limitation of my research design. My study can not provide direct information on potential changes in firms' internal debt structures based on consolidated financial statements. Due to restrictions in the data sample, I was not able to analyze the effect of differences in the national implementation of the earnings stripping rule, for example, regarding the escape clauses.

### 6.1 Hypothesis 1 – General Effect

The Member States in the treatment group vary in their interest limitation rules prior to the reform. One can rightly assume that the effect of the reform may vary between countries based on their pre-reform interest limitation rule. In my first hypothesis, I want to abstract from the details of the pre-reform interest limitation rule characteristics and purely focus on the European Commission's classification as not equally effective.

The European Commission specifically states that existing measures are only comparably effective if they lead to a "similar or higher tax liability for a majority of large undertakings" (European Commission, 2018, p. 2). Conversely, this means that large undertakings in countries without equally effective regulations prior to the reform face a higher tax liability on average upon implementation of the reform, irrespective of their prior interest limitation regime. Therefore, in every treated Member State, the new earnings stripping rule can be seen as a stricter interest limitation rule, be it through an extension of the scope of application from internal to total interest, a stricter interest deduction limit, or by closing loopholes. The tax advantage of debt is driven by the possibility of deducting interest expenses from corporate income. As the interest deduction becomes limited above a certain threshold, debt loses its marginal tax-related advantage. The associated marginal costs of debt remain unaltered. Based on earlier theoretical and empirical research, the average multinational firm is expected to decrease its debt ratio so that the marginal benefit and marginal cost of debt are in equilibrium again (Buettner et al., 2012, p. 932; Buslei and Simmler, 2012, p. 3; DeAngelo and Masulis, 1980, p. 21; S. Myers, 1984, p. 4). This assumes that companies are not cash-constrained or at least able to substitute equity for debt if necessary.

Multinational firms may be able to substitute debt in other high-tax countries without an interest limitation rule in place. If the cross-border financing decisions of multinational firms were perfectly elastic, then there is no effect at the consolidated group level to be expected upon the reform as long as at least one affiliate is present in a country without an interest limitation rule and the same effective tax rate. However, tax restructuring, to a certain extent, may be unattractive due to high deadweight costs or for non-tax reasons (Huizinga & Laeven, 2008, p. 1166). Furthermore, as the new earnings stripping rule covers all European Member States and since many developed non-European countries have at least implemented some variant of interest limitation rule (see Table 15 in the Appendix), it seems rather unlikely that the average European multinational firm can fully circumvent an interest restriction purely through reallocation of debt. Nonetheless, tax restructuring is not fully ruled out and may decrease the observed effect of the reform on a consolidated firm level. This leads to my first hypothesis:

> H 1: Firms that were not subject to an equally effective interest limitation in their country of domicile before the reform decreased their external debt ratio to a greater extent than firms that were already subject to an equally effective interest limitation rule.

### 6.2 Hypothesis 2 – Pre-Reform Characteristics

My second hypothesis considers the characteristics of existing interest limitation rules prior to the reform. Unfortunately, the sample limits an in-depth analysis of the complex pre-reform heterogeneity in interest limitation rules. Instead, I focus on the type of interest expenses that were restricted, in line with earlier research by De Mooij and Hebous (2018, p. 369). Prior to the reform, a firm could be subject to a limitation of internal interest expenses, total interest expenses, or no limitation at all.

Firms based in Member States that already restricted total interest expenses through an earnings stripping rule prior to the reform should show the least change in their debt ratio. Firms in Member States that did not limit total interest expenses were not explicitly restricted in using external debt before the reform and are, therefore, expected to show a significant decrease in their debt ratio. Those firms could have been subject to no form of interest limitation at all or only a limitation of internal interest expenses.

Firms based in Member States that only restricted internal interest expenses are of particular interest. Prior liter-

[15] This assumes that all other affiliates are optimally financed at their debt ratio limit and that the heterogeneity between the new earnings stripping rules is not sufficient to incentivize strong debt shifting between Member States.

ature found that firms substitute external for internal debt upon the implementation of a thin capitalization rule for both related party and total debt-to-equity thresholds at the individual firm level (Buettner et al., 2012, p. 936; Wamser, 2014, p. 22). Therefore, firms under a thin capitalization rule should show a higher external debt ratio than firms under no interest limitation rule at all.[16] This assumption should also apply under an earnings stripping rule limiting only internal interest expenses. Indeed, the average pre-reform external debt ratio of firms in my sample subject to only an internal interest restriction before the reform is almost 5 percent (1.2 percentage points) higher than that of firms with no prior interest limitation. Therefore, firms that were subject to only a limitation of internal interest expenses are expected to show a particularly strong decline in their external debt ratio. Additionally, firms may substitute internal for external debt after the reform if they deem internal debt to be more advantageous and only deviated from their internal debt level preference due to the restriction pre-reform. This "reversal" of the original substitution effect would also reduce the debt ratio of the overall firm as internal loans are generally not observable at the consolidated group level but only applies if the Member State did not keep its specific restriction on internal interest expenses upon the reform. My second hypothesis is as follows:

> H 2: Firms in Member States without an explicit limitation of total interest expenses before the reform significantly decreased their external debt ratio upon the reform.

### 6.3 Hypothesis 3 – Sink and Conduit Tax Havens

Prior research found that tax havens play a key role in cross-border financing and earnings-stripping practices of multinational enterprises (Coppola et al., 2021, p. 1544; Fuest et al., 2022, p. 30; Gravelle, 2009, p. 732). In the first step of the classic earnings stripping scenario, a firm in a tax haven grants a loan to an affiliate located in a foreign high-tax country, which is refinanced through the external capital market or cash holdings at the level of the tax haven. In line with the OECD's (2022, p. 67) transfer pricing guidelines, firms in tax havens should show a slightly positive net interest income on risk-free intra-group financing activities, as the interest received from the foreign affiliate has to equal the interest payments of the refinanced loan plus a risk-free rate of return. If firms in tax havens are generally net creditors, is there any relevance to interest limitation rules in tax havens? I want to highlight why the reaction of tax havens to the earnings stripping rule reform might be more complex than apparent at an initial glance, based on the categorization of tax havens into sink and conduit tax havens by Garcia-Bernardo et al. (2017, p. 6).

Garcia-Bernardo et al. (2017, p. 2) define sink tax havens as countries that attract and, most importantly, retain foreign capital. Traditional sink tax havens are an attractive final target location for capital and future cash flows, not least due to their generally low effective tax rates (Hines & Rice, 1994, p. 150). I propose that the relevance of interest limitation rules in tax havens is driven not by debt shifting but rather by other measures of profit shifting, specifically the allocation of intangibles. Prior research suggests that the relocation of intangible assets, in combination with transfer pricing manipulation, is one of the main drivers behind profit-shifting (Dischinger and Riedel, 2011, p. 693; Grubert, 2003, p. 239; Langenmayr and Reiter, 2022, p. 828; Tørsløv et al., 2023, p. 1518). An interest limitation rule in a tax haven restricts the possibility, or at least makes it more costly, to finance the relocation of intangibles, which is subject to transfer pricing regulations (OECD, 2022b, p. 245). This assumption is in line with the observation that none of the European sink tax havens had a codified interest limitation rule in place prior to the reform as well as their tendency to implement rather lenient versions of the earnings stripping rule. The earnings stripping rule reform may directly target one of the main advantages of sink tax havens: the ability to relocate future profits at a low cost. As traditional European sink tax havens introduced a less strict earnings stripping version on average, the question is whether the least strict version of the new earnings stripping rule can still significantly affect firms in sink tax havens. Given that the goal of the European Union was to set a minimum standard that effectively decreases the tax-related advantages of debt, I expect firms based in European sink tax havens to lower their external debt ratio. Following Garcia-Bernardo et al. (2017, p. 6), I define Luxembourg and Malta as sink tax havens.

Conduit tax havens are defined as tax havens that reroute profits from high-tax countries to their final offshore financial location (OFC) (Garcia-Bernardo et al., 2017, p. 2; Tørsløv et al., 2023, p. 1527). Conduit tax havens are attractive to foreign investors due to their comprehensive treaty networks, low withholding taxes, tax rulings, tax reliefs, and typically low or zero taxes on capital transfers (Garcia-Bernardo et al., 2017, p. 2; Lejour, 2021, p. 8). Firms can avoid the application of tax avoidance rules by routing profits through a conduit tax haven first, instead of directly to the sink tax haven, if they show a low level of real activity in the conduit tax haven (Tørsløv et al., 2023, p. 1527). Therefore, I expect firms in conduit tax havens to be net creditors on average and not as strongly affected as firms in sink tax havens. Following Garcia-Bernardo et al. (2017, p. 6), I define the Netherlands, the United Kingdom, Ireland, and Belgium[17] as conduit tax havens. For my third hypothesis, I formulate:

> H 3: Firms based in sink tax havens decreased their external debt ratio significantly upon the reform. Firms based in conduit tax havens showed a smaller decrease in their external debt ratio than firms in sink tax havens.

[16] Nonetheless, their total debt ratio should be lower, as the substitution between external and internal debt is imperfect (Desai et al., 2004, p. 20).

[17] Belgium is usually categorized as small conduit tax haven (Garcia-Bernardo et al., 2017, p. 6; Tørsløv et al., 2023, p. 1506).

### 6.4 Hypothesis 4 – Industry-Specific Effects

The new earnings stripping rule generally restricts a firm's interest expenses as they exceed the 30 percent net-interest-to-EBITDA threshold. Therefore, one would expect the relevance of the reform to vary based on a firm's pre-reform characteristics. A firm without any interest expenses is not affected by the reform, whereas firms above or close to the threshold need to consider the implications of the reform on their capital structure. I focus on industry characteristics instead of firm-level characteristics to avoid biased results. Naturally, leverage between different industries varies.[18] Industries that have naturally higher net-interest-to-EBITDA ratios should be affected more strongly by the new regulation and are expected to decrease their debt ratio above average. Notably, the threshold is applied at the individual firm level in the first step. Therefore, the net-interest-to-EBITDA ratio of the consolidated group is only an approximation of the actual effect. I do not see this as a critical limitation, as a high average group-wide net-interest-to-EBITDA ratio indicates that the average subsidiary has a high net-interest-to-EBITDA ratio. Lastly, I propose that:

> H 4: Firms in industries with an above-average net-interest-to-EBITDA ratio before the reform decreased their external debt ratio more strongly than those with a below-average net-interest-to-EBITDA ratio.

## 7 Research Design

As explained in the introduction to my hypotheses, I divide the Member States into a treatment group and a control group based on the country-level classification provided by the European Commission (2018, p. 1). Only firms in Member States that did not have an equally effective interest limitation rule prior to the reform are expected to adjust their capital structure. Consistent with the discussion in the previous section, I postulate that the average firm's debt ratio would have changed at the same rate across the control and treatment groups in the absence of the reform. I provide visual confirmation for the parallel trend assumption in Section 8. Consistent with earlier research on the interaction between taxes and the capital structure on a consolidated firm level, I rely on the external-debt-to-total-asset (D/A) ratio as a measure for financial leverage as my dependent variable (Blouin et al., 2014, p. 35; De Mooij and Hebous, 2018, p. 374). The baseline equation is the following:

$$\begin{aligned}\frac{D}{A}_{it} &= \beta_0 + \beta_1 Treat_i + \beta_2 Reform_t \\ &\quad + \beta_3 Treat_i \cdot Reform_t + \beta_4 STRx_{ct} \\ &\quad + \lambda_t + \mu_i + \varepsilon_{it}\end{aligned} \tag{1}$$

$Treat_i$ is a dummy variable and indicates whether a firm is treated based on its country of domicile and turns one (zero) if the firm is in the treatment (control) group. $Reform_{it}$ is a dummy variable indicating the timing of the reform and equals zero pre-reform (2014-2018) and one for every observation starting in the year 2019 until 2022. The $Treat_i \cdot Reform_{it}$ interaction term identifies each firm observation that has been treated by the reform. The coefficient of the interaction term is the variable of interest, which indicates if and how the average treated firm adjusts its debt ratio upon the reform compared to non-treated firms. A significant and negative coefficient would be in line with my general hypothesis. $STRx_{ct}$ is the combined statutory tax rate in country c at time t.[19] As I analyze consolidated financial statements of multinational firms, the combined statutory tax rate in a firm's country of domicile is admittedly an imperfect tax measure (De Mooij & Hebous, 2018, p. 371). I do not resort to average effective tax rates as they may also reflect the effect of the reform.

Due to the long observation period, I include both firm ($\mu_i$) and time ($\lambda_t$) level fixed effects to avoid biased results based on unobserved factors. The time-fixed effects cover general trends that are constant over all observations and vary over time. The firm fixed effects are particularly important and reflect time-constant effects that influence a firm's baseline debt ratio, which varies strongly. The firm fixed effects capture the $Treat_i$ dummy and the time fixed effects the $Reform_t$ dummy due to collinearity. Therefore, all time and firm-constant variables are not identified and thus not reported. The final regression equation with additional controls is:

$$\begin{aligned}\frac{D}{A}_{it} &= \beta_0 + \beta_1 Treat_i + \beta_2 Reform_t \\ &\quad + \beta_3 Treat_i \cdot Reform_t + \beta_4 STRx_{ct} \\ &\quad + \beta_5 Tangibility_{it} + \beta_6 ROA_{it} \\ &\quad + \beta_7 lnAssets_{it} + \beta_8 Loss_{it} \\ &\quad + \beta_{10} Inflation_{ct} + \lambda_t + \mu_i + \varepsilon_{it}\end{aligned} \tag{2}$$

$Tangibility_{it}$ depicts a firm's property, plant & equipment over its total assets and is a measure for collateral that may affect lending conditions. I expect a positive coefficient for $Tangibility_{it}$ as it improves lending conditions and incentivizes debt (Rajan & Zingales, 1995, p. 1451). Tangible assets could also provide a non-debt tax shield through higher depreciation, which may reduce taxable income and decrease the advantage of debt in certain scenarios (DeAngelo & Masulis, 1980). However, I expect the general advantage in improved lending conditions to outweigh the adverse effect on leverage incentives due to non-tax shields, which is situational. The $ROA_{it}$ ratio measures a firm's profitability and consists of EBITDA over total assets. On the one hand,

[18] For details on industry specific differences in leverage, see Bowen et al. (1982).

[19] Some countries such as Germany and Luxembourg have additional subcentral government corporate income taxes which are included in this specification.

profitable firms may have easier access to credit, hence increasing their leverage (Blouin et al., 2014, p. 11). On the other hand, firms with higher profitability can pay down their debt faster and are less reliant on external financing to realize investments (see also: pecking order theory (Donaldson, 1961; S. C. Myers and Majluf, 1984)). The direction of the coefficient is not ex-ante clear. I use $lnAssets_{it}$ as the natural logarithm of total assets, which would otherwise be heavily left-skewed as an indicator for firm size (Buslei and Simmler, 2012, p. 13; Carrizosa et al., 2023, p. 25).[20] Larger firms may be less prone to bankruptcy and are more likely to have access to different capital markets. Hence, $lnAssets_{it}$ is expected to show a positive coefficient.

I incorporate $Loss_{it}$ as a dummy variable that turns one (zero) if a firm has less than zero (at least zero) EBITDA as an approximation. Loss-making firms are likely to react differently to an interest limitation as tax deductions are not immediately relevant in a loss situation (Alberternst & Sureth-Sloane, 2016, p. 26). However, due to the possibility of both loss-carry forwards and interest expense carry forwards they may become relevant in the future. Furthermore, the variable is only an approximation as it indicates a loss at the consolidated group level for financial reasons which does not out rule that individual affiliates might be profitable and subject to taxes. Due to the complexity and potential varying reasons for a loss situation, the coefficient is not ex-ante clear. The existence of a loss carryforward would also be of interest. Unfortunately, I cannot access information on the loss carry forward positions of firms in my sample. Lastly, I include $Inflation_{ct}$ as a country-specific variable that approximates the change in interest rates (Blouin et al., 2014, p. 11; De Mooij and Hebous, 2018, p. 373). The coefficient is expected to be negative as higher interest payments increase the marginal cost of debt, especially under an earnings stripping rule.

## 8 Data and Descriptive Statistics

For the empirical analysis, I rely on the Thomson Reuters database for information on the consolidated financial statements of the STOXX Europe 600 constituents in the period of 2014 to 2022. It is theoretically possible that the reform in 2019 affected the composition of the index, in addition to the general fluctuation. Therefore, the sample is based on the end-of-2018 index constituents to avoid a biased sample and to ensure a common trend analysis based on the same set of firms over the observation period. The empirical results are robust to a sample based on end-of-2017 constituents as well as the combination of all unique constituents from 2017 to 2020. Self-selection into the treatment and control group was ruled out by comparing whether firms changed their country of domicile between 2018 and 2019, which could have affected their treatment classification. All financial statements in the sample follow the IFRS accounting standards and are generally comparable. The information from the Thomson Reuters database is augmented with country-level data on the combined statutory tax rates from the OECD tax database (OECD, 2024b) as well as details on country-specific inflation rates obtained by the World Bank (World Bank, 2024). Finally, these are combined with the information I collected about the interest limitation rules in the EU before and after the reform.

The analysis is based on the period from 2014 to 2022 for three main reasons. Firstly, this enables enough pre-reform observations to establish a robust common trend assumption. Secondly, no distortions should be expected by the direct aftermath of the European debt crisis due to the restriction to years from 2014 onwards (European Parliament, 2019, p. 1). Thirdly, starting the observation period in 2014 excludes distortions caused by prior interest rule changes in the treatment and control groups.[21] The observation period is not extended further into the present as the data on financial statements and additional control variables are incomplete from 2023 onwards at the time of this study.

The original sample with 600 firms is adjusted to ensure consistency in the research design. The STOXX Europe 600 index lists corporations from the European Economic Area as well as Switzerland. Since the research questions specifically focus on the earnings stripping rule reform based on the Directive in the European Union, only observations on firms based in a European Member State are kept. In the second step, all countries that fit neither the definition of the treatment nor the control group are dropped. Those are Latvia, Poland, and Romania, which voluntarily implemented the reform in 2018, and Austria and Ireland, which delayed their implementation until 2021 and 2022, respectively. Additionally, all observations based in the United Kingdom are dropped due to its implementation of the reform already in 2017 and the distortions that may arise due to its exit from the European Union (DESTATIS, 2023). In line with prior research, firms in the financial industry, based on their Industry Classification Benchmark (ICB), are excluded due to their particular capital structure (Buettner et al., 2012, p. 934; Buslei and Simmler, 2012, p. 15) and because most Member States explicitly exclude the financial sector from the application of the earnings stripping rule. Additionally, observations without information on key variables such as the year of the financial statement, EBITDA, total debt, total assets, and property, plant, and equipment (PPE) are dropped. The final sample stands at 298 individual firms in 2018 and 2,631 observations in the observation period from 2014 until 2022. All variables are winsorized at the 0.25 percent level.

Table 7 illustrates the number of firms in the treatment and control group in the pre- and post-reform periods, their key financial variables, and the assigned country-level data.

[20] Another popular control for firm size is the logarithm of sales (Blouin et al., 2014, p. 935; Buettner et al., 2018, p. 563). However, around 10 percent of the observations in my sample do not report net sales. The results are robust if I use ln(Sales) instead of ln(Assets), see Section 10.

[21] I have cross checked prior literature on interest limitation rules (De Mooij and Hebous, 2018, p. 370; Gresik et al., 2017, p. 70) with country specific news on interest limitation rule changes from 2013 onwards.

**Table 7:** Summary Statistics

Notes: Table 7 illustrates the summary statistics for pre- and post-reform observations separately reported for the treatment and control groups. The table reports statistics on the mean, standard deviation, and 1 and 99 percentiles of the variable of interest and all control variables. Variables are defined in Table 14 in the Appendix. Source: own calculations.

| | Pre-reform (2014-2018): 1.477 observations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Treat=0 (Observations 802) | | | | Treat=1 (Observations 675) | | | |
| Variable | Mean | Std. dev. | p1 | p99 | Mean | Std. dev. | p1 | p99 |
| DtA | 0.260 | 0.158 | 0.000 | 0.657 | 0.252 | 0.170 | 0.000 | 0.872 |
| STR | 33.138 | 5.100 | 25.000 | 44.433 | 24.898 | 4.091 | 20.000 | 33.990 |
| Tangibility | 0.208 | 0.184 | 0.001 | 0.848 | 0.224 | 0.191 | 0.000 | 0.839 |
| ROA | 0.111 | 0.061 | 0.002 | 0.302 | 0.136 | 0.091 | -0.066 | 0.492 |
| ln(Assets) | 23.257 | 1.388 | 19.935 | 26.354 | 23.347 | 1.535 | 19.256 | 26.374 |
| Loss | 0.010 | 0.099 | - | - | 0.015 | 0.121 | - | - |
| Inflation | 0.843 | 0.676 | -0.500 | 1.956 | 0.831 | 0.682 | -0.208 | 2.126 |
| | Post-reform (2019-2022): 1.154 observations | | | | | | | |
| | Treat=0 (Observations 623) | | | | Treat=1 (Observations 531) | | | |
| | Mean | Std. dev. | p1 | p99 | Mean | SD | p1 | p99 |
| DtA | 0.304 | 0.150 | 0.010 | 0.694 | 0.276 | 0.166 | 0.005 | 0.950 |
| STR | 29.527 | 2.739 | 25.000 | 34.433 | 23.660 | 3.134 | 20.000 | 31.500 |
| Tangibility | 0.223 | 0.171 | 0.001 | 0.765 | 0.238 | 0.189 | 0.001 | 0.894 |
| ROA | 0.100 | 0.061 | -0.077 | 0.252 | 0.134 | 0.084 | -0.028 | 0.450 |
| ln(Assets) | 23.644 | 1.263 | 20.879 | 26.446 | 23.747 | 1.423 | 20.283 | 26.473 |
| Loss | 0.029 | 0.168 | - | - | 0.021 | 0.143 | - | - |
| Inflation | 2.507 | 2.381 | -0.323 | 8.391 | 3.136 | 3.144 | -0.138 | 10.001 |

The treatment and control group are remarkably similar in all financial statement categories, which provides suggestive evidence that the groups are generally comparable. The biggest deviation can be observed in ROA, where firms in the treatment group are, on average, 23 percent more profitable than those in the control group, both pre- and post-reform. In both groups, the debt-to-asset ratio is higher in the post-reform period. From 2019 onwards, the new IFRS 16 standard introduced stricter rules for recognizing leases and related liabilities in the balance sheet which was expected to increase the debt ratio for financial statements applying IFRS significantly (IFRS, 2016, p. 3). The treatment group debt ratio increases less (+ 9.5 percent) than the control group (+ 16.9 percent), which is in line with the general hypothesis that the earnings stripping rule reform has an adverse effect on the relative leverage of the treatment group. Furthermore, the average statutory tax rate in the control group is significantly higher than in the treatment group. This is in line with the observation that countries with high corporate tax rates, on average, already introduced strict interest limitation rules to safeguard their tax base before the reform.

Figure 1 depicts the mean debt-to-asset ratio development for both the treatment and control groups over the observation period for a visual confirmation of the common trend assumption. Besides a deviation from 2015 to 2016, the control and treatment groups showed a strong parallel development before the reform in 2019. Estimation results are robust if I exclude the years 2014 and 2015, see Section 10. However, it also becomes apparent that the two groups are different regarding their baseline debt-to-asset ratio. If both groups were perfectly identical, one would expect the treated group to have a higher baseline debt ratio, as it is less restricted in its capital structure pre-reform. I do not see this as a major limitation for my research design, as my fixed effects strategy should cover the baseline difference. An additional two-sample t-test strongly indicates that the development of the mean debt ratio of both groups is not significantly different pre-reform.

Lastly, Figure 2 gives an overview of the composition of treatment and control groups based on the observations per country over the nine-year observation period. The final sample contains observations in 12 out of 27 Member States, as many countries do not have a firm present in the STOXX Europe 600 index. Therefore, one needs to be cautious when drawing a generalized conclusion, as firms in countries not represented in the sample could, in theory, react differently. I am nonetheless confident that the sample is diverse enough to obtain a substantiated estimation of the effect of the reform.

## 9 Empirical Results

This section presents the empirical results based on my hypotheses. I control for firm and time-fixed effects in all specifications of the following regressions. Standard errors are clustered at the country level (Abadie et al., 2022). The analysis and interpretation for Hypotheses H2 to H4 are based on the coefficients of subsamples of treated firms.

### 9.1 Hypothesis 1 – Regression Results

Table 8 presents my results on the estimated treatment effect of the reform on the external debt-to-asset ratio of

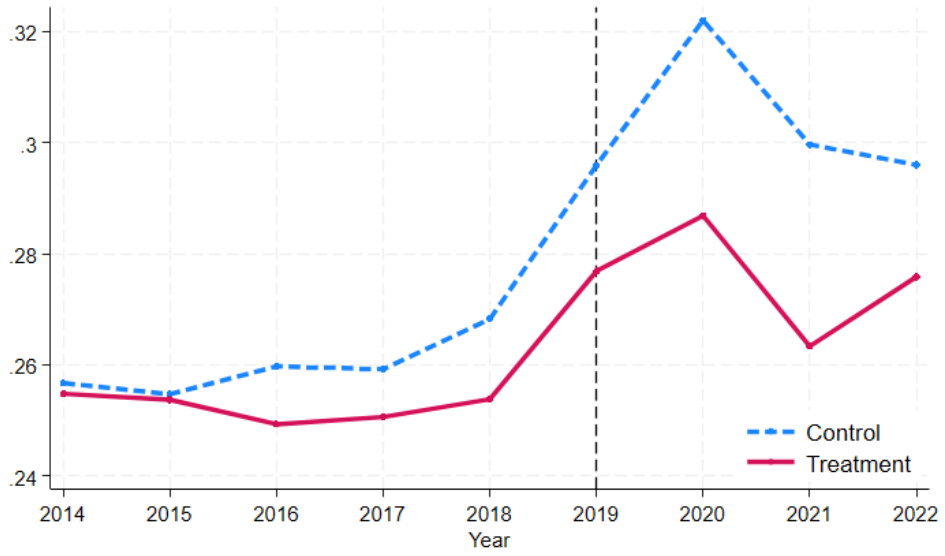



**Figure 1:** Average Debt to Asset Ratio per Year by Treatment Classification

Notes: Figure 1 illustrates the development of the mean debt-to-asset ratio over the observation period separately for the treatment and control group. The dashed black line indicates 2019 as the year of the reform. Source: own calculations.

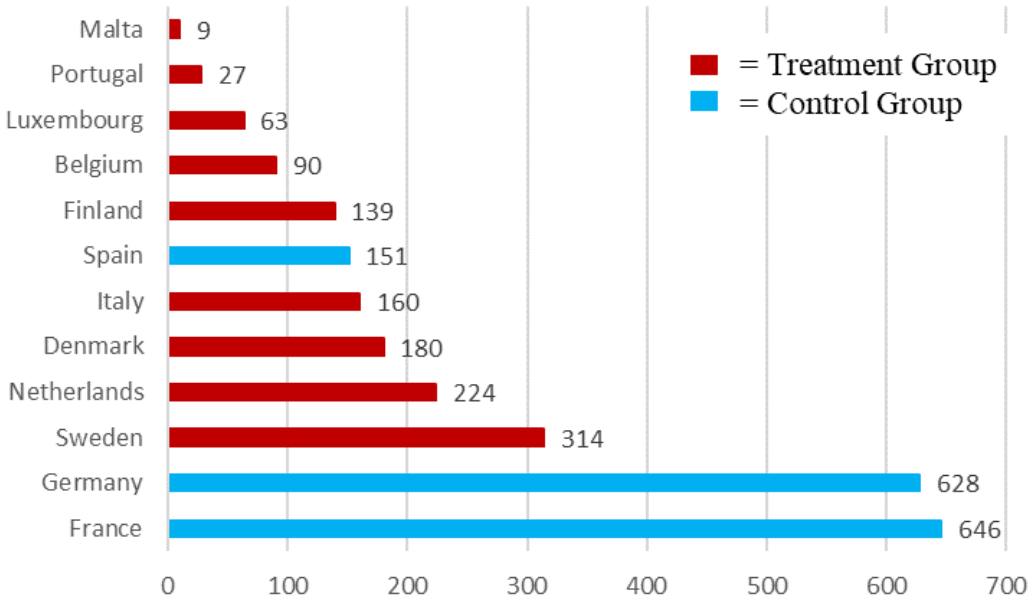



**Figure 2:** Country-Level Composition of Treatment and Control Group

Notes: Figure 2 gives an overview of the composition of the treatment and control groups based on observations per Member State. Source: own calculations.

firms in the treatment group compared to those in the control group. The first column shows the results of my basic regression without additional controls. The coefficient of the interaction term between treatment and reform is -0.019 and significant at the 5 percent level. Hence, the external debt ratio of treated firms decreased by 1.9 percentage points on average compared to firms in the control group. The combined statutory corporate tax rate coefficient is -0.001 and significant at the 5 percent level. If large consolidated multinational firms react to tax rate implications in their home country in line with the reactions of individual firms found in prior studies, the coefficient should be positive and sig-

nificant (Buettner et al., 2012, p. 935; Desai et al., 2004, p. 2452; Huizinga et al., 2008, p. 81). However, as already addressed in my research design, the domestic statutory tax rate is an imperfect measure of the actual tax effect on a consolidated multinational firm. I refrain from further interpretation as the tax coefficient varies slightly around zero in all further regressions and specifications. The adjusted $R^2$ varies between 0.8 and 0.9 in most regression specifications, which is higher than in related studies (Blouin et al., 2014, p. 35; De Mooij and Hebous, 2018, p. 374). This is not exceptionally surprising, as I run a firm-level fixed-effects strategy, which contributes strongly to the model's explanatory effect.

The second specification includes additional control variables and slightly alters the coefficient of my variable of interest. The coefficient is lower at -0.014 and only significant at the 10 percent level. Nonetheless, the direction of the effect is in line with my prediction that treated firms decrease their debt ratio upon the reform relative to non-treated firms. A 1.4 percentage points reduction in debt ratio would indicate a 5.5 percent decrease based on treated firms' pre-reform average external debt ratio. The result is lower than estimates reported by previous studies investigating the effects of interest limitation rules, which range between minus 6.3 and minus 21 percent (Blouin et al., 2014, p. 15; Buettner et al., 2012, p. 936; Buslei and Simmler, 2012, p. 20; De Mooij and Hebous, 2018, p. 374). This is unsurprising given that in my setup some Member States already had a limitation on total interest expenses in place prior to the reform, which is expected to decrease the average treatment effect.

**Table 8:** Results of the Regression for Hypothesis H1

Notes: Table 8 outlines the estimated effect of the earnings stripping rule reform on the debt ratio of treated firms compared to those in the control group. The dependent variable it the total debt-to-asset ratio. Specification (1) presents the basic estimation results without additional controls. Specification (2) includes the additional controls STR, Tangibility, ROA, ln(Assets), Loss and Inflation. Variables are defined in Table 14 in the Appendix. * Significant at 10-percent level. | ** Significant at 5-percent level. | *** Significant at 1-percent level. Source: own calculation.

| | (1) | (2) |
|---|---|---|
| Dependent variable | DtA | DtA |
| Treat x Reform | −0.019** | −0.014* |
| | (0.008) | (0.008) |
| STR | −0.001** | −0.001** |
| | (0.000) | (0.001) |
| Tangibility | | 0.475*** |
| | | (0.058) |
| ROA | | −0.282*** |
| | | (0.045) |
| ln(Assets) | | 0.050*** |
| | | (0.013) |
| Loss | | 0.035* |
| | | (0.019) |
| Inflation | | 0.000 |
| | | (0.001) |
| Observations | 2631 | 2631 |
| Treated Firms | 136 | 136 |
| Adjusted $R^2$ | 0.83 | 0.85 |

Tangibility, as the ratio of PP&E to total assets, is significant at the 1 percent level and positive in this and all further regressions. The positive coefficient is in line with the expectation that firms with a higher share of potential collaterals have better access to credit and are, therefore, more heavily indebted. ROA as a measure of profitability has a strongly significant coefficient of -0.282 and indicates that more profitable firms indeed tend to pay off debts instead of applying for more credit, thus providing suggestive evidence for the pecking order theory. The coefficients are directionally identical, albeit smaller in magnitude, to those found by Blouin et al. (2014, p. 35) and De Mooij and Hebous (2018, p. 374). Firm size seems to have an influence on borrowing conditions or the preference for leverage as ln Assets has a positive coefficient of 0.05, significant at the 1 percent level. Studies that rely on other indicators for firm size, such as sales, also find a significant positive correlation between firm size and debt ratio (Blouin et al., 2014, p. 35; Buettner et al., 2012, p. 936). The coefficient for the dummy variable Loss is positive and significant at the 10 percent level. This aligns with the ROA coefficient and indicates that firms pay off their debt more quickly when they are profitable. The Inflation coefficient is zero and insignificant in this specification. The time-fixed effects strategy might cover most of the effect since it should reflect changes in the European Central Bank's official interest rates, which strongly affect country-specific inflation and interest rates.

### 9.2 Hypothesis 2 – Regression Results

The regression results in Table 9 are based on a sample split where treated firms are allocated to one of the subsamples based on the type of interest that was restricted before the reform in their country of domicile. Additionally, I include information on the treated firms and their country of domicile in each subsample. In line with my prediction, column (1) indicates no significant effect on the external debt ratio of firms that were already subject to a limitation of total interest before the reform. The coefficient of zero is surprisingly low. Portuguese firms are the only firms to show a positive treatment coefficient which is an anomaly I can not explain based on other changes in their tax law. Both Denmark and Italy show a slightly negative coefficient on an individual country basis, in line with the expectation that the reform implemented a stricter limitation of total interest.

The estimated coefficient of the treatment effect in column (2) suggests that firms that were not restricted in total interest expenses before the reform reacted particularly strongly, with a 2.1 percentage point reduction of their external debt ratio, significant at the 5 percent level. A 2.1 percentage point reduction in the external debt ratio indicates an 8.3 percent decrease based on the pre-reform average external debt ratio of treated firms of 25.2 percent. The coefficient is slightly lower at 1.3 percentage points if I exclude French firms from the control group, but equally significant, see Section 10. The observed effect aligns with Hypothesis H2 and indicates that the earnings stripping rule reform significantly

**Table 9:** Results of the Regression for Hypothesis H2

Notes: Table 9 outlines the estimated effect of the earnings stripping rule reform on treated firms based on the type of interest that was limited in their country of domicile pre-reform. Specification (1) presents the results based on the subsample which was subject to a limitation of total interest before the reform. Specification (2) presents the results based on the subsample, which was not subject to a limitation of total interest before the reform. Specification (3) contains only those firms from column (2) that were subject to no interest limitation rule at all before the reform. Specification (4) shows the effect on firms that were subject to a restriction of internal interest before the reform.
Variables are defined in Table 14 in the Appendix.
* Significant at 10-percent level. | ** Significant at 5-percent level. | *** Significant at 1-percent level.
Source: own calculations.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable | DtA | DtA | DtA | DtA |
| Treated Subsample | prior limitation on total interest | no prior limitation on total interest | no prior limitation | prior limitation on internal interest only |
| Treat x Reform | 0.000 | −0.021** | -0.016 | −0.021** |
| | (0.008) | (0.007) | (0.013) | (0.005) |
| STR | −0.002** | −0.001** | −0.002** | −0.002*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Tangibility | 0.445*** | 0.510*** | 0.454*** | 0.552*** |
| | (0.068) | (0.050) | (0.062) | (0.037) |
| ROA | −0.327*** | −0.260*** | −0.324*** | −0.269** |
| | (0.037) | (0.059) | (0.032) | (0.073) |
| ln(Assets) | 0.056*** | 0.048** | 0.043** | 0.058*** |
| | (0.012) | (0.014) | (0.015) | (0.014) |
| Loss | 0.047*** | 0.038 | 0.053*** | 0.041* |
| | (0.008) | (0.022) | (0.003) | (0.018) |
| Inflation | 0.000 | 0.001 | 0.001 | 0.001 |
| | (0.002) | (0.001) | (0.001) | (0.002) |
| Observations | 1792 | 2264 | 1721 | 1968 |
| Treated Firms | 41 | 95 | 34 | 61 |
| Countries | DK, IT, PT | BE, LU, MT, NL, SE | LU, MT, NL | BE, FI, SE |
| Adjusted $R^2$ | 0.85 | 0.86 | 0.85 | 0.86 |

affected the debt bias of large multinational firms in the European Union. My coefficient is lower than the average 5 percentage points decrease in the external debt ratio found by De Mooij and Hebous (2018, p. 374). However, the authors include smaller and purely national groups, which will most likely not have the same flexibility in reallocating debt as the multinational firms in my sample. Firms in my sample may have partly substituted debt in countries outside of the European Union that do not have comparable interest limitation rules, such as Switzerland. The significant treatment effect in my analysis indicates that a complete substitution of external debt in other countries might be too costly or impossible due to non-tax reasons.

I split the subsample observed in column (2) into two more subsamples. Column (3) outlines the treatment effect on firms not subject to any interest limitation rule before the reform. The coefficient of -0.016 is not significant at conventional levels. Interestingly, the treatment group only contains firms in classical tax havens, such as Luxembourg, Malta, and the Netherlands. The observed heterogeneity in the reaction between those three countries is outlined under the regression results for Hypothesis H3. Due to the special composition of the treatment group, no general conclusions can be drawn on how the average firm, which was not subject to any interest limitation rule before the reform, reacts.

The estimated coefficient of the treatment effect in column (4) suggests that firms that were only restricted in internal interest expenses before the reform were the drivers of the effect observed in column (2). The sub-sample contains treated firms from Belgium, Finland, and Sweden. The results are robust on the individual country level and independent of the form of internal interest expense restriction before the reform. The estimation results could provide suggestive evidence for the substitution effects observed by prior studies, but the comparison to column (3) might be flawed due to its particular country composition (Buettner et al., 2012, p. 936; Wamser, 2014, p. 22). The coefficient is lower than that observed in earlier studies on the switch from a limitation of internal interest only to an earnings stripping rule, which range between 2 and 5 percentage points and consider both changes in internal and external debt ratios at the individual firm level (Alberternst and Sureth-Sloane, 2016, p. 22; Buslei and Simmler, 2012, p. 20; Dreßler and Scheuering, 2012, p. 21). Internal debt has been shown to be more responsive to changes in tax incentives (Desai et al., 2004, p. 23; Dreßler and Scheuering, 2012, p. 21). It is unsurprising that I find a smaller effect, given that I can only observe changes in the external debt ratio in my empirical setup. Furthermore, as noted earlier, the relocation of debt and tax restructuring might reduce the consolidated effect. Importantly, my results do not mean that the overall capital structure of firms in column (4) changed the most. Based

**Table 10:** Results of the Regression for Hypothesis H3

Notes: Table 10 outlines the estimated effect of the earnings stripping rule reform on treated firms based on their classification as a sink or conduit tax haven in columns (1) and (2). The dependent variable is the total debt-to-asset ratio. Specification (3) to (6) outline the reaction of each tax haven individually. Variables are defined in Table 14 in the Appendix.
* Significant at 10-percent level. | ** Significant at 5-percent level. | *** Significant at 1-percent level. Source: own calculations.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dependent variable | DtA | DtA | DtA | DtA | DtA | DtA |
| Treatment Subsample | sink tax haven | conduit tax haven | Luxembourg | Malta | Belgium | Netherlands |
| Treat x Reform | -0.043*** | -0.009 | -0.044*** | -0.038** | -0.021** | -0.004 |
| | (0.006) | (0.007) | (0.006) | (0.007) | (0.004) | (0.005) |
| STR | -0.002*** | -0.002** | -0.002** | -0.002*** | -0.002*** | -0.002** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Tangibility | 0.498*** | 0.464*** | 0.493*** | 0.515*** | 0.510*** | 0.464*** |
| | (0.040) | (0.068) | (0.041) | (0.045) | (0.044) | (0.070) |
| ROA | -0.336*** | -0.350*** | -0.330*** | -0.357*** | -0.366*** | -0.345*** |
| | (0.031) | (0.021) | (0.033) | (0.021) | (0.023) | (0.021) |
| ln(Assets) | 0.053** | 0.043* | 0.052** | 0.055** | 0.053** | 0.044* |
| | (0.012) | (0.016) | (0.013) | (0.014) | (0.013) | (0.018) |
| Loss | 0.054*** | 0.047*** | 0.054*** | 0.051*** | 0.047*** | 0.051*** |
| | (0.004) | (0.006) | (0.004) | (0.003) | (0.007) | (0.003) |
| Inflation | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 |
| | (0.002) | (0.001) | (0.002) | (0.002) | (0.001) | (0.000) |
| Observations | 1497 | 1739 | 1488 | 1434 | 1515 | 1649 |
| Treated Firms | 8 | 36 | 7 | 1 | 10 | 26 |
| Adjusted $R^2$ | 0.85 | 0.87 | 0.85 | 0.85 | 0.87 | 0.86 |

on the imperfect substitution between external and internal debt, I would expect to find the strongest reaction of firms in column (3) if I could observe changes in both internal and external debt. The control variables are consistent over the different subsamples and those found in the total sample.

### 9.3 Hypothesis 3 – Regression Results

Table 10 presents the results from estimating Hypothesis H3 based on a firm's country of domicile and its classification as sink (column 1) or conduit tax haven (column 2). In line with my Hypothesis H3, sink tax havens show a highly significant reaction at the 1 percent level and a strong decrease of 4.3 percentage points in their external debt ratio. This could indicate that firms in sink tax havens rely on external debt to finance the relocation of intangibles from other group members. A restriction on total interest expenses in sink tax havens seems to reduce debt bias and potentially, indirectly, the attractiveness of profit shifting through intangibles. The strong reaction from firms in sink tax havens could indicate that the reform successfully decreased incentives for tax avoidance. However, only eight firms in my sample are based in a sink tax haven, seven in Luxembourg, and one in Malta. It would be interesting to see whether the results stay consistent with more treated observations and a broader sample of sink tax havens.

Column (2) presents the results for firms in conduit tax havens which show no significant reaction to the reform. This aligns with my argument that firms in conduit tax havens tend to show a positive net interest income due to their position as middlemen to other offshore financial locations. However, Belgium, as a conduit tax haven, also shows a significant decline in the external debt ratio of firms, albeit not as strong as those in sink tax havens. Belgium already employed a limitation of internal interest expenses prior to the reform so that this effect may be driven by the observations made in Hypothesis H2. Goyvaerts and Roggeman (2020, p. 6) define Belgium only as a borderline conduit tax haven, which could also explain the stronger reaction compared to the Netherlands. However, further interpretation based on only two different conduit tax havens would be highly speculative. The weak reaction of conduit tax havens is strongly influenced by firms in the Netherlands, which show no significant reaction to the reform.

### 9.4 Hypothesis 4 – Regression Results

Table 11 outlines my results on Hypothesis H4, which predicts different effects on industries based on their pre-reform net-interest-to-EBITDA ratios. The sample contains firms in 10 industries, based on the ICB industry classification, six of which I consider in this analysis. Columns (1) and (2) contain the estimation results of the three industries with the highest (lowest) net-interest-to-EBITDA ratio based on the average 2016 to 2018. I do not include the four industries in the midfield, as their ratios are very similar and their relative position dependent on their net-interest-to-EBITDA ratio changes frequently.

In column (1), the estimated coefficient of the treatment effect is -0.014 and significant at the 5 percent level. Surprisingly, the coefficient in column (2) is higher in magnitude, at -0.022, albeit with a notably higher standard error and insignificant at conventional levels. The results generally support Hypothesis H4 and suggest that firms closer to the threshold of the new earnings stripping rule show a stronger reaction to the reform on average. Columns (3) to (8) show

**Table 11:** Results of the Regression for Hypothesis H4

Notes: Table 11 outlines the estimated effect of the earnings stripping rule reform on treated firms based on their industry. Columns (1) and (2) show the effect of the reform on the three industries with the highest (lowest) net-interest-to-EBITDA average in the years 2016-2018. The dependent variable is the external debt-to-asset ratio. Specifications (3) to (5) outline the reaction of the 3 industries with the highest net-interest-to-EBITDA ratio. Specifications (6) to (8) outline the reaction of the 3 industries with the lowest net-interest-to-EBITDA ratio. Sequence in descending order. Variables are defined in Table 14 in the Appendix.
* Significant at 10-percent level. | ** Significant at 5-percent level. | *** Significant at 1-percent level. Source: own calculations.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Dependent variable | DtA | DtA | DtA | DtA | DtA | DtA | DtA | DtA |
| Subsample: industry | top 3 | bot 3 | Real Estate | Utilities | Telecomu. | Health Care | Consumer | Technology |
| Treat x Reform | -0.014** | -0.022 | -0.014 | -0.044** | -0.024 | -0.002 | -0.058* | -0.009 |
| | (0.006) | (0.015) | (0.019) | (0.015) | (0.044) | (0.015) | (0.026) | (0.033) |
| STR | -0.002* | -0.004*** | -0.004 | 0.002* | -0.003 | -0.002 | -0.002 | -0.007*** |
| | (0.001) | (0.001) | (0.003) | (0.001) | (0.004) | (0.001) | (0.001) | (0.001) |
| Tangibility | 0.597*** | 0.543*** | 0.014 | 0.731*** | 0.347 | -0.203 | 0.624*** | 0.358* |
| | (0.084) | (0.108) | (0.160) | (0.083) | (0.203) | (0.292) | (0.076) | (0.147) |
| ROA | 0.003 | -0.420*** | -0.638* | -0.018 | -0.073 | -0.427** | -0.339 | -0.274 |
| | (0.199) | (0.112) | (0.301) | (0.295) | (0.439) | (0.177) | (0.201) | (0.184) |
| ln(Assets) | 0.026** | 0.072** | 0.044 | 0.080* | 0.002 | 0.051 | 0.122** | 0.088** |
| | (0.011) | (0.030) | (0.047) | (0.035) | (0.031) | (0.040) | (0.040) | (0.033) |
| Loss | -0.016 | 0.058** | | -0.001 | | -0.036 | 0.110* | |
| | (0.074) | (0.024) | | (0.041) | | (0.030) | (0.050) | |
| Inflation | 0.002 | -0.002 | -0.001 | 0.009 | -0.007 | -0.009 | 0.001 | 0.000 |
| | (0.004) | (0.003) | (0.005) | (0.008) | (0.009) | (0.007) | (0.006) | (0.005) |
| Observations | 487 | 991 | 143 | 173 | 171 | 341 | 462 | 188 |
| Treated Firms | 23 | 42 | 5 | 8 | 10 | 21 | 15 | 6 |
| Adjusted $R^2$ | 0.87 | 0.81 | 0.62 | 0.90 | 0.88 | 0.80 | 0.85 | 0.69 |

the estimation results for each industry separately from the left in descending order of their net-interest-to-EBITDA ratio. A trend is visible, according to which the reform's effect on the external debt ratio decreases as the average net-interest-to-EBITDA ratio per industry decreases, in line with my prediction. There are two outliers, the real estate and the consumer discretionary industry. Corporate groups in the real estate industry usually set up individual entities for each big project as to limit the risk of insolvency on the whole group. I see the insignificant coefficient as an indicator that the real estate industry is inherently able to exploit the de minimis threshold repeatedly, which is in line with prior observations from research and policymakers (Buslei and Simmler, 2012, p. 29; German Parliament, 2023b, p. 130). The strong reaction of firms in the consumer discretionary industry could indicate that other factors, such as an industry's traditional corporate group structure, may affect the usage of escape clauses. The results support concerns by De Mooij and Hebous (2018, p. 377) about the fairness of interest limitation rules that do not differentiate between industries.

## 10 Robustness Tests and Extensions

France voluntarily implemented the earnings stripping reform in 2019, which could potentially affect French firms in the control group if it influenced incentives for external debt. As France's pre-reform interest limitation regime was deemed at least equally effective, the reform could either make no difference or represent a relaxation of the existing interest limitation regulations if these were stricter than the minimum standard required by the Directive. France has kept its existing related party thin capitalization rule upon the reform but adjusted other aspects of its interest limitation regime. Prior to 2019, only 75% of interest expenses above 3 million net interest expenses were deductible for tax reasons under the "French rabot" restriction (Deloitte, 2018, p. 7). From 2019 onwards, the rule was transformed and now only applies to firms that use the equity or EBITDA financial group ratio escape (KPMG, 2019, p. 6). Firms that apply for the equity or EBITDA escape face the same interest restriction after the reform as they did before the reform. Firms that cannot use an escape clause and are above the new earnings stripping rule net-interest-to-EBITDA ratio are more strongly restricted in their interest expenses after the reform than before the reform, as interest deductions above 3 million are fully denied. Firms that are below the net-interest-to-EBITDA ratio of the new earnings stripping rule but above the 3 million net interest expense threshold face a less strict interest limitation regime after the reform. If the reform had relaxed the existing interest limitation regime for the average large multinational firm in France, French firms would have increased their debt ratio in 2019, leading to an overestimation of my coefficient of interest.

Table 12 outlines the main estimation results for hypotheses H1 to H4. Indeed, the general effect observed on the total sample was driven by the reaction of French firms, and it is not significant with only Germany and Spain in the control group. The estimation results for hypotheses H2 and H3 stay consistent, albeit smaller in magnitude. The standard error of the estimation results for Hypothesis H4 increases, but the

**Table 12:** Robustness Test of All Four Hypotheses Without France in the Control Group

Notes: Table 12 outlines the estimated effect of the earnings stripping rule, excluding firms based in France from the control group as a robustness test. Columns (1) to (9) repeat my main regression results based on the restricted control. Variables are defined in Table 14 in the Appendix.
* Significant at 10-percent level. | ** Significant at 5-percent level. | *** Significant at 1-percent level
Source: own calculations.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| Dependent variable | DtA | DtA | DtA | DtA | DtA | DtA | DtA | DtA | DtA |
| Hypothesis | 1 | 2 | | | | 3 | | 4 | |
| Subsample | Full sample | Total ILR | No Total ILR | No prior ILR | Int. IRL | Sink haven | Conduit haven | Top 3 indust. | Bot. 3 indust. |
| Treat x Reform | -0.005 | 0.007 | -0.013** | -0.008 | -0.016** | -0.024** | 0.000 | -0.012 | -0.004 |
| | (0.006) | (0.008) | (0.005) | (0.007) | (0.004) | (0.004) | (0.002) | (0.007) | (0.009) |
| STR | 0.001 | 0.001 | 0.001 | 0.004 | -0.001 | 0.003 | 0.000 | -0.003 | 0.002 |
| | (0.001) | (0.002) | (0.002) | (0.003) | (0.001) | (0.003) | (0.001) | (0.002) | (0.004) |
| Tangibility | 0.456*** | 0.388** | 0.498*** | 0.401*** | 0.552*** | 0.463*** | 0.404** | 0.592** | 0.443*** |
| | (0.072) | (0.085) | (0.064) | (0.076) | (0.048) | (0.031) | (0.093) | (0.095) | (0.123) |
| ROA | -0.281*** | -0.346*** | -0.249** | -0.336*** | -0.254* | -0.346*** | -0.367*** | 0.182 | -0.459*** |
| | (0.053) | (0.041) | (0.073) | (0.041) | (0.095) | (0.043) | (0.029) | (0.140) | (0.128) |
| ln(Assets) | 0.046** | 0.050** | 0.044** | 0.036 | 0.054** | 0.048* | 0.035 | 0.024** | 0.083** |
| | (0.015) | (0.016) | (0.017) | (0.019) | (0.017) | (0.017) | (0.020) | (0.008) | (0.035) |
| Loss | 0.026 | 0.041** | 0.029 | 0.051*** | 0.035 | 0.053*** | 0.042** | -0.013 | 0.063** |
| | (0.029) | (0.013) | (0.038) | (0.005) | (0.031) | (0.006) | (0.013) | (0.106) | (0.025) |
| Inflation | -0.001 | 0.000 | 0.002 | 0.003 | 0.002 | 0.008 | 0.000 | 0.000 | -0.002 |
| | (0.003) | (0.004) | (0.002) | (0.005) | (0.003) | (0.004) | (0.002) | (0.005) | (0.006) |
| Observations | 1985 | 1146 | 1618 | 1075 | 1322 | 851 | 1093 | 381 | 703 |
| Adjusted $R^2$ | 0.85 | 0.84 | 0.85 | 0.85 | 0.85 | 0.84 | 0.88 | 0.88 | 0.80 |

relative effect of the reform between industries with different net-interest-to-EBITDA ratios is more in line with my prediction.

As stated in Section 6, the treatment coefficient is expected to suffer from a downward bias due to spillover effects in my research design. I kept Portuguese firms in the sample, the only ones showing a positive treatment coefficient, which may introduce downward bias if it is indeed an anomaly. I adjusted neither the countries in the control group nor the treatment group but stayed consistent with the classification provided by the European Commission. Accordingly, I decided to keep France in the control group as it does not change the relative effects found between the subsamples or the interpretation of my hypotheses.

Five Member States implemented the earnings stripping rule reform before or after 2019, three of which contain firms in the STOXX Europe 600. Table 13 shows the reaction of the external debt ratio of firms in Ireland (2022), the United Kingdom (2017), and Poland (2018) upon their respective reform years. Irish firms showed an average decrease of 2 percentage points in their external debt ratio, significant at the 1 percent level. Firms in the United Kingdom showed no significant reaction, which indicates that my classification as a conduit tax haven, which includes both Ireland and the United Kingdom, is not a consistent predictor. Additionally, the United Kingdom left the European Union on January 31, 2020, which may introduce distortions in the observation of British firms (DESTATIS, 2023).The coefficient of the treatment effect on Polish firms of -0.035 is high in magnitude but insignificant at conventional levels. The high coefficient is consistent with Hypothesis H2, which predicts that firms subject to only a limitation of internal interest expenses prior to the reform particularly strongly decreased their external debt ratio. The high standard deviation is unsurprising due to the small sample of only five Polish firms.

Table 16 in the Appendix contains additional regression specifications for each control variable. The results are not driven by one single control variable. Furthermore, I included ln(Sales) instead of ln(Assets) as a measure of firm size which does not significantly change the results but slightly lowers the number of observations. Table 17 in the Appendix contains three additional regression specifications that test for robustness in different observation periods. In the first specification, I only include observations from 2016 onwards to exclude the observed divergence of treatment and control groups from 2015 to 2016. In column (2) I only include observations in 2017 and 2019 to control for adjustment effects in the pre-reform year. The third specification includes observations only until 2019 to exclude any heterogeneity that might be induced by the COVID-19 pandemic or subsequent changes in the earnings stripping rule. The observed effect on the full sample is overall robust to changes in the observation period, albeit slightly lower in magnitude and significance.

## 11 Conclusion

This paper estimates the impact of the earnings stripping rule reform through the ATAD Directive in 2019 on the firm-wide external debt ratio of large multinational firms in the European Union. The analysis is based on the consolidated financial statements of listed firms in 12 different Member States between 2014 and 2022.

**Table 13:** Extended Regression Results for Ireland, United Kingdom, and Poland

Notes: Table 13 outlines additional regression results for the reform effect in Ireland, United Kingdom and Poland based on each country's individual implementation date. Variables are defined in Table 14 in the Appendix.
* Significant at 10-percent level. | ** Significant at 5-percent level. | *** Significant at 1-percent level
Source: own calculations.

| | (1) | (2) | (3) |
|---|---|---|---|
| Dependent variable | DtA | DtA | DtA |
| Treated Subsample | Ireland | United Kingdom | Poland |
| Treat x Reform | -0.020*** | -0.010 | -0.035 |
| | (0.002) | (0.007) | (0.021) |
| STR | -0.002*** | -0.001* | -0.002*** |
| | (0.000) | (0.001) | (0.001) |
| Tangibility | 0.506*** | 0.529*** | 0.513*** |
| | (0.033) | (0.037) | (0.041) |
| ROA | -0.277* | -0.406*** | -0.282*** |
| | (0.091) | (0.049) | (0.055) |
| ln(Assets) | 0.052** | 0.046*** | 0.057*** |
| | (0.012) | (0.007) | (0.007) |
| Loss | 0.057*** | 0.080*** | 0.059*** |
| | (0.008) | (0.019) | (0.019) |
| Inflation | 0.001 | 0.000 | 0.002 |
| | (0.002) | (0.004) | (0.003) |
| Observations | 1514 | 1968 | 1792 |
| Treated Firms | 11 | 117 | 5 |
| Adjusted $R^2$ | 0.84 | 0.77 | 0.85 |

The estimation results indicate that firms not subject to a limitation of total interest expenses before the reform decreased their external debt ratio by 2.1 percentage points, which indicates an 8.3 percent decrease based on their pre-reform average external debt ratio. The effect is lower at 1.3 percentage points but equally significant if I exclude French firms from the control group. I find a particularly consistent and strong reaction from firms that were only restricted in their internal interest expenses before the reform, which may indicate the "reversal" of the substitution effect between external and internal debt found in prior studies (Buettner et al., 2012, p. 936; Wamser, 2014, p. 22). I assume tax havens to be net creditors in aspects of debt shifting. I postulate that sink tax havens rely on external debt to finance the relocation of intangible assets, which has been shown to be the main channel for profit shifting. In line with my prediction, sink tax havens show a significant decline of 4.3 percentage points in their external debt ratio upon the reform. Lastly, my results suggest that firms in industries with naturally higher net-interest-to-EBITDA ratios significantly reduce their external debt ratio. I observe outliers, which may indicate that the accessibility of escape clauses varies between industries. The overall estimation results of this study suggest that the earnings stripping rule reform in the European Union significantly affected the debt bias of large multinational firms.

Since I can only observe changes in external debt based on consolidated financial statements, I can not directly conclude that the reform was effective against debt shifting. The reduction of external debt observed in firms located in sink tax havens may have indirectly decreased the profitability of relocating intangibles and, therefore, incentives for profit shifting. A more detailed understanding of the reform could be achieved by analyzing unconsolidated financial statements, which allow the observation of changes in internal and external debt and, thus, a more direct conclusion on its effect on tax avoidance. Unfortunately, due to limitations in the data set, I was not able to analyze the effect of heterogeneity in the national implementation of the reform between Member States. It would be interesting to determine to what extent escape clauses, especially based on the financial group level, incentivize tax restructuring, whether they significantly change the reform's effectiveness in general, and their effect on tax competition within the EU. An analysis of affiliates of EU Member States in Switzerland could give an insight into the potential redistribution effects of debt, as Switzerland has no explicit interest limitation rule. Future research may also examine potential adverse effects on investment due to an increase in the cost of capital (Fazzari et al., 1988, p. 186), which have been observed in the context of thin capitalization rules (Buettner et al., 2018, p. 564; De Mooij and Liu, 2021, p. 5).

Ironically, the European Commission (2016, p. 2) lists the legal certainty of the reform as one of its advantages, while its role model has been pending before the constitutional court in Germany since 2016 (2 BvL 1/16). Finally, I would like to express my doubts about whether a regulation whose effect varies between industries, potentially triggers double taxation, and is so deeply involved in firms' fundamental financing decisions can fulfill its self-proclaimed goal: fair and effective taxation (European Commission, 2016, p. 2).

## References


Abadie, A., Athey, S., Imbens, G. W., & Wooldridge, J. M. (2022). When Should You Adjust Standard Errors for Clustering? *The Quarterly Journal of Economics*, *138*(1), 1–35. https://doi.org/10.1093/qje/qjac038

Alberternst, S., & Sureth-Sloane, C. (2016). Interest Barrier and Capital Structure Response. *WU International Taxation Research Paper Series No. 2015-09*. https://doi.org/http://dx.doi.org/10.2139/ssrn.2563572

Auerbach, A. J. (2002). Taxation and Corporate Financial Policy. In *Handbook of Public Economics* (pp. 1251–1292, Vol. 3). Elsevier. https://doi.org/10.1016/S1573-4420(02)80023-4

Bach, S., & Buslei, H. (2009). Empirische Analysen zur Zinsschranke auf Grundlage von Handelsbilanzdaten. *DIW Berlin Research Notes 30*.

Bachmann, C., Lahmann, A., & Schuler, C. (2015). The Impact of Thin-Capitalization and Earnings Stripping Rules in the EU-15 on the Tax Shield. *University of Leipzig*.

Barclay, M. J., & Smith, C. W. (2005). The Capital Structure Puzzle: The Evidence Revisited. *Journal of Applied Corporate Finance*, *17*(1), 8–17. https://doi.org/10.1111/j.1745-6622.2005.012_2.x

Bianchi, J. (2011). Overborrowing and Systemic Externalities in the Business Cycle. *American Economic Review*, *101*(7), 3400–3426. https://doi.org/10.1257/aer.101.7.3400

Blouin, J., Nicodème, G., Huizinga, H., & Laeven, L. (2014). Thin Capitalization Rules and Multinational Firm Capital Structure. *IMF Working Paper WP/14/12*. https://doi.org/10.2778/32784

Bowen, R. M., Daley, L. A., & Huber, C. C. (1982). Evidence on the Existence and Determinants of Inter-Industry Differences in Leverage. *Financial Management*, *11*(4), 10. https://doi.org/10.2307/3665227

Bradley, M., Jarrell, G. A., & Kim, E. H. (1984). On the Existence of an Optimal Capital Structure: Theory and Evidence. *The Journal of Finance*, *39*(3), 857–878. https://doi.org/10.1111/j.1540-6261.1984.tb03680.x

Broer, M. (2009). Ziele, Wirkungsweise und Steueraufkommen der neuen Zinsschranke. *Schmollers Jahrbuch*, *129*(3), 391–413. https://doi.org/10.3790/schm.129.3.391

Buettner, T., Overesch, M., Schreiber, U., & Wamser, G. (2009). Taxation and Capital Structure Choice—Evidence from a Panel of German Multinationals. *Economics Letters*, *105*(3), 309–311. https://doi.org/10.1016/j.econlet.2009.09.001

Buettner, T., Overesch, M., Schreiber, U., & Wamser, G. (2012). The Impact of Thin-Capitalization Rules on the Capital Structure of Multinational Firms. *Journal of Public Economics*, *96*(11-12), 930–938. https://doi.org/10.1016/j.jpubeco.2012.06.008

Buettner, T., Overesch, M., & Wamser, G. (2016). Restricted Interest Deductibility and Multinationals' Use of Internal Debt Finance. *International Tax and Public Finance*, *23*(5), 785–797. https://doi.org/10.1007/s10797-015-9386-8

Buettner, T., Overesch, M., & Wamser, G. (2018). Anti Profit-Shifting Rules and Foreign Direct Investment. *International Tax and Public Finance*, *25*(3), 553–580. https://doi.org/10.1007/s10797-017-9457-0

Buslei, H., & Simmler, M. (2012). The Impact of Introducing an Interest Barrier: Evidence from the German Corporation Tax Reform 2008. *DIW Berlin Discussion Paper No. 1215*. https://doi.org/10.2139/ssrn.2111316

Carrizosa, R., Gaertner, F. B., & Lynch, D. P. (2023). Debt and Taxes? The Effect of TCJA Interest Limitations on Capital Structure. *The Journal of the American Taxation Association*, *45*(2), 35–55. https://doi.org/10.2308/JATA-2021-010

Coppola, A., Maggiori, M., Neiman, B., & Schreger, J. (2021). Redrawing the Map of Global Capital Flows: The Role of Cross-Border Financing and Tax Havens. *The Quarterly Journal of Economics*, *136*(3), 1499–1556. https://doi.org/10.1093/qje/qjab014

De la Feria, R., & Dourado, A. P. (2008). Thin Capitalization Rules in the Context of the CCCTB. In *Common Consolidated Corporate Tax Base* (pp. 1–40). Linde Verlag. https://ssrn.com/abstract=2293447

De Mooij, R. A. (2012). Tax Biases to Debt Finance: Assessing the Problem, Finding Solutions. *Fiscal Studies*, *33*(4), 489–512. http://www.jstor.org/stable/24440192

De Mooij, R. A., & Hebous, S. (2018). Curbing Corporate Debt Bias: Do Limitations to Interest Deductibility Work? *Journal of Banking & Finance*, *96*, 368–378. https://doi.org/10.1016/j.jbankfin.2018.07.013

De Mooij, R. A., & Keen, M. (2016). Debt, Taxes, and Banks. *Journal of Money, Credit and Banking*, *48*(1), 5–33. https://doi.org/https://doi.org/10.1111/jmcb.12289

De Mooij, R. A., & Liu, L. (2021). At a Cost: The Real Effects of Thin Capitalization Rules. *Economics Letters*, *200*, 1–6. https://doi.org/10.1016/j.econlet.2021.109745

DeAngelo, H., & Masulis, R. W. (1980). Optimal Capital Structure under Corporate and Personal Taxation. *Journal of Financial Economics*, *8*(1), 3–29. https://doi.org/10.1016/0304-405X(80)90019-7

Deloitte. (2018). France - Global Guide to M&A Tax: 2018 Edition. https://www.taxand.com/wp-content/uploads/2018/08/France_Tax and_MA_guide_2018_v2.pdf

Desai, M. A., Foley, C. F., & Hines, J. R. (2004). A Multinational Perspective on Capital Structure Choice and Internal Capital Markets. *The Journal of Finance*, *59*(6), 2451–2487. https://doi.org/10.1111/j.1540-6261.2004.00706.x

DESTATIS. (2023). Europe - Brexit Monitor. https://www.destatis.de/Europa/EN/Topic/Brexit/_node.html

Devereux, M. P., Auerbach, A. J., Keen, M., Oosterhuis, P., Schön, W., & Vella, J. (2021). Destination-Based Cash Flow Taxation. In *Taxing Profit in a Global Economy* (1st ed., pp. 267–334). Oxford University Press. https://doi.org/10.1093/oso/9780198808060.003.0007

Dischinger, M., & Riedel, N. (2011). Corporate Taxes and the Location of Intangible Assets within Multinational Firms. *Journal of Public Economics*, *95*(7-8), 691–707. https://doi.org/10.1016/j.jpubeco.2010.12.002

Donaldson, G. (1961). *Corporate Debt Capacity: A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity*. Harvard University.

Dreßler, D., & Scheuering, U. (2012). Empirical Evaluation of Interest Barrier Effects. *ZEW Discussion Paper No. 12-046*. https://doi.org/10.2139/ssrn.2112117

Entwurf eines Unternehmensteuerreformgesetzes 2008. (2007). https://dserver.bundestag.de/btd/16/048/1604841.pdf

European Commission. (2007). Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee - The Application of Anti-Abuse Measures in the Area of Direct Taxation – within the EU and in Relation to Third Countries. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A52007DC0785

European Commission. (2016). COUNCIL DIRECTIVE (EU) 2016/1164. https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A32016L1164

European Commission. (2018). Commission Notice - Measures Considered Equally Effective to Article 4 of the Anti-Tax Avoidance Directive. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018XC1207(01)&from=EN

European Commission. (2019). November Infringements Package: Key Decisions. https://ec.europa.eu/commission/presscorner/detail/en/inf_19_6304

European Commission. (2022). Proposal for a Councel Directive on Laying Down Rules on a Debt-Equity Bias Reduction Allowance and on Limiting the Deductibility of Interest for Corporate Income Tax Purposes. https://taxation-customs.ec.europa.eu/taxation-1/debt-equity-bias_en

European Parliament. (2019). A Decade on from the Crisis - Main Responses and Remaining Challenges. https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/642253/EPRS_BRI%282019%29642253_EN.pdf

European Parliament. (2022). Assessment of Recent Anti-Tax Avoidance and Evasion Measures (ATAD & DAC 6). https://www.europarl.europa.eu/RegData/etudes/STUD/2022/703353/IPOL_STU(2022)703353_EN.pdf:~:text=such%20a%20rule%20prior%20to,KEY%20FINDINGS

European Union. (2024). Taxation. https://eur-lex.europa.eu/summary/chapter/taxation.html?root_default=SUM_1_CODED%3D21&locale=en

EY. (2023). EY Worldwide Corporate Tax Guide. https://www.ey.com/en_gl/technical/tax-guides/worldwide-corporate-tax-guide

Fazzari, S. M., Hubbard, R. G., Petersen, B. C., Blinder, A. S., & Poterba, J. M. (1988). Financing Constraints and Corporate Investment. *Brookings Papers on Economic Activity*, *1988*(1), 141. https://doi.org/10.2307/2534426

Feld, L. P., Heckemeyer, J. H., & Overesch, M. (2013). Capital Structure Choice and Company Taxation: A Meta-Study. *Journal of Banking & Finance*, *37*(8), 2850–2866. https://doi.org/10.1016/j.jbankfin.2013.03.017

Forbes. (2023). The Global 2000. https://www.forbes.com/lists/global2000/

Fuest, C., Hugger, F., & Neumeier, F. (2022). Corporate Profit Shifting and the Role of Tax Havens: Evidence from German Country-by-Country Reporting Data. *Journal of Economic Behavior & Organization*, *194*, 454–477. https://doi.org/10.1016/j.jebo.2021.11.016

G20. (2012). G20 Leaders Declaration. https://www.oecd.org/g20/summits/los-cabos/2012-0619-loscabos.pdf

Garcia-Bernardo, J., Fichtner, J., Takes, F. W., & Heemskerk, E. M. (2017). Uncovering Offshore Financial Centers: Conduits and Sinks in the Global Corporate Ownership Network. *Scientific Reports*, *7*(1), 6246. https://doi.org/10.1038/s41598-017-06322-9

German Parliament. (2007). Entwurf eines Unternehmensteuerreformgesetzes 2008.

German Parliament. (2023a). Wachstumschancengesetz Gesetzesentwurf. https://dserver.bundestag.de/btd/20/086/2008628.pdf

German Parliament. (2023b). Wachstumschancengesetz Gesetzesentwurf.

Goyvaerts, D., & Roggeman, A. (2020). The Impact of Thin Capitalization Rules on Subsidiary Financing: Evidence from Belgium. *De Economist*, *168*(1), 23–51. https://doi.org/10.1007/s10645-019-09353-x

Graham, J. R. (1996). Debt and the Marginal Tax Rate. *Journal of Financial Economics*, *41*(1), 41–73. https://doi.org/10.1016/0304-405X(95)00857-B

Gravelle, J. G. (2009). Tax Havens: International Tax Avoidance and Evasion. *National Tax Journal*, *62*(4), 727–753. http://www.jstor.org/stable/41790645

Gresik, T. A., Schindler, D., & Schjelderup, G. (2017). Immobilizing Corporate Income Shifting: Should It Be Safe to Strip in the Harbor? *Journal of Public Economics*, *152*, 68–78. https://doi.org/10.1016/j.jpubeco.2017.06.001

Grubert, H. (2003). Intangible Income, Intercompany Transactions, Income Shifting, and the Choice of Location. *National Tax Journal*, *56*(1.2), 221–242. https://doi.org/10.17310/ntj.2003.1S.05

Haufler, A., & Runkel, M. (2012). Firms' Financial Choices and Thin Capitalization Rules under Corporate Tax Competition. *European Economic Review*, *56*(6), 1087–1103. https://doi.org/10.1016/j.euroecorev.2012.03.005

Heckemeyer, J. H., & de Mooij, R. A. (2017). Taxation and Corporate Debt: Are Banks Any Different? *National Tax Journal*, *70*(1), 53–76. http://www.jstor.org/stable/26349715

Heckemeyer, J. H., & Overesch, M. (2017). Multinationals' Profit Response to Tax Differentials. *The Canadian Journal of Economics / Revue canadienne d'Economique*, *50*(4), 965–994. https://www.jstor.org/stable/48581982

Heider, F., & Ljungqvist, A. (2015). As Certain as Debt and Taxes: Estimating the Tax Sensitivity of Leverage from State Tax Changes. *Journal of Financial Economics*, *118*(3), 684–712. https://doi.org/10.1016/j.jfineco.2015.01.004

Hines, J. R., & Rice, E. M. (1994). Fiscal Paradise: Foreign Tax Havens and American Business. *The Quarterly Journal of Economics*, *109*(1), 149–182. https://doi.org/10.2307/2118431

Hodder, J. E., & Senbet, L. W. (1990). International Capital Structure Equilibrium. *The Journal of Finance*, *45*(5), 1495–1516. https://doi.org/10.1111/j.1540-6261.1990.tb03725.x

Huizinga, H., & Laeven, L. (2008). International Profit Shifting within Multinationals: A Multi-Country Perspective. *Journal of Public Economics*, *92*(5-6), 1164–1182. https://doi.org/10.1016/j.jpubeco.2007.11.002

Huizinga, H., Laeven, L., & Nicodeme, G. (2008). Capital Structure and International Debt Shifting. *Journal of Financial Economics*, *88*(1), 80–118. https://doi.org/10.1016/j.jfineco.2007.05.006

IFRS. (2016). IFRS 16 Leases - Effects Analysis. https://www.ifrs.org/content/dam/ifrs/project/leases/ifrs/published-documents/ifrs16-effects-analysis.pdf

IMF. (2009). Debt Bias and Other Distortions: Crisis-Related Issues in Tax Policy, IMF Policy Paper.

Irish Tax Institute. (2021). ATAD Implementation Article 4 Interest Limitation - Response to Feedback Statement. https://taxinstitute.ie/wp-content/uploads/2021/03/2021-03-08-Irish-Tax-Institute-Response-to-Feedback-Statement-on-ATAD-implementation-of-Article-4-Interest-Limitation.pdf

Kalamov, Z. Y. (2020). Safe Haven or Earnings Stripping Rules: A Prisoner's Dilemma? *International Tax and Public Finance*, *27*(1), 38–76. https://doi.org/10.1007/s10797-019-09545-w

Knauer, T., & Sommer, F. (2012). Interest Barrier Rules as a Response to Highly Leveraged Transactions: Evidence from the 2008 German Business Tax Reform. *Review of Accounting and Finance*, *11*(2), 206–232. https://doi.org/10.1108/14757701211228228

KPMG. (2017). Romania Country Profile. https://assets.kpmg.com/content/dam/kpmg/ro/pdf/tax-card-2017-en-web.pdf

KPMG. (2018). Bulgaria Country Profile. https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2018/06/country-profile-bulgaria-2018.pdf

KPMG. (2019). France Country Profile. https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2020/10/france-country-profile-2020.pdf

KPMG. (2020). Austria Country Profile. https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2020/10/austria-country-profile-2020.pdf

Kraus, A., & Litzenberger, R. H. (1973). A State-Preference Model of Optimal Financial Leverage. *The Journal of Finance*, *28*(4), 911. https://doi.org/10.2307/2978343

Langenmayr, D., & Reiter, F. (2022). Trading Offshore: Evidence on Banks' Tax Avoidance*. *The Scandinavian Journal of Economics*, *124*(3), 797–837. https://doi.org/10.1111/sjoe.12507

Lejour, A. M. (2021). The Role of Conduit Countries and Tax Havens in Corporate Tax Avoidance. *CentER Discussion Paper Nr. 2021-014*. https://doi.org/10.2139/ssrn.3843734

MacKie-Mason, J. K. (1990). Do Taxes Affect Corporate Financing Decisions? *The Journal of Finance*, *45*(5), 1471. https://doi.org/10.2307/2328746

Mardan, M. (2017). Why Countries Differ in Thin Capitalization Rules: The Role of Financial Development. *European Economic Review*, *91*, 1–14. https://doi.org/10.1016/j.euroecorev.2016.09.003

Marsh, P. (1982). The Choice Between Equity and Debt: An Empirical Study. *The Journal of Finance*, *37*(1), 121–144. https://doi.org/10.1111/j.1540-6261.1982.tb01099.x

Mayer, C. (1990). Financial Systems, Corporate Finance, and Economic Development. In *Asymmetric Information, Corporate Finance, and Investment* (pp. 307–332). National Bureau of Economic Research, Inc. https://EconPapers.repec.org/RePEc:nbr:nberch:11477

Miller, M. H. (1977). Debt and Taxes. *The Journal of Finance*, *32*(2), 261. https://doi.org/10.2307/2326758

Mintz, J., & Weichenrieder, A. J. (2005). Taxation and the Financial Structure of German Outbound FDI. *CESifo Working Paper No. 1612*. https://doi.org/10.2139/ssrn.875306

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, *48*(3), 261–297. http://www.jstor.org/stable/1809766

Modigliani, F., & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review*, *53*(3), 433–443. http://www.jstor.org/stable/1809167

Myers, S. (1984). *Capital Structure Puzzle* (tech. rep. No. w1393). National Bureau of Economic Research. https://doi.org/10.3386/w1393

Myers, S. C. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics*, *5*(2), 147–175. https://doi.org/10.1016/0304-405X(77)90015-0

Myers, S. C., & Majluf, N. S. (1984). Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not

Have. *Journal of Financial Economics*, *13*(2), 187–221. https://doi.org/10.1016/0304-405X(84)90023-0

OECD. (1979). Transfer Pricing and Multinational Enterprises. https://www.oecd-ilibrary.org/content/publication/9789264167773-en

OECD. (1987). Thin Capitalisation - Taxation of Entertainers, Artistes and Sportsmen. https://www.oecd-ilibrary.org/content/publication/5b556cb3-en

OECD. (1998). Harmfull Tax Competition - An Emerging Global Issue. https://www.oecd.org/ctp/harmful/1904176.pdf

OECD. (2013). Action Plan on Base Erosion and Profit Shifting. https://www.oecd.org/ctp/BEPSActionPlan.pdf

OECD. (2015a). Limiting Base Erosion Involving Interest Deductions and Other Financial Payments, Action 4 - 2015 Final Report.

OECD. (2015b). Designing Effective Controlled Foreign Company Rules, Action 3 - 2015 Final Report. https://www.oecd-ilibrary.org/content/publication/9789264241152-en

OECD. (2015c). Limiting Base Erosion Involving Interest Deductions and Other Financial Payments, Action 4 - 2015 Final Report. https://www.oecd-ilibrary.org/content/publication/9789264241176-en

OECD. (2017). Limiting Base Erosion Involving Interest Deductions and Other Financial Payments, Action 4 - 2016 Update. https://www.oecd-ilibrary.org/content/publication/9789264268333-en

OECD. (2019). Interest Limitation Rules (IRL). https://qdd.oecd.org/subject.aspx?Subject=ILR

OECD. (2020). Corporate Tax Statistics, Second Edition. https://www.oecd-ilibrary.org/taxation/corporate-tax-statistics-second-edition_ff4d4ce8-en

OECD. (2022a). Safe Harbours and Penalty Relief: Global Anti-Base Erosion Rules (Pillar Two), OECD/G20 Inclusive Framework on BEPS. https://www.oecd.org/tax/beps/safe-harbours-and-penalty-relief-global-anti-base-erosion-rules-pillar-two.pdf

OECD. (2022b). OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations 2022. https://www.oecd-ilibrary.org/content/publication/0e655865-en

OECD. (2023a). Members of the OECD/G20 Inclusive Framework on BEPS. https://www.oecd.org/tax/beps/inclusive-framework-on-beps-composition.pdf

OECD. (2023b). Transfer Pricing Country Profiles. https://www.oecd.org/tax/transfer-pricing/transfer-pricing-country-profiles.htmtpcountryprofiles

OECD. (2024a). Controlled Foreign Company (CFC) Rules. https://qdd.oecd.org/data/CFC/.ALL

OECD. (2024b). OECD Tax Database. https://stats.oecd.org/Index.aspx?QueryId=78166

Oh, C. H. (2009). The International Scale and Scope of European Multinationals. *European Management Journal*, *27*(5), 336–343. https://doi.org/10.1016/j.emj.2008.12.002

Overesch, M., & Wamser, G. (2010). Corporate Tax Planning and Thin-Capitalization Rules: Evidence from a Quasi-Experiment. *Applied Economics*, *42*(5), 563–573. https://doi.org/10.1080/00036840701704477

Pazarbasioglu, C., Keen, M., & Claessens, S. (2010). Financial Sector Taxation The IMF's Report to the G-20 and Background Material. https://www.imf.org/external/np/seminars/eng/2010/paris/pdf/090110.pdf

PwC. (2024a). New Zealand - Worldwide Tax Summaries. https://taxsummaries.pwc.com/new-zealand/corporate/group-taxation

PwC. (2024b). Worldwide Tax Summaries Online. https://taxsummaries.pwc.com/

PwC. (2024c). Finland - Worldwide Tax Summaries. https://taxsummaries.pwc.com/finland/corporate/group-taxation

Rajan, R. G., & Zingales, L. (1995). What Do We Know about Capital Structure? Some Evidence from International Data. *The Journal of Finance*, *50*(5), 1421–1460. https://doi.org/10.1111/j.1540-6261.1995.tb05184.x

Ruf, M., & Schindler, D. (2015). Debt Shifting and Thin-Capitalization Rules – German Experience and Alternative Approaches. *Nordic Tax Journal*, *2015*(1), 17–33. https://doi.org/10.1515/ntaxj-2015-0002

Sikka, P., & Willmott, H. (2010). The Dark Side of Transfer Pricing: Its Role in Tax Avoidance and Wealth Retentiveness. *Critical Perspectives on Accounting*, *21*(4), 342–356. https://doi.org/10.1016/j.cpa.2010.02.004

Stiglitz, J. E. (1969). A Re-Examination of the Modigliani-Miller Theorem. *The American Economic Review*, *59*(5), 784–793. http://www.jstor.org/stable/1810676

Stiglitz, J. E. (1972). Some Aspects of the Pure Theory of Corporate Finance: Bankruptcies and Take-overs. *The Bell Journal of Economics and Management Science*, *3*(2), 458. https://doi.org/10.2307/3003033

Summers, L. H., Bosworth, B. P., Tobin, J., & White, P. M. (1981). Taxation and Corporate Investment: A q-Theory Approach. *Brookings Papers on Economic Activity*, *1981*(1), 67. https://doi.org/10.2307/2534397

Swenson, D. L. (2001). Tax Reforms and Evidence of Transfer Pricing. *National Tax Journal*, *54*(1), 7–25. https://doi.org/10.17310/ntj.2001.1.01

Tørsløv, T., Wier, L., & Zucman, G. (2023). The Missing Profits of Nations. *The Review of Economic Studies*, *90*(3), 1499–1534. https://doi.org/10.1093/restud/rdac049

Umbrecht, R. L., & Llewellyn, D. W. (1994). Planning Pitfalls and Opportunities for Foreign Owned Corporations under the Earnings Stripping Rules. *The Tax Lawyer*, *47*(3), 641–712. http://www.jstor.org/stable/20771630

Verfassungsmäßigkeit der sog. Zinsschranke - Billigkeitsmaßnahme. (2015). https://www.bundesfinanzhof.de/de/entscheidung/entscheidungen-online/detail/STRE201610031/

Wamser, G. (2014). The Impact of Thin-Capitalization Rules on External Debt Usage – A Propensity Score Matching Approach. *Oxford Bulletin of Economics and Statistics*, *76*(5), 764–781. https://doi.org/10.1111/obes.12040

Ways and Means Committee. (2016). A Better Way for Tax Reform. https://www.novoco.com/public-media/documents/ryan_a_better_way_policy_paper_062416.pdf

Weichenrieder, A. J., & Windischbauer, H. (2008). Thin-Capitalization Rules and Company Responses - Experience from German Legislation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1299533

Weyzig, F. (2013). Tax Treaty Shopping: Structural Determinants of Foreign Direct Investment Routed through the Netherlands. *International Tax and Public Finance*, *20*(6), 910–937. https://doi.org/10.1007/s10797-012-9250-z

World Bank. (2024). World Development Indicators - DataBank. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://databank.worldbank.org/source/world-development-indicators&ved=2ahUKEwie5Lbbk6uFAxXmBdsEHc2ZDVAQFnoECBgQAQ&usg=AOvVaw2izQ-SvJ7A84W2Mu5znrYz