The Allowance for Corporate Equity in Europe — The Latvian, Italian and Portuguese Cases

— First draft —

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Abstract

Classical corporate taxation typically favours debt finance over equity. The resulting debt bias leads to over- leveraged firms. One remedy is the Allowance for Corporate Equity (ACE), which grants a notional deduction on the cost of equity. Its implementation however differs widely in practice. Moreover, empirical evaluation differs with respect to data sources and methodology. This work offers a comparison of three recent cases of ACE reform: Latvia (2009-2013), Italy (since 2011) and Portugal (2010-2013). By applying a broad range of evaluative methods on a large firm-level dataset, we analyse a possible debt-reducing effect of the ACE. From a methodological point of view we innovate by relating the difference-in-differences (DID) method, which captures the effect of the treatment itself, i.e. the sole existence of an ACE, and the Effective Marginal Tax Rate (EMTR), which enables to measure the intensity of that treatment. For both Italy and Portugal we find that financial leverage decreases by 1% to 2%, while the Latvian ACE, against intuition, increases leverage. Another interesting feature is that while the Italian and Latvian ACE show a larger leverage cut among large firms, small firms are more affected in Portugal.

Keywords: Leverage; Corporate debt bias; Allowance for Corporate Equity (ACE); Quasi natural experiment; Differences in Differences (DID); Effective Marginal Tax Rate (EMTR)

JEL: C32, F23, H25, H32, K34

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1 Motivation

Classical corporate taxation typically favours debt finance over equity. Seminal work by Modigliani and Miller (1958) and Stiglitz (1973) showed theoretically that by just deducting interest on debt from taxable income, corporate taxation might drive a wedge between the different sources of funding. King and Fullerton (1983) add that the interplay between corporate and individual income taxation is decisive in determining the effective impact of taxation. Empirically, research remains inconclusive, with some authors finding confirmation in the data, like Gordon and Lee (2001), and some others do not (i.e. Graham (2000)). The existence of a tax-induced corporate debt bias leads to over-leveraged firms and potentially weakens their resilience in times of financial stress. As such, the debt-equity bias contributes to the fragility of economies, especially in the financial sector (Langedijk et al. (2014)). The tax preference for debt cannot be justified on legal or economic grounds (Devereux and Gerritsen (2010)). Even less so in an age where the existence of hybrid financing instruments further blurs the distinction between both sources of funds (de Mooij (2012)).

Solutions to the existing problem of tax-induced corporate debt bias exist and are manifold. Some are more fundamental in that they require systemic change and possibly multilateral coordination. Other solutions can be considered as rather incremental or ad hoc changes to the existing framework. Among the more practicable solutions to the particular case of debt biases arising out of multi-national tax planning are so-called thin capitalisation rules (TCR) or earnings-stripping rules (ESR). TCRs restrict the tax-deductibility of leverage to a pre-defined level. Empirical evidence by Blouin et al. (2014), Mooij and Hebous (2017) and Buettner et al. (2012) suggests that TCRs are indeed effective in reducing firm leverage and responsiveness to tax differentials, and even more so for firm-internal debt measures. ESRs limit the share of interest payments as part of a firm's profitability measure, e.g. the EBITDA. Both measures are also incorporated in multilateral initiatives to limit base erosion and profit shifting, i.e. the OECD's BEPS framework and the EU's Anti-tax Avoidance Directives (ATAD).

A more fundamental approach relates to eliminating the debt bias by approximating the effective marginal tax rates for debt and equity. There exist two polar cases: the so-called Comprehensive Business Income Tax (CBIT) foresees the elimination of the tax deductibility of interest, on the one hand, and the Allowance for Corporate Equity (ACE), initially proposed by Boadway and Bruce (1984), on the other hand. Unlike CBIT, ACE implies the extension of interest deduction to encompass both debt and equity. As such, ACE schemes aim at restricting the taxable base of returns to equity to economic rent. This foresees the deduction of the cost of equity, calculated by the product of a notional rate and a predetermined amount of equity. Both elements differ widely in practice. The notional rate is usually the riskless nominal interest rate, possibly augmented by a risk premium. The correct determination of the notional rate is necessary for an ACE scheme to only exempt normal returns from taxation. Devereux and Sørensen (2006) allude to the difficulty of estimating the exact magnitude of economic rent through a single rate. With respect to the determination of the deductible amount, Hebous and Ruf (2015) broadly categorise existing ACE schemes into hard and soft ACE regimes. A hard ACE includes the full stock of equity and applies the full tax rate to the deduction. Such schemes have been implemented by e.g. Belgium or Croa-

tia. Soft (or partial) ACE versions vary in their characteristics. So-called incremental schemes only consider newly issued equity (Zangari (2014)). Some schemes also only grant a deduction upon equity remuneration in the form of dividends (i.e. Brazil) or apply reduced tax rates on the deduction (i. e. as under the first Italian and the Austrian ACE scheme).

Current international coordination efforts to reform corporate taxation (i.e. in the European Union (EU)) include versions of ACE-type schemes. However, the experience so far with ACE reform is mixed, both because implementation and empirical evaluation differ widely across countries. In this work, we consequently examine three countries in which ACE reform has been implemented: Latvia (2009-2013), Italy (since 2011) and Portugal (since 2010). The Latvian ACE allowed the deduction of notional interest on retained earnings, while the Italian and Portuguese versions applied to the broader aggregate of new equity. In our analysis we make use of a firm-level dataset on financial and accounting values, complemented by ownership characteristics and macroeconomic information. Our empirical approach combines both difference-in-differences analysis and a measure of reform intensity to identify the impact of ACE reform on leverage levels of treatment firms vis-à-vis a respective control group of firms. We additionally control for firm-specific characteristics and the macroeconomic environment, and conduct robustness tests via propensity score matching.

We proceed as follows: in section 2, we review the experience with existing ACE schemes and highlight differences in their implementation. Section 3 then introduces our case study of the Latvian, Italian and Portuguese ACE reforms. Section 4 then deals with the empirical examination hereof. Section 5 provides space for an in-depth discussion of the results and the limitations of the empirical approach. We also hint to possible policy implications in the context of other ACE experiences, and suggest further research paths. Section 6 concludes.

2 The Allowance for Corporate Equity in Practice

As highlighted above, the actual shape that an ACE can take in practice is far from homogeneous. Based on the categorisation of Hebous and Ruf (2015), this section summarises the experience with both hard and soft ACE schemes. However we reserve for the next section the case of the three countries at stake in our empirical exercise.

Croatia

Croatia was the first country to implement an ACE in 1996. It granted a notional interest deduction based on the full stock of equity, i.e. a hard ACE. The corresponding notional interest rate amounted to 5% plus (positive) inflation of industrial sector goods. The deduction was determined monthly in order to reduce the incentive for firms to shift balance sheet items during the year for tax purposes. This increased firm compliance but also the administrative burden (Keen and King (2003)).

Belgium

Another prominent and widely studied example of a hard ACE occurred in Belgium in 2006. Its

implementation followed the gradual abolishment of the disputed "coordination center" regime, which granted sizeable tax advantages to attract foreign multinationals (cf. Princen (2012) for a detailed description). The Belgian ACE granted a notional interest deduction to incorporated entities, based on the full stock of equity (despite certain provisions to prevent abuse). The notional interest rate was determined annually as the return to Belgian 10-year government bonds two years before the actual tax period (cf. Princen (2012)). Possibly acknowledging the potential asymmetries in equity finance conditions, a premium of 0.5% was added to the rate for small- and medium-sized enterprises (SMEs). Albeit the introduction of the ACE reduced the debt bias in Belgian corporate taxation, it did not eliminate it.

Various studies analysed the ACE effect on corporate financial structures. Performing difference-in-differences analysis on Belgian firms while using French companies as a control group, Princen (2012) finds a significant negative effect of the ACE reform on both book and financial leverage, albeit no effect on investment. Contesting the validity of the common trend assumption underlying DID analysis for French control firms, Aus dem Moore (2014) considers companies from the UK as a control group instead. He finds an unexpected positive effect on both book and financial leverage. Restricting the sample by firm size, he still finds a negative leverage effect for large firms. Moreover, he identifies the effect to be absolutely increasing in leverage and for capital-intensive industries. Considering only small firms, van Campenhout and van Caneghem (2013) find no effect on corporate leverage while Kestens et al. (2012) find significantly negative effects. Panier et al. (2013) also find evidence that leverage reduction was more prevalent among larger firms. Interestingly, they identify that decreases in leverage were caused by an increase in equity and not by a decrease in liabilities.

Liechtenstein

Liechtenstein also introduced a hard ACE in 2011. Apart from anticipative simulations using pre-reform data, however, to our knowledge there exist no relevant empirical studies on that case.

Austria

Austria had an ACE system between 2000 and 2004, based on new equity and a notional interest rate. The rate was the interest rate of government bonds in secondary markets plus a risk premium of 0.8% (Hebous and Ruf (2015)). As noted by Frühwirth and Kobialka (2011), the Austrian ACE differed from other incremental systems with respect to the definition of new equity. Instead of accumulating equity after a certain year, the Austrian ACE required continuous equity increases in order to qualify for the notional interest deduction. Frühwirth and Kobialka (2011) find no effect on overall leverage and attribute this to short-term liabilities being less subject to planning of financial structures.

Brazil

The Brazilian version of a soft ACE was implemented in 1996 and is still in place today. It constitutes an outlier among the soft ACE systems, as it transcends the borders between corporate and personal income taxation. It is determined by three distinctive characteristics (Laureano and

Portal (2016)): first, the notional interest deduction is only granted when dividends are fully distributed to shareholders. The notional interest rate is calculated as the long-term rate applicable to loans by the state development banks from the preceding tax period. Second, firms need to fulfil certain criteria concerning their past profitability and equity ratios. Third, the equity deduction is taxed at reduced rates, depending on the type of tax payer. The Brazilian ACE has been investigated in depth by Klemm (2007).

Others

Let us mention that in 2015, Turkey and Cyprus also implemented soft ACE schemes. In 1982, Israel introduced an ACE-type corporate tax scheme to install financing neutrality under (high) inflation. It granted a deduction to firms based on their equity stocks and the inflation rate, hereby targeting the part of debt finance which arises out of the interplay between tax structures and the monetary environment (Klemm (2007)). Currently, a soft ACE scheme has also been proposed as part of the proposal for a Common Consolidated Corporate Tax Base (CCCTB) in the EU. The included so-called Allowance for Growth and Investment (AGI) would apply to new equity, as calculable within a ten year period. The respective notional interest rate would be based on the Euro area's ten-year government bond interest rate plus a 2% risk premium. Moreover, it includes special provisions to prevent tax cascading and double-dipping within corporate structures.
Overall, the experience with ACE schemes so far is mixed. While they definitely exert an influence on corporate financial structures, their effect depends on a multitude of factors: the applicable amount of equity and the determination of the notional rate; the interplay between personal and corporate taxation; the alignment of the ACE to other corporate incentive structures; firm heterogeneity with respect to size, type of entity and financial situation.

3 Latvia, Italy and Portugal as Case Studies: An Economic Introduction

It is now time to turn to the three ACE reforms at stake in our empirical investigation. In this section we describe the reforms and their policy background before surveying the economic literature they have generated. Then we focus to the model developed by Sørensen (2015), a tool especially adapted to the derivation of corporate optimal policy under an incremental ACE scheme.

3.1 Policy Background and Research Survey

Latvia

The Latvian ACE was adopted in the end of 2008 and came into effect on the 1st of January 2009. It provided that corporate taxable income should be reduced by the product of a notional interest rate and pre-period retained earnings. The latter were to be accumulated after 31.12.2008 onwards. The first actual deduction hence occurred in the tax year 2010. The notional interest rate was determined to be equal to the annual weighted interest rate of the credit granted by Latvian banks to domestic non-financial enterprises. The rates were listed on the central bank's website in the respective year. A further requirement for the deduction was that the company would not be dis-

tributing dividends neither partially nor fully.[1] It also only applied to incorporated (non-financial) businesses. The Latvian ACE constitutes a soft ACE as it applies to incremental equity. Unlike the Austrian or Italian scheme, however, the full tax rate was applied to the deduction. Moreover, the Latvian ACE can be considered as the antithesis to the Brazilian ACE version, since it only granted a deduction if profits were kept within the firm. The Latvian ACE ended in the beginning of 2014.

Two elements are crucial in evaluating the Latvian ACE: first, following Langedijk et al. (2014), the low level of the statutory rate in Latvia suggests that a possible tax debt shield should be lower than in countries with higher statutory rates. Hence a possible debt-reducing effect of the Latvian ACE should be comparably smaller in magnitude vis-à-vis countries with higher statutory rates. A comparison of EMTRs on debt and retained earnings shows that the Latvian debt bias still decreased considerably from 21.2% in 2009 to 6.8% in 2010 (Spengel et al. (2014)). Second, the introduction of the Latvian ACE coincided with the onset of the financial crisis in the Baltic economies. The Latvian economy was hit particularly hard due to its high levels of leverage and dependence on foreign finance. Latvia received financial help from institutional lenders in 2009, after consultations had been held with IMF officials from mid-November 2008 onwards. Among the conditions underlying the stand-by-agreement with the IMF was also commitment by the Latvian government to develop a comprehensive strategy for restructuring private sector debt (International Monetary Fund (2009)). The introduction of the ACE in 2009 likely falls in this context. In the same year, the period during which losses could be carried forward was extended from 5 to 8 years. These provisions were further extended in 2012 to an infinite horizon for losses that occurred after 2008.

Italy

Italy provides two experiences with (soft) ACE implementations: first from 1997 until 2003 and second from 2011 onwards. According to Bordignon et al. (1999), the first experimentation with an ACE was accompanied by a broad set of changes to PIT, tax compliance and tax shifts from the national to the regional level. The notional interest deduction only applied to new equity, accumulated from 1996 onwards. The interest rate applied was equal to the weighted market interest rate on public and private bonds plus a premium. The premium could be set at government's discretion to up to 3%. Instead of being fully tax-exempt, the notional interest was taxed at a reduced rate. The goals of the first Italian ACE reform were multiple: boosting firm investment and reducing firm leverage at low fiscal cost while staying internationally competitive by achieving lower effective average tax rates.

By deriving the resulting optimal firm tax schedules, Bordignon et al. (1999) find that the overall reform was indeed successful in both reducing the debt bias and the cost of capital. They also identify a stronger decrease in the cost of financing investment for financially constrained firms. Empirically, Staderini (2001) finds a decrease in firm leverage after the 1997 ACE reform by approximating the ACE through time fixed effects and tax debt shields for a panel of Italian firms. Bontempi et al. (2004) also provide evidence that the Italian ACE reform reduced corpo-

[1] Fatica et al. (2012), pg. 16

rate leverage, while controlling for competing motivations underlying corporate finance (pecking-order theory (Myers and Majluf (1984)) vs. classical corporate trade-off theory (Harris and Raviv (1991))). Identifying the single impact of the ACE reform is difficult, however, since the initial reform underwent continuous change over time.

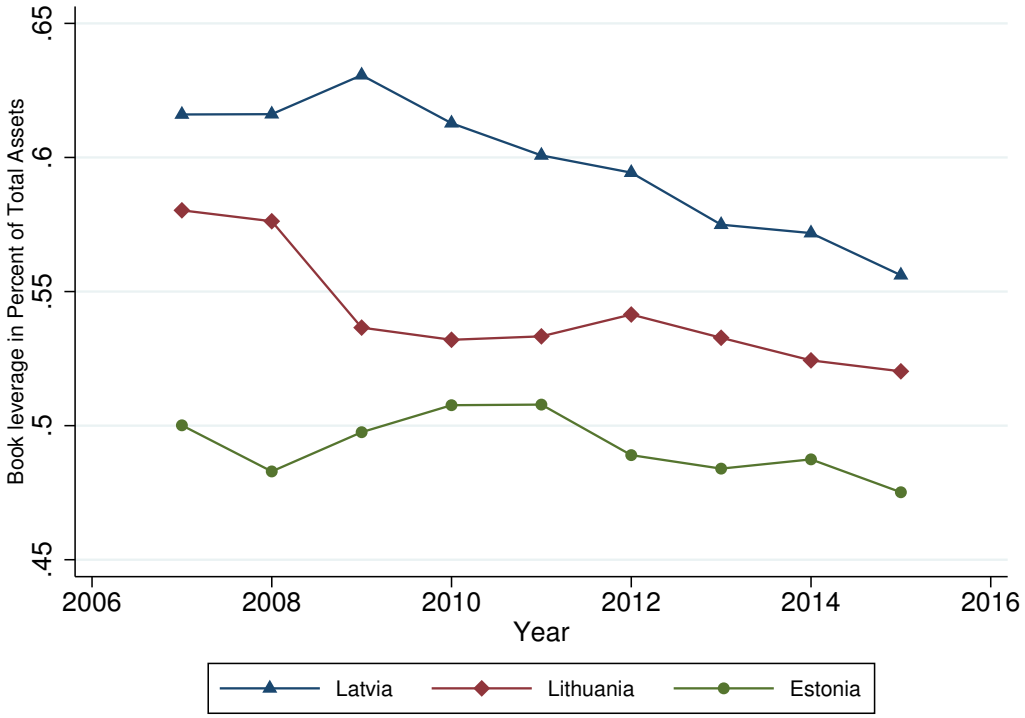
Santoro (2005) further examines how the ACE affected different groups of firms. He finds that larger Italian firms profited more from the ACE reform than smaller firms, since they are issuing equity more frequently. This added to the political contentiousness of the reform, as larger firms are more represented in Northern Italy than in the South. In 2004, the ACE was then replaced by thin capitalisation rules, which aim at limiting debt finance at smaller fiscal cost (cf. Massimi and Petroni (2012)). However, thin capitalization rules only target intra-group transfers of large firms. They hence turned out to be ineffective at countering excessive debt financing in general, leading to their abolishment in 2008 (Massimi and Petroni (2012)).

In 2011 a new version of the ACE was then reintroduced. As before, it applied to new equity, this time accumulated after the tax year 2011. While being set at 3% for the first three years of the scheme, future rates were based on public debt securities plus a risk premium of up to 3% (Massimi and Petroni (2012)). The resulting deductions can now be carried forward over an infinite horizon. It is similar to the former reform in granting the deduction to both incorporated and unincorporated businesses, and hence avoids possible tax-induced distortions to incorporation that exist in other countries (e.g. Belgium). Zangari (2014) notes that the 2011 reform included further refinements with respect to the deductible amount of equity. For instance, equity which is subject to legal requirements and not to shareholders' discretion was excluded from the ACE base. Following the ACE reform, tax-induced debt bias in Italy, as measured by the difference of EMTRs between debt and equity finance, decreased from 41% in 2011 to 28.8% in 2012 (Spengel et al. (2014)). Empirical evidence suggests that the 2011 ACE reform significantly reduced firm leverage. Unlike the former Italian experience with an ACE, Panteghini et al. (2012) find that the 2011 reform decreased leverage levels particularly of small and Southern Italian firms. Using DID analysis and French and German firms as a control group, Gérard and Mahoux (2017) also find a significantly negative ACE effect on corporate leverage.

Portugal

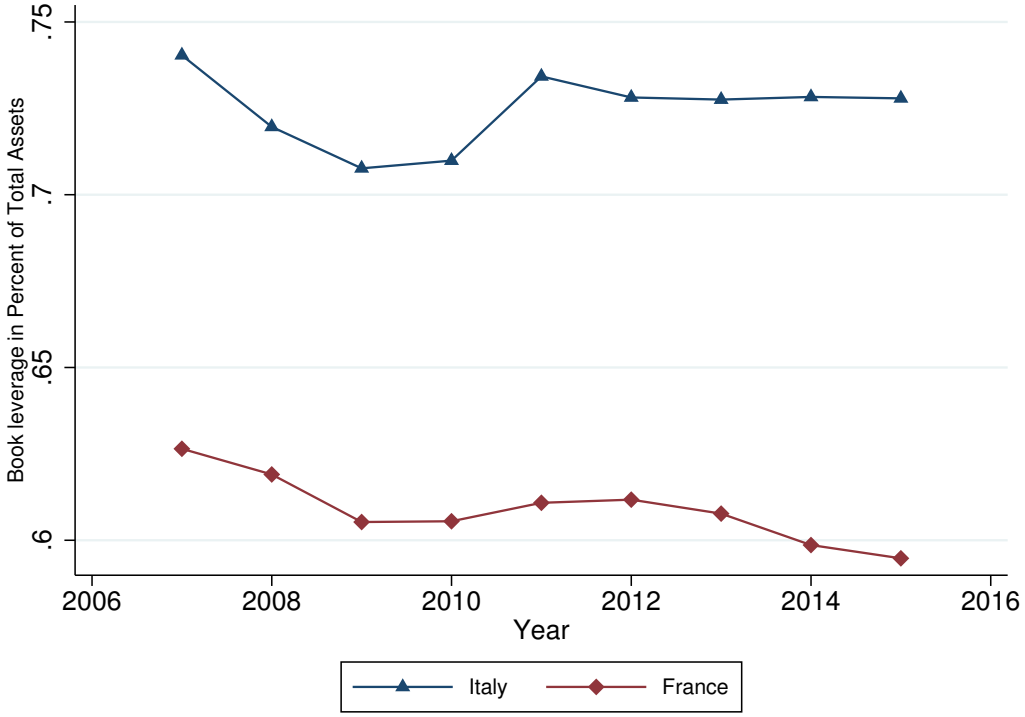
Portugal introduced an incremental ACE scheme in 2010, particularly targeting SMEs under specific ownership structures (i.e. individuals, venture capital owners and business angels (cf. Hebous and Ruf (2015))). After 2013, the latter limitation was lifted in favour of a broader set of SMEs. To our knowledge, empirical analysis of the general effectiveness of the Portuguese ACE has not been conducted so far, yet the Economic and Development Review Committee (EDRC) (2017) notes that these schemes were not considered to be effective in stimulating investment. As a consequence, since 2017 the Portuguese ACE is not restricted to SMEs anymore.

Figure 1: Trend in Book Leverage for Latvia, Lithuania and Estonia



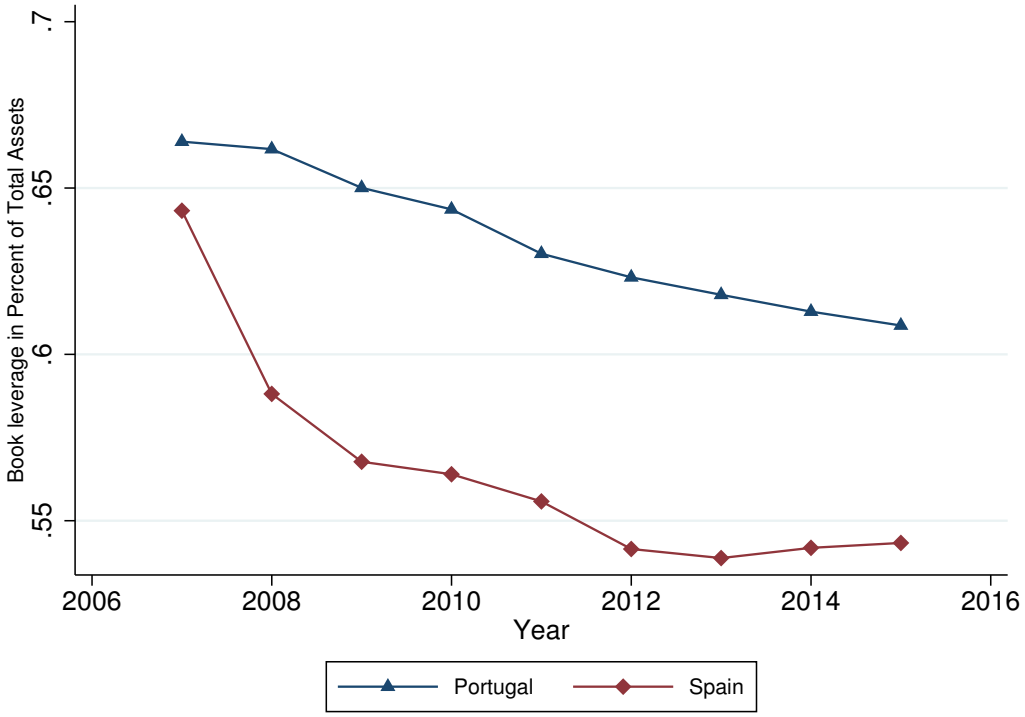
Note: The figure shows the behaviour of firm book leverage over time. Book leverage is defined as the ratio of current and non-current liabilities over total assets. Data are from the AMADEUS database.

Figure 2: Trend in Book Leverage for Italy and France



Note: The figure shows the behaviour of firm book leverage over time. Book leverage is defined as the ratio of current and non-current liabilities over total assets. Data are from the AMADEUS database.

Figure 3: Trend in Book Leverage for Portugal and Spain



Note: The figure shows the behaviour of firm book leverage over time. Book leverage is defined as the ratio of current and non-current liabilities over total assets. Data are from the AMADEUS database.

3.2 Optimal Policy: Theoretical Effect on Leverage

In the following, we derive the expected effect of incremental (soft) ACE schemes on firm leverage, with a particular focus on the Latvian ACE variant. To this end we utilise a theoretical model developed by Sørensen (2015), and adapt it to the incremental nature of the ACE schemes considered. Under omission of potential agency conflicts, firms should choose funding sources such that their discounted net present value is maximised. This is identical to maximising the value of both equity and debt, or simply the discounted stream of after-tax profits:

$$\max \text{NPV} = V^E + V^D = \sum_{t=0}^{T} (1+r)^{-t} \Pi_t \ , \tag{1}$$

where V^E and V^D denote the present values of equity and debt, Π_t is after-tax profit in period t and r the real interest rate. It is assumed that government gets tax policy right in that capital depreciation can be deducted completely from taxable income. The stream of net profits can then be further split up into its subcomponents:

$$\sum_{t=0}^{T} (1+r)^{-t} \Pi_t = \sum_{t=0}^{T} (1+r)^{-t} [(1-\tau)(F(k_t) - \delta k_t) - q_t k_t] \ , \tag{2}$$

where $(F(k_t) - \delta k_t)$ is the taxable profit of the firm. It is composed of a neoclassical production function with capital as sole input factor, $F(k_t)$, minus capital depreciation δk_t for $\delta \in (0, 1)$.[2] It is implicit in the above equation that any net produce, i.e. firm output minus capital depreciation and the cost of capital, q_t, is considered as investment and increases the capital stock in the next period. In conventional tax systems, only debt interest is deductible from the corporate tax base, such that

$$q_t = \beta(r + p_d(\beta) - \tau(r + p_d(\beta) + i))) + (1 - \beta)(r + p_e(\beta)) \ , \tag{3}$$

$p_d(\beta)$ and $p_e(\beta)$ denote the risk premiums associated to debt and equity finance, and i is inflation. Risk premiums for debt and equity are convex functions of the firm share of debt, β, such that interior solutions to the problem of leverage choice become possible. As argued by Sørensen (2015), $p'_d(\beta) > 0$ globally whereas $p'_e(\beta)$ should be of parabolic shape. This implies that some level of debt is preferable to no debt at all, due to the higher combined supervisory capacity of both equity and debt holders. For simplicity we further assume the tax rate τ, the interest rate r and inflation i to be exogenously determined and constant throughout the considered time period. The resulting optimal choice of debt finance β can be derived like in Sørensen (2015) via second-order Taylor-approximation (cf. technical appendix) as

$$\beta = \beta^* + \frac{\tau(r + i + p_d(\beta^*) + \beta^* p'_d(\beta^*))}{p''(\beta^*)} \ , \tag{4}$$

where β^* is the debt level chosen in the absence of distorting tax policy. The additional term is the so-called debt tax shield.

The introduction of a hard ACE scheme, as in Belgium or Croatia, would lead to the addition of the term $\tau(1 - \beta)(r + p_e(\beta) + i)$ to equation (3). This would result in a coincidence of β and β^*. This partial solution to the financing problem does not change if one considers instead the abolition of debt interest deduction, as foreseen under the CBIT, or the equal-rate deduction under the ACC. Whether the deduction would also need to include the risk premium $p_e(\beta_t)$ to achieve debt unbiasedness, i.e. $\beta = \beta^*$, is unclear. As noted by Bond and Devereux (2003), it ultimately depends on the probability with which investors expect to receive the notional interest deduction. They argue that, if the ACE tax is designed in a way that guarantees the deduction of the normal risk-less return also under firm bankruptcy, adding a risk premium to $r + i$ constitutes a redundant tax grant that exempts economic rent from taxation — which the ACE is supposed to target explicitly. Despite this theoretical objection, risk-adjustments of the notional interest rate prevail in practical applications of the ACE. The above model also assumes that the notional interest rate is known in advance by the corporate decision maker. This is practically also the case for instance in Belgium, where the rate is determined two years in advance. However, in the case of Latvia, for example, the notional interest rate was published in the same year as the deduction was granted. As such it did not increase investor certainty about expected returns.

Two aspects still need to be mentioned: first, the accounting notion of retained earnings is based on retained earnings from the last period plus net profit of the current period minus div-

[2] A neoclassical production function is concave, such that $F'(k_t) > 0$ and $F''(k_t) < 0$. Moreover, the Inada conditions are assumed to hold, i.e. $\lim_{k\to\infty} F'(k) = 0$ and $\lim_{k\to 0} F'(k) = \infty$.

idend payments in the current period. This implies that the (real) normal return to equity, as denoted by $(1-\beta)(r+p_e(\beta_t))$, is considered as a dividend by accountants. Second, distribution of profits to shareholders constitutes a process governed by manifold, foremost legal considerations. Including the respective choice architecture into the present model would only complicate the already elaborate structure. We still include the share of profits which are to be distributed as $\gamma \in [0,1]$ in order to highlight a specificity of the Latvian system.

Let firm profit maximisation under the Latvian ACE be denoted as

$$\begin{aligned}\max_{\beta_t,\gamma_t} \sum_{t=0}^{T}(1+r)^{-t}[(1-\tau)(F(k_t)-\delta k_t)-k_t\beta_t(r+p_d(\beta_t)-\tau(r+p_d(\beta_t)+i)))\\ -\gamma_t k_t(1-\beta_t)(r+p_e(\beta_t))+\tau(r+i+\bar{x})\Phi_{j-1}]\ ,\end{aligned} \tag{5}$$

where the partial distribution of dividends is $\gamma_t k_t(1-\beta_t)(r+p_e(\beta_t))$. The grant of the notional interest deduction on last period's retained earnings is denoted by $\tau(r+i+\bar{x})\Phi_{j-1}$. In Latvia, the weighted interest rate of Latvian banks to non-financial enterprises determined the ACE rate. This implies the notional interest deduction to be equal to a nominal interest rate, $(r+i)$ plus a weighted average risk premium of all firms, $\bar{x}$. $\bar{x}$ would in this case not be a function of individual firm-level leverage any more. The time subscript j indicates that retained earnings are deductible only for a sub-period of the time horizon, ranging from period $j > t = 0$ to period T. The law of motion for retained earnings, denoted here by Φ, can further be given as

$$\Phi_j = \begin{cases} \Phi_{j-1}+(1-\gamma_j)(1-\beta_j)k_j(r+p_e(\beta_j)) & \text{if } \mathbb{E}_j[\sum_{j}^{T}(1+r)^{-(j-t)}\Pi_j|F(k_j+\Phi_j)] \geq \\ & \mathbb{E}_j[\sum_{j}^{T}(1+r)^{-(j-t)}\Pi_j|F(k_j)+(r+i)(k_j(1-\beta_j)+\Phi_j)] \\ 0 & \text{if not.} \end{cases} \tag{6}$$

The defining inequality above states that earnings will only be retained under the partial ACE if its retention in the enterprise is deemed profitable from an investor point of view. This implies that the internal firm capital freed from taxation is yielding higher future streams of expected profits than the return from an alternative, riskless investment instead. It hence becomes clear that financing decisions under this partial ACE are driven by investor anticipations of future profitability in each period. The role of γ needs to be further clarified: in the case of Latvia, the tax deduction on retained earnings was only granted if dividends were neither partially nor fully distributed. Hence, firm choice should be either $\gamma = 0$ if the defining inequality of equation (6) holds, or $\gamma = 1$ if not.

The derivation of optimal firm financing choices under the Latvian ACE requires once again some further assumptions. We take first as given that there exists a strictly positive stream of profits in the future such that profits are actually distributable. Second, we assume an infinite time horizon, $T \longrightarrow \infty$, such that the differences in starting points become irrelevant. Third, we assume that the notional interest deduction is sufficiently high in all periods such that $\gamma = 0$ and all profits are retained in each period. The above maximisation problem can then be further

simplified to:

$$\max_{\beta_t} \sum_{t=0}^{\infty} (1+r)^{-t}[(1-\tau)(F(k_t)-\delta k_t) - k_t\beta_t(r+p_d(\beta_t)-\tau(r+p_d(\beta)+i)) \\ -k_t(1-\beta_t)(r+p_e(\beta_t)-\tau(r+i+\bar{x}))] \tag{7}$$

and the resulting optimal level of leverage for the firm converges to

$$\beta = \beta^* + \frac{\tau(p_d(\beta)+\beta p_d'(\beta)-\bar{x})}{p''(\beta)} \tag{8}$$

It becomes clear that two elements of the Latvian ACE are important in eliminating the debt bias, i.e. $\beta = \beta^*$. First, a sufficiently long history of (correctly expected) positive profits, which ensures that retained earnings gradually unsolder older equity financing. Second, it is important to get the notional interest rate right. This is difficult to achieve as it is heterogeneous across companies due to different refinancing conditions. Moreover, it may create moral hazard problems when trying to account for risk heterogeneity by adapting it accordingly. Devereux and Sørensen (2006) add that, despite the notion that a riskless rate should be theoretically sufficient to neutralise the financing decision, systematic differentiation of notional interest rates also bears the concern of intensive political lobbying. Note that the Latvian ACE theoretically even leaves open the possibility of a debt level below β^*. This might be the case for some firms whose equity financing costs are below the weighted average underlying the notional interest deduction. Yet, as argued above, it may also exempt economic rent from taxation. Conversely, riskier firms will still have a debt-biased financing condition after the reform if their risk premiums are above $\bar{x}$ and their investors do not expect to get the notional return with certainty.

The important insight of this section is that incremental ACE schemes in general and the Latvian ACE variant in particular should lead to the gradual elimination of the debt bias in leverage levels. However, the underlying necessary conditions, i.e. ongoing streams of (positive) profits and expected future profitability of investment, are strong given the circumstances at its introduction. Moreover, the debt-reducing effect could differ with firms' idiosyncratic characteristics. With respect to the empirical analysis in section 4, a possible leverage-reducing effect through the Latvian ACE is likely to be small, given the low statutory tax rate and the required build-up of retained earnings by Latvian firms during the time period considered.

4 Empirical Analysis

4.1 Identification Strategy

Our empirical analysis focuses on ACE reform from three different perspectives. A first approach centres on regarding the introduction of an ACE as a quasi-natural experiment by applying a difference-in-differences (DID) approach. The outcome of interest is a possible effect of the ACE on the leverage levels of firms in the respective country. The periods of treatment (i.e. the ACE

duration) are 2009-2014 (Latvia), 2011-2015 (Italy) and 2010-2014 (Portugal).[3] The control group for Latvia consists of both Estonian and Lithuanian firms. The respective control groups for Italy and Portugal are France and Spain, which share a comparable development of leverage levels before the reform (cf. figures 2 and 3).

In a second approach, we incorporate the intensity of ACE reform into the examination. We measure it by the absolute value of the difference between effective marginal tax rates for debt- and equity-financing, i.e. the measurement of debt bias. Depending on the underlying tax base, the notional interest rate applied and the statutory tax rate, EMTRs can vary considerably. By using the absolute EMTR difference between both financing sources we assure to capture the relative change in debt financing incentives of firms.[4] Third, we combine DID analysis and the measurement of ACE reform intensity, following a methodology developed by Acemoglu et al. (2004). Our work does further control for firm and macroeconomic variables that possibly influence leverage levels. Moreover, we additionally look for heterogeneous effects along firm size and conduct robustness checks by using propensity score matching.

The remaining procedure is as follows: the rest of this section first explains the dataset, its sources and restrictions. We then present the results of our study, followed by robustness checks. Further, section 5 offers space for a discussion of our results, focusing a.o. on strengths and limitations of our study, as well as on policy recommendations and avenues for further research.

4.2 Data

The individual firm data stem from the AMADEUS database, which is maintained by the Bureau Van Dijk. It contains unconsolidated financial and accounting data of European incorporated firms. Data are accessible for the time period from 2007 until 2016. The database also includes information on ownership structures of these firms. We complement the dataset by adding data on macroeconomic development from the Worldbank, public finance records from Eurostat and tax policy developments from the European Commission. Data quality varies across the three country pairs used in our study. The reason is twofold: first, Bureau Van Dijk works with domestic credit rating agencies in these countries. These are usually subject to national regulations concerning the extent to which firms need to report their accounting and financial data. Additionally, the compliance with these non-governmental agencies is generally lower than the compliance with quasi-governmental institutions like e.g. the National Bank of Belgium, which is the corresponding data provider for AMADEUS in Belgium. Second, accounting standards in e.g. Latvia and Lithuania are oriented towards the Anglo-Saxon standard while Estonia adopted the continental European standard. This can render the standardised reporting of certain variables difficult.

[3] Technically, the Latvian reform started on 1 January 2009 and had already ended in the beginning of 2014. Because of possible overlaps between fiscal and tax years and because the reform end was announced late in 2013, we still look for possible effects on leverage in 2014. Similar reasoning applies to the Portuguese case, which additionally instead of being abolished in 2014 was replaced by a similar, yet capped deduction scheme.

[4] For Latvia, Lithuania and Estonia, we use the EMTR on retained earnings, whereas for the Italian case we apply the EMTR on new equity in general. Portuguese ACE reform aimed at small and medium enterprises exclusively. Since Spengel et al. (2016) refer to a representative firm in their simulation studies, they calculate no post-reform decrease in EMTRs on equity. Thus our current estimations do not include an approximation of treatment intensity alongside EMTRs.

In order to ensure comparability between firms we conduct a cleaning procedure of the dataset, based on various approaches in the literature. In a first step, we follow Kalemli-Özcan et al. (2015) in eliminating observations which include missing values for total assets, turnover, sales or employment and those which feature negative values for total assets, employment, sales or tangible fixed assets. In order to reduce selection bias alongside non-uniform and size-dependant reporting standards, we restrict the sample to non-micro businesses (i.e. at least ten employees and two million euros of total assets). Second, we adapt the procedure by Princen (2012) in excluding firms from the primary, public, and eventually financial and real estate sector.[5] Third, we restrict each respective sample to the years 2007 until the respective end of ACE reform. In general the year 2016 is excluded from the sample because of large amounts of missing observations for this year. We also exclude inactive firms (due to e.g. solvency) and cases where reported equity is larger than total assets. We also eliminate observations who do not include data for the main variables of interest, book and financial leverage, and those companies which have negative financial or book leverages. Moreover, we restrict the sample to private and public limited companies, hereby excluding e.g. non-profit organisations and public authorities, as defined by their legal status. In a fourth step, we follow Oestreicher et al. (2014) in deleting the first and the ninety-ninth percentile of companies along the distribution of total assets minus equity and liabilities (since some companies deviate substantially from this absolute minimum accounting requirement concerning a firm balance sheet). We also eliminate all values of balance sheet items and turnover that are smaller than zero or larger than total assets.[6]

4.3 Results

This section develops the basic difference-in-differences approach that we will use to analyse the implementation of the ACE. The envisioned DID analysis rests on two important assumptions which need to hold true for it to be valid. First, firms in the treatment and control groups must follow a common trend in the absence of treatment. Second, DID analysis rests on the uniqueness of the treatment effect. This means that the effect of the policy of interest should not be confounded with the effect of other policy measures that also influence the outcome variable. This assumption usually implies that a possible treatment effect can be identified with certainty directly after its inception.

The baseline DID regression that is to be estimated in this section can be given by

$$Y_{it} = \gamma_0 + \gamma_1 \mathrm{TR}_i + \gamma_2 \mathrm{Time}_t + \gamma_3 \mathrm{ACE}_{it} + \sum_j^J \phi_j X_{jit} + \sum_l^L \mu_l \mathrm{Ind}_{li} + u_{it} \ , \tag{9}$$

where the subscripts i and t denote the observation of firm i in year t. Y is the dependent variable,

[5] Excluded sectors for Latvia and Portugal (including control groups) are those belonging to the NACE-Rev.2-categories 0-1000 (primary), 6400-6832 (financial and real estate sector) and 8400-9900 (non-commercial services). In Italy, ACE applied to also to financial businesses, hence we leave NACE-Rev.2 6400-6832 in the sample.

[6] Two exceptions are working capital and net current assets. Both can be negative, and hence are only excluded if negative values are larger than the total balance sheet.

leverage. Its choice can have an impact on policy evaluation. We follow Princen (2012) in using two alternative definitions of leverage ratios, book leverage and financial leverage. The former is defined as the ratio of total firm debt over its total assets. Financial leverage is a sub-aggregate of book leverage, and differs by only including financial debt (i.e. loans and long-term debt) in the nominator. The difference between both dependent variables hence is that the former is also strongly influenced by short-term movements in firm liabilities (e.g. for provisions, personnel cost, debt to trade suppliers etc.). Financial leverage instead captures changes in the long-term financial situation. Since deductibility of interest usually only applies to financial debt, we also expect a stronger change due to the ACE for financial than for book leverage.

Among the independent variables of the model, the difference-in-differences components are the three binary variables TR (treated group), Time and ACE. The former two take the value one if a firm is located in the country of reform and if the reform is in action in the respective year. Both variables are zero otherwise. ACE is the product of TR and Time, i.e. [TR x Time]. As such, γ_3 measures the ACE reform impact on leverage. In the case of Latvia, where the control group consists of two countries, we add a country fixed effect to capture a possible effect of unobserved and constant determinants of firm leverage.

X denotes two sets of additional explanatory variables which control for changes in the economic environment. The first set of control variables is then composed of individual firm financial and accounting ratios, i.e. tangibility, profitability, firm size and net operating loss. The second set includes macroeconomic control variables, namely growth of per capita GDP and inflation. These two sets of financial and macro-economic control variables are included in a step-wise procedure. This way we can differentiate between the pure treatment effect, and the effect when taking account of individual firm effects and trends in the firm aggregate. 'Ind' denotes industry-fixed effects according to the two-digit NACE-Rev.2 industrial classification standard. u_{it} is the error term, whose variance is calculated under consideration of both heterogeneity and serial correlation at the firm level (i.e. firm-level clustering).

Positive signs are expected for tangibility and firm size, as both imply smaller risk for lending banks. Almeida and Campello (2007) indeed show empirically that tangible assets increase access to external finance for borrowing-constrained firms. Profitability and net operating loss should have a converse effect on firm leverage. Our approach does not control for a possible non-debt tax shield, as done in Princen (2012).

Since our interest lies also in examining the intensity of the ACE effect, we add two different sets of regressions. Staderini (2001), Laureano and Portal (2016) and Kestens et al. (2012) employ the effective tax advantage of debt or effective marginal tax rates. Following Acemoglu et al. (2004), we estimate a regression that captures a quantified measure of the reform-induced decrease in debt bias. To this end we use the differential in EMTRs on equity and debt, developed methodologically by Devereux and Griffith (1998) and calculated by Spengel et al. (2016). This way, we account for the fact that relative shifts in statutory tax rates or the tax base after

ACE reform can influence the effectiveness of the ACE reform, as the identification method centres on regarding differences between control and treated firms. The estimated equation is equal to:

$$Y_{it} = \gamma_0 + \gamma_1 \text{TR}_i + \gamma_2 \text{Time}_t + \gamma_3 \text{TIME x DEBTBIAS}_{it} + \sum_j^J \phi_j X_{jit} + \sum_l^L \mu_l \text{Ind}_{li} + u_{it} \ , \quad (10)$$

where DEBTBIAS = $\text{EMTR}_{equity} - \text{EMTR}_{debt}$. Due to negative EMTRs on debt and positive EMTRs on equity, this measure is generally positive.[7] Finally, we estimate the above equation without the time fixed effect TIME, without the associated interaction term TIME x DEBTBIAS but with the simple DEBTBIAS measure instead.

Our empirical analysis yields a multitude of leverage effects following the ACE reform. In the baseline DID setting we find that financial leverage levels decrease (cf. tables 12 and 22), although for Latvian firms this only holds true before taking into account both sets of control variables (cf. 2). Overall book leverage levels however evince a pattern that runs counter to the reform intuition. Since book leverage covers a broader aggregate of liability components (e.g. social security provisions and deferred taxes), we expect that financial leverage better captures strategic firm reactions to ACE reform. The control variables evince the same signs as in the analysis of Princen (2012). This implies that the unexpected signs of control variables in Princen (2012) continue to be unexpected in my work. For instance, it is interesting that certain coefficients differ similarly between book and financial leverage (i.e. firm size or tangibility). It also indicates that the latter ratio seems to behave closer to the predictions arising out of corporate financial theory. Moreover, this could also imply that either the hypothesised relationship falls short of the true relationship, or that additional complementary covariates are required (or both). Once we adapt our regressions to account for the intensity of reform, we continue to find small negative leverage effects for Italian enterprises and for financial leverage in general, which amounts to 1% to 2% at actual debt bias magnitudes. For Latvia, identifying the expected negative coefficient for EMTR is not possible.

Empirical evidence further indicates that tax reforms seldom have an uniform effect on treated entities. As argued for in section 2, past ACE reforms usually raised inequality concerns due to firm heterogeneity. Santoro (2005) showed that larger firms were more likely to issue new equity under the first Italian ACE reform. In the context of the Brazilian ACE, Klemm (2007) notes that the effectiveness of the tax reform depended strongly on firms' payout ratios, which were distributed very unevenly. With respect to the Belgian ACE experience, Princen (2012), Aus dem Moore (2014) and Panier et al. (2013) find evidence that larger firms reacted stronger to the tax reform than smaller firms. Reasons for this heterogeneity are manifold. Intuitively, many micro and small enterprises lack the resources and knowledge to fully profit from tax advantages. Moreover, transaction costs may decrease the frequency with which smaller firms adjust their capital structure (cf. Strebulaev (2007) and Leary and Roberts (2005)). Also, small firm entrepreneurs might also face personal credit constraints that induce them to extract retained earnings despite the existence of the notional interest deduction.

[7] The only European exception is Estonia, where the existence of a S-Cashflow taxation system leads to non-discrimination between both sources of funds finance, and hence to a debt bias measure equal to zero.

In this work, we hence consider firm size as an important dimension of firm heterogeneity. There exist various ways to account for it. Restricting the sample according to firm categories has the advantage over simply including additional indicators of heterogeneity that parametrization is fully flexible between sub-samples. This is also the approach followed by Princen (2012) and Aus dem Moore (2014) with respect to size categories. Likewise, we use the EC definition to separate the sample into large companies (either total assets above EUR 43 million or more than 250 employees) and small/medium-sized firms.[8] The respective results on tables 3, 13 and 23 indicate that there are substantial differences in a possible debt-reducing ACE effect. In Italy and Latvia, it was (expectedly) more pronounced among large firms (albeit the coefficient is still (insignificantly) positive in the Latvian case). In the Portuguese case, however, small firms seem to have reacted more to change finance incentives under the ACE than their medium-sized counterparts. By considering financial leverage as the dependent variable instead, this difference between small- and medium-sized Portuguese enterprises persists.

4.4 Robustness

In order to assure that the obtained results are not subject to systemic biases due to, for example, erroneous sample selection procedures or inadequately chosen treatment periods, we conduct a series of robustness checks. First, we conduct the above regressions on an almost untreated firm sample. Second, we employ propensity score matching alongside Princen (2012) and Aus dem Moore (2014) to assure comparability of firms across countries. Finally, we vary in the treatment periods considered, allowing for possible lagged or anticipation effects to play a role in reform evaluation.

— Robustness results for untreated data to be added —

In order to further account for country-specific unobserved variables that potentially influence leverage levels we make use of matching methods. Dating back to Rubin (1979), we hereby use probit regressions to estimate a propensity score, according to which firms from treated and control countries are matched according to their characteristics. Results for matching are displayed in the appendix. The above results only change marginally for matched samples of firms (cf. tables 8, 18 and 24).

— Robustness results for lagged or anticipated effects to be added —

[8] In the Portuguese case, where we only consider SMEs, we separate the sample into small- and medium-sized firms

5 Discussion and Research Perspectives

A general result of our examination is that ACE reforms can have different effects on firm financial choices. We consider two financial outcomes, book and financial leverage. Using DID analysis, we find a small negative ACE effect on firm financial leverage, but an unexpected positive coefficient in the Latvian case. Firm book leverage, which captures a broader set of liabilities instead, seems not to be reduced by the reforms. We moreover note that insights from the literature regarding the coefficient signs and magnitudes of key control variables (e.g. tangibility) are confirmed rather by financial leverage than by book leverage. This difference in the effects on the financial aggregates also coincides with other findings in the literature (e.g. Princen (2012)). It may hence indicate that looking at financial leverage provides a better approximation of firm reactions to tax reform than book leverage.

Apart from the choice of leverage measure, accounting for firm size substantially influences our results. An interesting feature hereof are moreover the differences between reforms in the considered countries: whereas in Latvia and Italy, large firms profit more from the ACE than SMEs, the Portuguese reform leads to a larger benefit for small firms than for medium-sized firms. In line with e.g. the Brazilian and first Italian ACE experience (cf. Klemm (2007) and Santoro (2005)), the role that firm size can have on ACE reform effects is a recurrent finding that potentially bears consequences for the political economy of tax reform.

In order to provide a better account of the intensity of ACE reform, we also extended our initial analysis by considering an interaction between DID and a measure of the debt bias. We approximated the latter through the difference between EMTRs on debt and equity finance. Although this provides a conceptual innovation over simple DID analysis, in our case studies we only found a confirmation of the expected coefficient sign for the Italian ACE. The utilisation of the debt bias as single measure of reform effects does not yield improvement over baseline results. Finally, our results stay broadly unchanged once we restrict our sample using propensity score matching before applying the mentioned methods.

Our study further faces several limitations. For instance, the chosen methods to evaluate the effects of ACE implementation require further discussion: DID analysis assumes a constant shift in leverage levels following treatment. While being fully adequate in the case of e.g. Belgium, where the full stock of equity became tax-deductible following ACE reform, in our cases a more subtle evaluation is required. Since we analyse incremental ACE schemes, we expect continuous instead of one-off treatment effects. In our study we allow for post-treatment intensity to vary by combining EMTR measures and DID methods.

Yet two questions arise from the utilisation of the EMTR, both related to the underlying methodology. First, Spengel et al. (2016) focus on a representative firm. From an econometric point of view this alleviates potential concerns of endogeneity. By this we recognise that an EMTR measure which accounts for a wide variety of individual firm characteristics might simultaneously be derived from the same accounting items that determine firm leverage levels in the first place. Yet some intermediate degree of differentiation which avoids this mentioned pitfall can still pro-

vide for a better firm-level estimation of the intensity of treatment. Second, Spengel et al. (2016) assume a variety of parameter values that determine investment profitability in order to simulate EMTRs. While they take into account post-reform changes in the notional interest rates, they assume real interest rates which lay substantially above the current low-interest figures. E.g. in Belgium the simultaneous post-crisis decrease in notional and real interest rates lead to a decreasing attractiveness of its ACE scheme. In the light of this experience we deem it worthwhile to consider that exceptional monetary circumstances might play a role beyond what is captured by the EMTR. A possible measure hereof could be the spread between notional and actual interest rates.

Alternatively, we could also rely on more flexible approaches to ACE evaluation. One possibility would be to employ a generalised version of DID analysis. Hereby, a series of time and treatment effects allows to capture e.g. an increasing ACE effect over time. Besides the advantage that it would offer over classical DID analysis from a dynamic perspective, this method might also help to reduce another deficiency: in the Latvian case for instance, the assumption of a common leverage trend among treated and control firms at treatment inception seems less justifiable than in the Italian or Portuguese cases. Vandenberghe (2017) describes a method which accounts for such deviations from the common trend. By capturing pre-treatment accelerations (or higher-order changes) in outcome variables, one can extrapolate these deviations and adapt DID coefficients accordingly.

Yet the question of a common trend in the Latvian case relates to another important assumption underlying DID analysis: uniqueness of treatment. The Latvian ACE was introduced shortly after agreeing with the IMF on deleveraging the private sector. The increase in firm leverage in 2009 could then be interpreted as the cause of the succeeding treatment. The ACE itself can consequently be viewed a response to pre-existing differences in leverage between Latvian and control firms. That could question whether the inferred effect stems from an identified causal relationship. Similarly, both Italian and Portuguese firms were highly indebted at reform inception. Even though we control for economic growth and inflation, a limit of our methodology hence relates to the way how we capture shifts in firms' financing conditions. An appropriate way to improve our current research setting could then imply to find adequate variables which measure the interplay between supply- and demand-side conditions on corporate financial markets. With respect to the uniqueness of treatment in the Latvian case, we can further observe that no similar policy measure was enacted domestically or in Lithuania and Estonia (cf. figure 4). While in Latvia an extension of loss carry-forward was enacted in the same year as the ACE, this policy measure does not in itself affect financing choices by firms — apart from possibly contributing to the firm deleveraging process by reducing the tax burden.

Our study yields several lessons for tax policy reform: foremost, the effect of the analysed reforms strongly depends on firm size. While the Latvian and Italian ACE were beneficial mostly to larger firms, the Portuguese ACE succeeded in reversing this usual pattern of ACE reform. The underlying concern of equity relates to ensuring that competition among firms of different

sizes is not asymmetrically distorted by corporate taxation. One possible reason for the common divergence in ACE reform effects can be traced back to a typical ACE feature challenged by Bond and Devereux (2003): most ACE schemes in practice approximate the notional rate of return through the nominal interest rate and a uniform risk premium. The existence of such a uniform risk premium in the presence of heterogeneous refinancing conditions for firms, even if it is correct on average, implies that economic rents of larger, less risky, firms are exempted from taxation. Conversely, smaller firms might also be taxed on the normal return to capital. It could be more adequate from a competition point of view to permit more favourable notional rates to SMEs. A possible objection to such a differentiation might relate to concerns of political lobbying and moral hazard. However, while the former critique also applies to most other schemes that particularly alleviate the tax burden of smaller firms, the latter objection would also extend to debt interest deductions. With respect to current policy proposals that include ACE-type schemes, such as the AGI in the CCCTB, this implies that some degree of rate differentiation might be appropriate. E.g. this is the case in Belgium where the difference is set by law to half a percentage point.

The Portuguese ACE theoretically further has another advantage over the Latvian and Italian ACE. Since its notional rate was fixed in advance (albeit at 3% for 2010-2013), it guaranteed investor certainty about returns. Instead, investors in Latvian companies were not granted return security for retained earnings, as the notional interest was not determined in advance. Neither did the Italian ACE, whose notional interest rate was determined annually under the discretion of the financial ministry. In comparison with other ACE schemes, a positive aspect of the Latvian ACE was that it gave firms incentives to generate additional finance from internal revenues. The experience with the Brazilian ACE demonstrated that under market imperfections, perfect substitutability of external and internal funds might not exist — even less so with respect to the Latvian background at the time. Due to their incremental nature, the considered ACE schemes were also fiscally favourable measures in comparison with hard ACE schemes.

Apart from the analytical improvements already mentioned above, further research could additionally focus on more adequate topics of corporate finance than firm leverage. One might alternatively consider the propensity of firms to retain earnings or to issue debt or (external) equity after the reform (e.g. like Santoro (2005)). This requires, however, sufficiently detailed firm data. More detailed data might also allow us to capture cross-country intra-company movements and achieve intra-firm conglomerate consolidation of balance sheets. This way one could separate the different flows of capital due to ACE reform from unrelated financial flows. Hereby, Hebous and Ruf (2015) succeed in separating active investment related flows from passive flows. The latter can be rather related to tax minimisation practices instead of real activity. In any case, evaluation of the long-term effect of incremental ACE schemes would benefit from future policy experiments being maintained for a longer time horizon.

6 Conclusion

Under classical corporate taxation, interest on debt is deductible against the corporate income tax base while compensation of equity is not. The resulting debt bias contributes to firm fragility and calls for remedies. Among the possible remedies, the Allowance for Corporate Equity (ACE) grants a notional deduction on the cost of equity. Ideally, it equalises the tax treatment of debt and equity.

Its implementation however differs widely in practice. In this work, we analyse three recent cases of ACE reform which occurred in Latvia (2009-2013), Italy (since 2011) and Portugal (2010-2013) respectively. Our empirical analysis bases on a difference-in-differences (DID) approach, using Lithuanian and Estonian (Latvia), French (Italy) and Spanish (Portugal) firms as control (treatment) groups. In order to capture the possible differentiated effect of the intensity of ACE reform on firm leverage, and thus not just of its sole existence, we extend our initial DID setting by combining it with the difference between effective marginal tax rates (EMTRs) for debt and equity. We also consider robustness tests by e.g. making use of propensity score matching.

Our results suggest that financial leverage of Italian and Portuguese firms decreased by 1% - 2% in response to the introduction of an ACE mechanism in those countries. In the Latvian case, as well as when we use another measure for leverage, called book leverage, we do not find the expected signs. Our analysis further yields results which depend on firm size: for Latvian and Italian firms, we find that larger companies benefit more from ACE than their smaller counterparts. In contrast, in the Portuguese case, we find the opposite outcome. Extending analysis by an EMTR measure of reform intensity does not yield significant changes in the results. Neither does accounting for robustness. Our findings are then not only in line with the relevant literature: they also shed light on the importance of taking into account heterogeneity among firms when analysing ACE reform effects.

Insights from our work and contributions can then be summarised as follows: first, the choice of the evaluation method needs to be adapted with care to the reform at stake. In our case, the reforms are incremental: unlike hard ACE schemes like in Belgium, they should not have a large immediate effect on leverage reduction. This is due to various factors, e.g. they targeted new equity and retained earnings, respectively. This feature calls for alternative methods to capture continuous changes in treatment instead. Second, conventional measures to account for reform intensity via EMTRs and for macroeconomic conditions influencing firm leverage might fall short of their task due to conceptual limitations. By the former, we relate to the difficulty of providing an accurate measure of EMTRs via a representative firm. The latter concern arises out of measuring reform effects in the wake of financial or debt crisis, respectively. Third, ACE reforms often neglect equity, in the sense of fairness, adding also to their political contentiousness. Our study and discussion provide both empirical evidence and theoretical arguments for a debate on that issue. Such debate is especially relevant in today's European Union — and larger economic areas — where fair taxation of both domestic and cross-border firms is a topic particularly at stake.

References

Acemoglu, Daron, David Autor, and David Lyle. 2004. "Women, War, and Wages: The Effect of Female Labor Supply on the Wage Structure at Midcentury." *Journal of Political Economy* 112 (3): 497–551.

Almeida, Heitor, and Murillo Campello. 2007. "Financial Constraints, Asset Tangibility, and Corporate Investment." *Review of Financial Studies* 20 (5): 1429–1460.

Aus dem Moore, Nils. 2014. *Corporate Taxation and Investment: Evidence from the Belgian ACE Reform.* Ruhr Economic Papers 534. RWI - Leibniz-Institut für Wirtschaftsforschung, Ruhr-University Bochum, TU Dortmund University, University of Duisburg-Essen.

Blouin, Jennifer, Harry Huizinga, Luc Laeven, and Gaëtan Nicodème. 2014. *Thin Capitalization Rules and Multinational Firm Capital Structure.* Taxation Papers 42. Directorate General Taxation and Customs Union, European Commission, January.

Boadway, Robin, and Neil Bruce. 1984. "A general proposition on the design of a neutral business tax." *Journal of Public Economics* 24 (2): 231–239.

Bond, Stephen R., and Michael Devereux. 2003. "Generalised R-based and S-based taxes under uncertainty." *Journal of Public Economics* 87 (5-6): 1291–1311.

Bontempi, Maria Elena, Silvia Giannini, and Roberto Golinelli. 2004. "Corporate taxation and its reform: the effects on corporate financing decisions in Italy." March.

Bordignon, Massimo, Silvia Giannini, and Paolo Panteghini. 1999. "Corporate Tax in Italy: An Analysis of the 1998 Reform." *FinanzArchiv: Public Finance Analysis* 56 (3/4).

Buettner, Thiess, Michael Overesch, Ulrich Schreiber, and Georg Wamser. 2012. "The impact of thin-capitalization rules on the capital structure of multinational firms." Fiscal Federalism, *Journal of Public Economics* 96 (11): 930–938. ISSN: 0047-2727.

de Mooij, Ruud A. 2012. "Tax Biases to Debt Finance: Assessing the Problem, Finding Solutions*." *Fiscal Studies* 33 (4): 489–512. ISSN: 1475-5890.

Devereux, Michael P., and Peter Birch Sørensen. 2006. *The Corporate Income Tax: international trends and options for fundamental reform.* European Economy - Economic Papers 2008 - 2015 264. Directorate General Economic and Financial Affairs (DG ECFIN), European Commission, December.

Devereux, Michael, and Aart Gerritsen. 2010. "The tax treatment of debt and equity." In *Towards a European Profits Tax,* edited by D. Albregtse and P. Kavelaars. Kluwer.

Devereux, Michael, and Rachel Griffith. 1998. *The taxation of discrete investment choices.* IFS Working Papers W98/16. Institute for Fiscal Studies.

Economic and Development Review Committee (EDRC). 2017. *Economic Survey of Portugal.* Technical report. OECD.

Fatica, Serena, Thomas Hemmelgarn, and Gaëtan Nicodème. 2012. *The Debt-Equity Bias: consequences and solutions.* Taxation Papers 33. Directorate General Taxation and Customs Union, European Commission.

Frühwirth, Manfred, and Marek Kobialka. 2011. *Do equity tax shields reduce leverage? The Austrian Case.* Technical report. July.

Gérard, Marcel, and Bastien Mahoux. 2017. *On the effectivity of tax incentives: Patent Box Regimes and Allowance for Corporate Equity.* Technical report. Working Paper, Université Catholique de Louvain.

Gordon, Roger, and Young Lee. 2001. "Do taxes affect corporate debt policy? Evidence from U.S. corporate tax return data." *Journal of Public Economics* 82 (2): 195–224.

Graham, John R. 2000. "How Big Are the Tax Benefits of Debt?" *The Journal of Finance* 55 (5): 1901–1941. ISSN: 1540-6261.

Harris, Milton, and Artur Raviv. 1991. "The Theory of Capital Structure." *The Journal of Finance* 46 (1): 297–355. ISSN: 1540-6261.

Hebous, Shafik, and Martin Ruf. 2015. *Evaluating the Effects of ACE Systems on Multinational Debt Financing and Investment.* CESifo Working Paper Series 5360. CESifo Group Munich.

International Monetary Fund. 2009. *IMF Country Report No. 09/3.* Technical report. January.

Kalemli-Özcan, Sebnem, Bent Sorensen, Carolina Villegas-Sanchez, Vadym Volosovych, and Sevcan Yesiltas. 2015. *How to Construct Nationally Representative Firm Level data from the ORBIS Global Database.* NBER Working Papers 21558. National Bureau of Economic Research, Inc, September.

Keen, Michael, and John King. 2003. "The Croatian Profit Tax: An ACE in Practice." In *Integriertes Steuer- und Sozialsystem,* edited by Manfred Rose, 323–342. Heidelberg: Physica-Verlag HD. ISBN: 978-3-642-57376-7.

Kestens, Katrien, Philippe Van Cauwenberge, and Johan Christiaens. 2012. "An Investigation of the Effect of the Notional Interest Deduction on the Capital Structure of Belgian SMEs." Working paper.

King, Mervyn A., and Don Fullerton. 1983. *The Taxation of Income from Capital: A Comparative Study of the U.S., U.K., Sweden, and West Germany–The Theoretical Framework–.* NBER Working Papers. National Bureau of Economic Research, Inc.

Klemm, Alexander. 2007. "Allowances for Corporate Equity in Practice." *CESifo Economic Studies* 53, no. 2 (June): 229–262.

Konings, J., C. Lecocq, B. Merlevede, and R. Vandendriessche. 2016. *The Role of an Allowance for Corporate Equity for the Capital Structure and Employment in Multinational Enterprises - An evaluation of the Notional Interest Deduction in Belgium.* Technical report. Vives Policy Paper.

Langedijk, Sven, Gaëtan Nicodème, Andrea Pagano, and Alessandro Rossi. 2014. *Debt Bias in Corporate Taxation and the Costs of Banking Crises in the EU.* Taxation Papers 50. Directorate General Taxation and Customs Union, European Commission, October.

Laureano, Luis, and Márcio Telles Portal. 2016. "Does Brazilian allowance for corporate equity reduce the debt bias? Evidences of rebound effect and ownership-induced ACE clientele." *Research in International Business and Finance.*

Leary, Mark T., and Michael R. Roberts. 2005. "Do Firms Rebalance Their Capital Structures?" *The Journal of Finance* 60 (6): 2575–2619. ISSN: 1540-6261.

Massimi, Francesco, and Carlo Petroni. 2012. "Real-World ACE reforms and the Italian Experience. Towards a General Trend?" *Intertax* 11:632–642.

Modigliani, Franco, and Merton H. Miller. 1958. "The Cost of Capital, Corporation Finance and the Theory of Investment." *The American Economic Review* 48 (3): 261–297. ISSN: 00028282.

Mooij, Ruud de, and Shafik Hebous. 2017. *Curbing Corporate Debt Bias: Do Limitations to Interest Deductibility Work?* CESifo Working Paper Series 6312. CESifo Group Munich.

Myers, Stewart C., and Nicholas S. Majluf. 1984. "Corporate financing and investment decisions when firms have information that investors do not have." *Journal of Financial Economics* 13 (2): 187–221. ISSN: 0304-405X.

Oestreicher, A., R. Koch, D. Vorndamme, and S. Hohls. 2014. *ASSERT - Assessing the effects of reforms in taxation - a micro-simulation approach.* S. FAT Working Paper, no. 14-001. Göttingen University.

Panier, Frédéric, Francisco Pérez-González, and Pablo Villanueva. 2013. *Capital Structure and Taxes: What Happens When You (Also) Subsidize Equity?*

Panteghini, P. M., M. L. Parisi, and F. Pighetti. 2012. *Italy's ACE tax and its effect on a firm's leverage.* Technical report. CESifo WP Series 3869.

Princen, Savina. 2012. *Taxes do Affect Corporate Financing Decisions: The Case of Belgian ACE.* CESifo Working Paper Series. CESifo Group Munich.

Rubin, Donald. 1979. "Using Multivariate Matched Sampling and regression Adjustment to Control Bias in Observational Studies." *Journal of the American Statistical Association* 75 (366): 318–329.

Santoro, Alessandro. 2005. "The Italian Partial ACE: An Ex-post Evaluation." University of Milano-Biocca.

Sørensen, Peter Birch. 2014. *Taxation and the optimal constraint on corporate debt finance.* Working Papers 1427. Oxford University Centre for Business Taxation.

———. 2015. *Taxation and the optimal constraint on corporate debt finance.* Working Papers 1427. CES-ifo Area Conference on Public Sector Economics.

Spengel, Christoph, Dieter Endres, Katharina Finke, and Jost Heckemeyer. 2014. *Effective tax levels using the DEVEREUX/GRIFFITH methodology: Project for the EU Commission TAXUD/2013/CC/120.* ZEW - Zentrum für Europäische Wirtschaftsforschung / Center for European Economic Research.

Spengel, Christoph, Frank Schmidt, Jost H. Heckemeyer, Katharina Nicolay, Alexandra Bartholmeß, Rainer Bräutigam, Julia Braun, et al. 2016. *Effective tax levels using the Devereux/Griffith methodology. Project for the EU Commission TAXUD/2013/CC/120: Final report.* ZEW - Zentrum für Europäische Wirtschaftsforschung / Center for European Economic Research.

Staderini, Alessandra. 2001. *Tax reform to influence Corporate Financial Policy: the Case of the Italian Business Tax Reform of 1997-97.* Technical report 423:1-30. Banca d'Italia Working Paper.

Stiglitz, Joseph. 1973. "Taxation, corporate financial policy, and the cost of capital." *Journal of Public Economics* 2 (1): 1–34.

Strebulaev, Ilya A. 2007. "Do Tests of Capital Structure Theory Mean What They Say?" *The Journal of Finance* 62 (4): 1747–1787. ISSN: 1540-6261.

van Campenhout, Geert, and Tom van Caneghem. 2013. "How did the notional interest deduction affect Belgian SMEs' capital structure?" *Small Business Economics* 40 (2): 351–373.

Vandenberghe, Vincent. 2017. *Treatment-effect identification without parallel paths: An illustration in the case of Objective 1-Hainaut/Belgium, 1994-2006.* Economics Discussion Papers 2017-23. Kiel Institute for the World Economy (IfW).

Zangari, Ernesto. 2014. *Addressing the Debt Bias: A Comparison between the Belgian and the Italian ACE Systems.* Taxation Papers 44. Directorate General Taxation and Customs Union, European Commission.

Appendices

A Technical Appendix

The derivation of second-order Taylor approximations for risk premiums based on Sørensen (2014) starts from the cost of capital, formerly introduced as

$$q = \beta(r + p_d(\beta) - \tau(r + p_d(\beta) + i))) + (1 - \beta)(r + p_e(\beta)) \ . \tag{11}$$

Moreover, financial risk premium can be given in more concise notation as

$$p(\beta) = (1 - \beta)p_e(\beta) + \beta(1 - \tau)p_d(\beta) \ , \tag{12}$$

which yields a simplified version of the cost of capital as

$$q = r + p(\beta) - \beta\tau(r + i) \ . \tag{13}$$

Sørensen (2014) then conducts a second-order Taylor approximation around the unbiased leverage level β^* (i.e. without biasing taxation) in the form of

$$p(\beta) \approx p(\beta^*) + \frac{dp(\beta^*)}{d\beta^*}(\beta - \beta^*) + \frac{1}{2}\frac{d^2p(\beta^*)}{d^2\beta^*}(\beta - \beta^*)^2 \ . \tag{14}$$

Now firms aim to minimize their financial costs through their relative shares of equity and debt. Hence the respective first order condition of equation (11) can be given as

$$\frac{dq}{d\beta} = p'(\beta) = \tau(r + i) \ . \tag{15}$$

Similarly, deriving first-order conditions of the polynomial approximation in equation (14) with respect to β yields:

$$\frac{dP(\beta)}{d\beta} = -\tau a + b(\beta - \beta^*) \ , \tag{16}$$

where $a = p_d(\beta^*) + \beta^* p'_d > 0$ and $b = p''(\beta^*)$ Equating both marginal conditions yields the tax effect on leverage financing as the right hand side of

$$\beta = \beta^* + \frac{\tau(r + i + a)}{b} \ . \tag{17}$$

With respect to the tax debt shield of the Latvian ACE, we make only one change to the initial equations: we expand the cost of capital in equation (13) by subtracting the term $(1-\beta)\tau(r+i+\bar{x})$. This leaves us with a changed first-order condition in the form of $\frac{dq}{d\beta} = -\tau\bar{x}$, such that

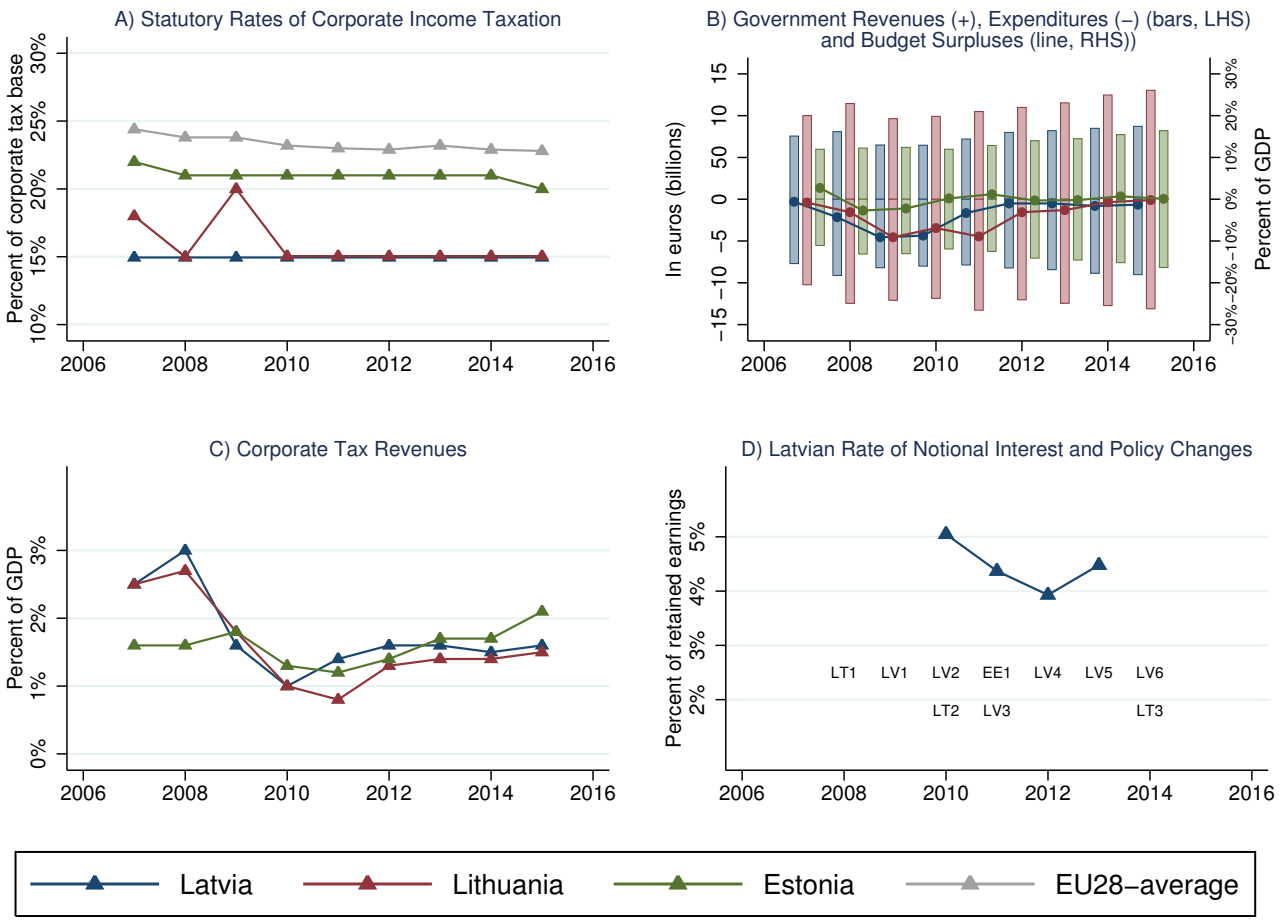
$$\beta = \beta^* + \frac{\tau(p_d(\beta) + \beta p'_d(\beta) - \bar{x})}{p''(\beta)} = \beta^* + \frac{\tau(a - \bar{x})}{b} \ . \tag{18}$$

Table 1: **ACE Schemes in Practice**

Country	Year	Type	Studied by	Effect on	Method
Austria	2000-2004	Soft	Frühwirth and Kobialka (2011)	D/A (none)	Panel without control group using time effects
				FD/A (-); FD/C (- -)	
Belgium	Since 2006	Hard	Princen (2012)	FD/A (-); D/A (-)	Propensity Score Matching + Differences-in-differences
				D/A^{large} (- -); I/C (none)	
			Aus dem Moore (2014)	FD/A; D/A (+)	Propensity Score Matching + Differences-in-differences
				FD/A^{large} (-)	
			Panier et al. (2013)	ND/A (-); ND/A^{large} (- -)	Differences-in-differences
			van Campenhout and van Caneghem (2013)	$Leverage^{small}$ (none)	First-differences on SMEs
			Kestens et al. (2012)	$Leverage^{SME's}$ (-)	Effect measured by marginal tax rates
			Hebous and Ruf (2015)	PI (+); AI (none)	Differences-in-differences on German MNE's
			Konings et al. (2016)	E/A (+); Employment (+)	Differences-in-differences on European MNE's
Brazil	Since 1996	Soft	Klemm (2007)	FD/A (none); I/C (+)	Panel without control group using time fixed effects
			Laureano and Portal (2016)	FD/A (+); FD/E (+)	Panel without control group using equity interest rate/ debt tax advantage
Croatia	1994-2000	Hard	Keen and King (2003)	I (+)	Cross-country comparison of FDI
Italy	1997-2003	Soft	Santoro (2005)	EI^{small} (+); EI^{large} (++)	Logit & Probit
			Bontempi et al. (2004)	Leverage (-)	Panel without control group using time fixed effects
			Staderini (2001)	FD/NE (-)	Panel without control group using time fixed effects/debt tax advantage
			Bordignon et al. (1999)	ETR (-)	Simulation based on tax rate changes
	Since 2011	Soft	Gérard and Mahoux (2017)	D/E-ratio (-); I (none)	Differences-in-differences
			Panteghini et al. (2012)	D/A^{small} (- -); D/A^{large} (-)	Panel without control groups using time fixed effects
Latvia	2009-2013	Soft	—	—	—
Liechtenstein	Since 2011	Hard	—	—	—
Portugal	Since 2010	Soft	—	—	—
Turkey	Since 2015	Soft	—	—	—
Cyprus	Since 2015	Soft	—	—	—

Note: Information about ACE schemes retrieved from Hebous and Ruf (2015), Zangari (2014) and Klemm (2007). Abbreviations are as follows: SMEs denotes small- and medium-sized enterprises. EI is Equity Issuance. I is investment. I/C is investment over capital. PI/AI is passive/active investment. E/A is equity over total assets. ETR are effective tax rates. The different definitions of leverage ratios are: D/A is debt over total assets. FD/A is financial (long-term) debt over total assets. FD/C is financial debt over capital. ND/A is net leverage, which denotes the ratio of total non-equity liabilities minus cash and cash equivalents over total assets. Simple leverage or investment states that no further information about the underlying variables is available. + + / - - indicates that a measured effect was larger/smaller for a specific subgroup.

Figure 4: Fiscal Policy in the Baltic Economies



Note: The figure shows the development of CIT statutory rates (panel A), absolute levels of government tax revenues and expenditures and relative government net lending (panel B), the relative share of CIT as part of GDP (panel C) and the notional interest applied for equity deductions in the case of Latvia (panel D). In the latter case, additionally policy changes possibly influencing corporate decisions are depicted. In panel C, corporate tax revenues include holding gains by companies. Sources: CIT statutory rates are provided by the EC's database "data on taxation". Fiscal data on government revenues, expenditures and the relative shares of specific taxes are downloaded from EUROSTAT. The notional interest rate of Latvia is obtained from the website of the Latvian Central Bank. Below, policy developments in the areas of corporate and personal income taxation as well as monetary policy are documented.

Policy Development (Panel D):
Latvia:
1: Introduction of Allowance for Corporate Equity on retained earnings. The applied notional interest rate is equal to the weighted interest rate average of loans by Latvian banks to domestic non-financial enterprises. In the same year, extension of the period loss carry-forward from 5 to 8 years. And the PIT rate on business income is reduced from 25% to 15%, while the general rate is reduced from 25% to 23%.
2: Increase of general flat PIT rate and PIT rate on individual business income to 26%. Capital gains are taxed at 15% and investment income on 10% respectively 26%, depending on the sort of income. Further reduced rates were applied to small businesses.
3: Decrease of general PIT rate again to 25%.
4: Losses that have occurred before 2008 can be carried-forward for up to 8 years. Losses having occurred after 2008 can be forwarded indefinitely for tax purposes. Additional provisions to special economic zones apply.
5: Further decrease of PIT rate to 24%. Introduction of special tax treatments for holding companies: CIT exemption, exemption of capital gains from company shares and elimination of withholding taxes on dividends that are paid to non-residents.
6: Abolishment of ACE system and of the transfer of losses within groups of companies. Introduction of new form of tax relief for certain costs related to R&D. The same year Latvia joins the euro.
Estonia:
1: Introduction of Euro as new national currency.
Lithuania
1: Introduction of a deduction on R&D of up to 50% on investment expenditure incurred (until 2013). Decrease of personal income tax rate to a flat 15%
2: Introduction of reduced 5% CIT rate for micro-businesses. Also introduction of new provisions for extending the scope of deductions used for transferring tax losses within the same group.
3: New restrictions on the loss carried forward. Tax deductions providing an incentive for investment expenditure were extended for the period 2014-2018. Lithuania also joins the euro, unsoldering its former currency, which was pegged to the euro since 2002.

B Econometric Appendix

Table 2: Impact of Taxation on Firm Leverage - DID - Latvia

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.052***	−0.061***	−0.060***	−0.010*	−0.005	−0.009*
	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)
Latvia	0.058***	0.064***	0.040***	0.002	0.007	−0.019***
	(0.008)	(0.008)	(0.008)	(0.007)	(0.006)	(0.006)
Time	−0.018***	−0.031***	−0.008*	−0.009***	−0.015***	0.005
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
ACE	−0.005	−0.008	0.014**	−0.009*	0.002	0.024***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
Tangibility		−0.004	−0.005		0.264***	0.263***
		(0.012)	(0.012)		(0.010)	(0.010)
Profitability		−0.446***	−0.448***		−0.204***	−0.202***
		(0.043)	(0.043)		(0.021)	(0.021)
Firm Size		−0.021***	−0.021***		0.006***	0.006***
		(0.002)	(0.002)		(0.002)	(0.002)
Net Operating Loss		−0.043***	−0.042***		−0.026***	−0.029***
		(0.010)	(0.010)		(0.006)	(0.006)
GDP per capita growth			0.000*			−0.001***
			(0.000)			(0.000)
Inflation			0.003***			0.003***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,314	34,314	34,314	34,314	34,314	34,314
Adjusted R^2	0.852	0.862	0.863	0.562	0.619	0.620

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 3: Heterogeneous Impact of Taxation on Firm Leverage - DID - Latvia

Dependent Variable	Book leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.060***	−0.067***	−0.067***	−0.005	−0.007	−0.006
	(0.007)	(0.007)	(0.007)	(0.020)	(0.019)	(0.019)
Latvia	0.053***	0.062***	0.034***	0.085***	0.076***	0.074***
	(0.008)	(0.008)	(0.008)	(0.021)	(0.021)	(0.020)
Time	−0.017***	−0.030***	−0.004	−0.028***	−0.030***	−0.027**
	(0.004)	(0.004)	(0.005)	(0.010)	(0.010)	(0.012)
ACE	−0.004	−0.009	0.016**	−0.021	−0.014	−0.012
	(0.007)	(0.006)	(0.007)	(0.018)	(0.017)	(0.016)
Tangibility		0.013	0.013		−0.086***	−0.086***
		(0.013)	(0.013)		(0.032)	(0.032)
Profitability		−0.442***	−0.445***		−0.474***	−0.475***
		(0.045)	(0.046)		(0.053)	(0.053)
Firm Size		−0.027***	−0.027***		−0.033***	−0.033***
		(0.003)	(0.003)		(0.007)	(0.007)
Net Operating Loss		−0.042***	−0.040***		−0.066***	−0.066***
		(0.010)	(0.010)		(0.017)	(0.017)
GDP per capita growth			0.000*			0.000
			(0.000)			(0.000)
Inflation			0.004***			0.000
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,502	30,502	30,502	3,788	3,788	3,788
Adjusted R^2	0.852	0.863	0.864	0.870	0.878	0.878

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage is defined as the ratio of debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EC definition. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 4: Impact of Taxation on Firm Leverage - DID Intensity - Latvia

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.074***	−0.084***	−0.088***	−0.032***	−0.023***	−0.042***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.005)	(0.005)
Latvia	0.043***	0.046***	0.037***	−0.017***	−0.001	−0.016***
	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)
Time	−0.006	−0.020***	0.011*	0.000	−0.004	0.028***
	(0.004)	(0.004)	(0.006)	(0.003)	(0.003)	(0.005)
Time x Debt bias	−0.001***	−0.001***	−0.002***	−0.001***	−0.001***	−0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		−0.005	−0.006		0.264***	0.261***
		(0.012)	(0.012)		(0.010)	(0.010)
Profitability		−0.446***	−0.447***		−0.204***	−0.201***
		(0.043)	(0.043)		(0.021)	(0.021)
Firm Size		−0.020***	−0.021***		0.006***	0.005***
		(0.002)	(0.002)		(0.002)	(0.002)
Net Operating Loss		−0.042***	−0.042***		−0.026***	−0.029***
		(0.010)	(0.010)		(0.006)	(0.006)
GDP per capita growth			−0.000			−0.002***
			(0.000)			(0.000)
Inflation			0.003***			0.003***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,314	34,314	34,314	34,314	34,314	34,314
Adjusted R^2	0.852	0.863	0.863	0.563	0.620	0.621

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 5: Heterogeneous Impact of Taxation on Firm Leverage - DID and Intensity - Latvia

Dependent Variable	Book leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.082***	−0.091***	−0.094***	−0.031	−0.033*	−0.046**
	(0.007)	(0.007)	(0.007)	(0.020)	(0.019)	(0.021)
Latvia	0.039***	0.042***	0.033***	0.055***	0.050***	0.039**
	(0.007)	(0.007)	(0.007)	(0.018)	(0.017)	(0.018)
Time	−0.006	−0.019***	0.013**	−0.010	−0.010	0.014
	(0.004)	(0.004)	(0.006)	(0.013)	(0.013)	(0.020)
Time x Debt bias	−0.001***	−0.001***	−0.001***	−0.002***	−0.002***	−0.002***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Tangibility		0.013	0.011		−0.087***	−0.089***
		(0.013)	(0.013)		(0.031)	(0.032)
Profitability		−0.442***	−0.444***		−0.474***	−0.473***
		(0.046)	(0.046)		(0.053)	(0.053)
Firm Size		−0.027***	−0.027***		−0.033***	−0.033***
		(0.003)	(0.003)		(0.007)	(0.007)
Net Operating Loss		−0.041***	−0.041***		−0.066***	−0.067***
		(0.010)	(0.010)		(0.017)	(0.017)
GDP per capita growth			−0.000			−0.001
			(0.000)			(0.001)
Inflation			0.004***			0.002
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,502	30,502	30,502	3,788	3,788	3,788
Adjusted R^2	0.852	0.864	0.864	0.870	0.878	0.878

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage is defined as the ratio of debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EC definition. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 6: Impact of Taxation on Firm Leverage - Intensity - Latvia

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.030***	−0.031***	−0.074***	0.022***	0.014**	−0.032***
	(0.009)	(0.009)	(0.010)	(0.007)	(0.007)	(0.008)
Latvia	0.062***	0.068***	0.044***	0.008	0.015***	−0.008
	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)
Debt bias	0.001***	0.001***	−0.001**	0.001***	0.001***	−0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		−0.002	−0.005		0.265***	0.263***
		(0.012)	(0.012)		(0.010)	(0.010)
Profitability		−0.435***	−0.448***		−0.199***	−0.203***
		(0.042)	(0.043)		(0.020)	(0.021)
Firm Size		−0.021***	−0.021***		0.005***	0.006***
		(0.002)	(0.002)		(0.002)	(0.002)
Net Operating Loss		−0.043***	−0.042***		−0.027***	−0.029***
		(0.010)	(0.010)		(0.006)	(0.006)
GDP per capita growth			0.000			−0.001***
			(0.000)			(0.000)
Inflation			0.004***			0.003***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,314	34,314	34,314	34,314	34,314	34,314
Adjusted R^2	0.852	0.862	0.863	0.562	0.619	0.620

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 7: Heterogeneous Impact of Taxation on Firm Leverage - Intensity - Latvia

Dependent Variable	Book leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.039***	−0.038***	−0.083***	0.034	0.031	0.005
	(0.009)	(0.009)	(0.010)	(0.025)	(0.024)	(0.028)
Latvia	0.058***	0.064***	0.040***	0.082***	0.077***	0.062***
	(0.007)	(0.007)	(0.007)	(0.019)	(0.018)	(0.019)
Debt bias	0.001***	0.001***	−0.001**	0.002**	0.001**	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Tangibility		0.016	0.013		−0.084***	−0.086***
		(0.013)	(0.013)		(0.031)	(0.031)
Profitability		−0.432***	−0.445***		−0.464***	−0.474***
		(0.044)	(0.046)		(0.053)	(0.053)
Firm Size		−0.027***	−0.027***		−0.034***	−0.034***
		(0.003)	(0.003)		(0.007)	(0.007)
Net Operating Loss		−0.042***	−0.040***		−0.064***	−0.065***
		(0.010)	(0.010)		(0.017)	(0.017)
GDP per capita growth			0.000			0.000
			(0.000)			(0.001)
Inflation			0.004***			0.003***
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,502	30,502	30,502	3,788	3,788	3,788
Adjusted R^2	0.852	0.863	0.864	0.869	0.877	0.878

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage is defined as the ratio of debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EC definition. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 8: Probit for Latvian, Lithuanian and Estonian Firms

Variable	Coefficient	(Std. Err.)
Tangibility	0.073	(0.142)
Profitability	−0.002	(0.247)
Firm Size	−0.041	(0.026)
Publicly Listed	0.344	(0.550)
Net Operating Loss	−0.183*	(0.107)
Industry dummies	Yes	
Observations	1.786	
Log-Likelihood	−1209.085	
Pseudo R^2	0.010	

Note: The figure displays the estimation results of a probit regression in the year before ACE reform is implemented. Data source is the AMADEUS firm database. The dependent variable takes the value one if a firm is located in the treatment country, and zero otherwise. Publicly quoted is a binary variable equal to one if the firm is listed on the stock exchange. Firm size is the natural logarithm of total assets. Industry dummies refer to industrial sector fixed effects for two-digit NACE Rev. 2 codes. The different levels of significance are characterized according to the p-values: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Impact of Taxation on Firm Leverage after Matching - DID - Latvia

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.041**	−0.052***	−0.054***	−0.022*	−0.020*	−0.024**
	(0.016)	(0.016)	(0.016)	(0.013)	(0.012)	(0.012)
Latvia	0.072***	0.071***	0.027*	−0.008	−0.002	−0.033***
	(0.015)	(0.014)	(0.014)	(0.012)	(0.011)	(0.011)
Time	−0.044***	−0.066***	−0.023***	−0.021***	−0.032***	−0.005
	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.007)
ACE	−0.013	−0.009	0.028***	−0.006	0.005	0.030***
	(0.010)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
Tangibility		0.001	−0.002		0.236***	0.234***
		(0.023)	(0.023)		(0.019)	(0.019)
Profitability		−0.532***	−0.535***		−0.249***	−0.248***
		(0.025)	(0.026)		(0.019)	(0.019)
Firm Size		−0.014***	−0.014***		0.004	0.004
		(0.004)	(0.004)		(0.003)	(0.003)
Net Operating Loss		−0.039***	−0.043***		−0.028***	−0.033***
		(0.010)	(0.011)		(0.008)	(0.008)
GDP per capita growth			−0.001***			−0.002***
			(0.000)			(0.000)
Inflation			0.007***			0.004***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,738	12,738	12,738	12,738	12,738	12,738
Adjusted R^2	0.851	0.864	0.865	0.567	0.619	0.622

Note: The above regressions are estimated using a matching differences-in-differences (MDID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 10: Impact of Taxation on Firm Leverage after Matching - Intensity of DID - Latvia

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.068***	−0.084***	−0.100***	−0.043***	−0.038***	−0.058***
	(0.016)	(0.016)	(0.016)	(0.013)	(0.012)	(0.012)
Latvia	0.050***	0.049***	0.028**	−0.022**	−0.007	−0.024**
	(0.014)	(0.014)	(0.014)	(0.011)	(0.010)	(0.010)
Time	−0.032***	−0.050***	0.013	−0.011**	−0.018***	0.024***
	(0.007)	(0.007)	(0.009)	(0.005)	(0.005)	(0.007)
Time x Debt bias	−0.002***	−0.002***	−0.003***	−0.001***	−0.001***	−0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		−0.000	−0.005		0.235***	0.231***
		(0.023)	(0.023)		(0.019)	(0.019)
Profitability		−0.534***	−0.534***		−0.250***	−0.247***
		(0.025)	(0.026)		(0.019)	(0.019)
Firm Size		−0.014***	−0.014***		0.004	0.004
		(0.004)	(0.004)		(0.003)	(0.003)
Net Operating Loss		−0.038***	−0.042***		−0.027***	−0.032***
		(0.010)	(0.011)		(0.008)	(0.008)
GDP per capita growth			−0.002***			−0.002***
			(0.000)			(0.000)
Inflation			0.006***			0.004***
			(0.001)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,738	12,738	12,738	12,738	12,738	12,738
Adjusted R^2	0.851	0.865	0.866	0.568	0.620	0.623

Note: The above regressions are estimated using a matching differences-in-differences (MDID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 11: Impact of Taxation on Firm Leverage after Matching - Intensity - Latvia

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	−0.008	−0.014	−0.121***	0.000	−0.006	−0.076***
	(0.018)	(0.018)	(0.019)	(0.014)	(0.013)	(0.014)
Latvia	0.073***	0.074***	0.019	−0.005	0.005	−0.030***
	(0.014)	(0.014)	(0.014)	(0.011)	(0.010)	(0.010)
Debt bias	0.001***	0.002***	−0.003***	0.001***	0.001**	−0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		0.011	−0.001		0.240***	0.234***
		(0.023)	(0.023)		(0.019)	(0.019)
Profitability		−0.496***	−0.533***		−0.234***	−0.248***
		(0.025)	(0.026)		(0.019)	(0.019)
Firm Size		−0.015***	−0.014***		0.003	0.004
		(0.004)	(0.004)		(0.003)	(0.003)
Net Operating Loss		−0.039***	−0.043***		−0.028***	−0.032***
		(0.010)	(0.011)		(0.008)	(0.008)
GDP per capita growth			−0.002***			−0.002***
			(0.000)			(0.000)
Inflation			0.008***			0.004***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,738	12,738	12,738	12,738	12,738	12,738
Adjusted R^2	0.850	0.862	0.865	0.566	0.617	0.622

Note: The above regressions are estimated using a matching differences-in-differences (MDID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 12: Impact of Taxation on Firm Leverage - DID - Italy

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.119***	0.128***	0.128***	0.071***	0.051***	0.049***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Time	−0.010***	−0.009***	−0.004***	0.002***	0.000	0.003***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
ACE	0.016***	0.010***	0.011***	−0.021***	−0.013***	−0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tangibility		−0.116***	−0.115***		0.208***	0.208***
		(0.004)	(0.004)		(0.002)	(0.002)
Profitability		−0.106	−0.106		−0.046	−0.046
		(0.082)	(0.083)		(0.037)	(0.037)
Firm Size		−0.013***	−0.013***		0.013***	0.013***
		(0.001)	(0.001)		(0.000)	(0.000)
Net Operating Loss		−0.011	−0.010		−0.013**	−0.013**
		(0.012)	(0.012)		(0.005)	(0.005)
GDP per capita growth			0.002***			−0.000**
			(0.000)			(0.000)
Inflation			0.009***			0.005***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,210,357	1,210,357	1,210,357	1,210,357	1,210,357	1,210,357
Adjusted R^2	0.921	0.924	0.924	0.471	0.511	0.511

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 13: Heterogeneous Impact of Taxation on Firm Leverage - DID - Italy

Dependent Variable	Book leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.128***	0.139***	0.139***	0.034***	0.031***	0.032***
	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)
Time	−0.011***	−0.010***	−0.006***	−0.014***	−0.017***	−0.009***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
ACE	0.018***	0.012***	0.013***	−0.009***	−0.009***	−0.009***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Tangibility		−0.111***	−0.111***		−0.135***	−0.134***
		(0.003)	(0.003)		(0.008)	(0.008)
Profitability		−0.100	−0.101		−0.590***	−0.595***
		(0.079)	(0.079)		(0.020)	(0.021)
Firm Size		−0.022***	−0.022***		−0.013***	−0.013***
		(0.001)	(0.001)		(0.001)	(0.001)
Net Operating Loss		−0.011	−0.010		−0.054***	−0.054***
		(0.012)	(0.012)		(0.004)	(0.004)
GDP per capita growth			0.002***			0.002***
			(0.000)			(0.000)
Inflation			0.009***			0.013***
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,104,276	1,104,276	1,104,276	106,077	106,077	106,077
Adjusted R^2	0.922	0.925	0.925	0.916	0.921	0.921

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage is defined as the ratio of debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EC definition. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 14: Impact of Taxation on Firm Leverage - DID Intensity - Italy

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.120***	0.129***	0.129***	0.075***	0.054***	0.053***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Time	0.017***	0.007***	0.015***	−0.046***	−0.032***	−0.028***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time x Debt bias	−0.000***	−0.000***	−0.000***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		−0.116***	−0.115***		0.208***	0.207***
		(0.004)	(0.004)		(0.002)	(0.002)
Profitability		−0.106	−0.106		−0.046	−0.046
		(0.082)	(0.083)		(0.037)	(0.037)
Firm Size		−0.013***	−0.013***		0.013***	0.013***
		(0.001)	(0.001)		(0.000)	(0.000)
Net Operating Loss		−0.011	−0.010		−0.013**	−0.013**
		(0.012)	(0.012)		(0.005)	(0.005)
GDP per capita growth			0.002***			0.000*
			(0.000)			(0.000)
Inflation			0.010***			0.004***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,210,357	1,210,357	1,210,357	1,210,357	1,210,357	1,210,357
Adjusted R^2	0.921	0.924	0.924	0.472	0.511	0.512

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 15: Heterogeneous Impact of Taxation on Firm Leverage - DID and Intensity - Italy

Dependent Variable	Book leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.129***	0.140***	0.140***	0.035***	0.033***	0.033***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Time	0.021***	0.009***	0.016***	−0.032***	−0.036***	−0.028***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Time x Debt bias	−0.001***	−0.000***	−0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		−0.111***	−0.111***		−0.135***	−0.134***
		(0.003)	(0.003)		(0.008)	(0.008)
Profitability		−0.100	−0.101		−0.590***	−0.594***
		(0.079)	(0.079)		(0.020)	(0.021)
Firm Size		−0.022***	−0.022***		−0.013***	−0.013***
		(0.001)	(0.001)		(0.001)	(0.001)
Net Operating Loss		−0.011	−0.010		−0.054***	−0.054***
		(0.012)	(0.012)		(0.004)	(0.004)
GDP per capita growth			0.002***			0.002***
			(0.000)			(0.000)
Inflation			0.010***			0.013***
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,104,276	1,104,276	1,104,276	106,077	106,077	106,077
Adjusted R^2	0.922	0.925	0.925	0.916	0.921	0.921

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage is defined as the ratio of debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EC definition. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 16: Impact of Taxation on Firm Leverage - Intensity - Italy

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.126***	0.134***	0.132***	0.072***	0.054***	0.051***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Debt bias	−0.000***	0.000	−0.000***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		−0.116***	−0.116***		0.208***	0.208***
		(0.004)	(0.004)		(0.002)	(0.002)
Profitability		−0.106	−0.106		−0.046	−0.046
		(0.082)	(0.083)		(0.037)	(0.037)
Firm Size		−0.013***	−0.013***		0.013***	0.013***
		(0.001)	(0.001)		(0.000)	(0.000)
Net Operating Loss		−0.011	−0.010		−0.013**	−0.013**
		(0.012)	(0.012)		(0.005)	(0.005)
GDP per capita growth			0.002***			−0.000***
			(0.000)			(0.000)
Inflation			0.009***			0.003***
			(0.001)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,210,357	1,210,357	1,210,357	1,210,357	1,210,357	1,210,357
Adjusted R^2	0.921	0.924	0.924	0.472	0.512	0.512

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 17: Heterogeneous Impact of Taxation on Firm Leverage - Intensity - Italy

Dependent Variable	Book leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.135***	0.145***	0.143***	0.041***	0.040***	0.034***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Debt bias	−0.000***	−0.000	−0.000***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		−0.111***	−0.111***		−0.135***	−0.134***
		(0.003)	(0.003)		(0.008)	(0.008)
Profitability		−0.100	−0.101		−0.585***	−0.593***
		(0.079)	(0.079)		(0.020)	(0.020)
Firm Size		−0.022***	−0.022***		−0.013***	−0.013***
		(0.001)	(0.001)		(0.001)	(0.001)
Net Operating Loss		−0.011	−0.010		−0.054***	−0.054***
		(0.012)	(0.012)		(0.004)	(0.004)
GDP per capita growth			0.002***			0.002***
			(0.000)			(0.000)
Inflation			0.009***			0.016***
			(0.001)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,104,276	1,104,276	1,104,276	106,077	106,077	106,077
Adjusted R^2	0.922	0.925	0.925	0.916	0.921	0.921

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage is defined as the ratio of debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EC definition. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 18: Probit for Italian and French Firms

Variable	Coefficient	(Std. Err.)
Tangibility	0.910***	(0.027)
Profitability	−1.159***	(0.057)
Firm Size	0.043***	(0.003)
Publicly Listed	−0.708***	(0.076)
Net Operating Loss	−0.228***	(0.016)
Industry dummies	Yes	
Observations	79.646	
Log-Likelihood	−45954.921	
Pseudo R^2	0.048	

Note: The figure displays the estimation results of a probit regression in the year before ACE reform is implemented. Data source is the AMADEUS firm database. The dependent variable takes the value one if a firm is located in the treatment country, and zero otherwise. Publicly quoted is a binary variable equal to one if the firm is listed on the stock exchange. Firm size is the natural logarithm of total assets. Industry dummies refer to industrial sector fixed effects for two-digit NACE Rev. 2 codes. The different levels of significance are characterized according to the p-values: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 19: Impact of Taxation on Firm Leverage after Matching - DID - Italy

Dependent Variable	Financial leverage			Book leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.068***	0.067***	0.066***	0.104***	0.105***	0.106***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Time	−0.005***	−0.006***	−0.005***	−0.024***	−0.024***	−0.021***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
ACE	−0.001	−0.001	−0.001	0.003	0.003	0.003**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Tangibility		0.191***	0.191***		−0.087***	−0.086***
		(0.005)	(0.005)		(0.006)	(0.006)
Profitability		−0.028	−0.028		−0.055	−0.056
		(0.026)	(0.026)		(0.048)	(0.048)
Firm Size		0.008***	0.008***		−0.005***	−0.005***
		(0.001)	(0.001)		(0.001)	(0.001)
Net Operating Loss		−0.009**	−0.009**		0.000	0.001
		(0.004)	(0.004)		(0.007)	(0.007)
GDP per capita growth			0.000**			0.002***
			(0.000)			(0.000)
Inflation			0.002***			0.008***
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	535,361	535,361	535,361	535,361	535,361	535,361
Adjusted R^2	0.503	0.536	0.536	0.913	0.915	0.915

Note: The above regressions are estimated using a matching differences-in-differences (MDID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 20: Impact of Taxation on Firm Leverage after Matching - Intensity of DID - Italy

Dependent Variable	Financial leverage			Book leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.070***	0.068***	0.068***	0.106***	0.106***	0.108***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Time	−0.011***	−0.011***	−0.010***	−0.022***	−0.022***	−0.019***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Time x Debt bias	0.000***	0.000***	0.000***	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		0.191***	0.191***		−0.087***	−0.086***
		(0.005)	(0.005)		(0.006)	(0.006)
Profitability		−0.028	−0.028		−0.055	−0.056
		(0.026)	(0.026)		(0.048)	(0.048)
Firm Size		0.008***	0.008***		−0.005***	−0.005***
		(0.001)	(0.001)		(0.001)	(0.001)
Net Operating Loss		−0.009**	−0.009**		−0.000	0.001
		(0.004)	(0.004)		(0.007)	(0.007)
GDP per capita growth			0.000**			0.002***
			(0.000)			(0.000)
Inflation			0.002***			0.008***
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	535,361	535,361	535,361	535,361	535,361	535,361
Adjusted R^2	0.503	0.536	0.536	0.913	0.915	0.915

Note: The above regressions are estimated using a matching differences-in-differences (MDID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 21: Impact of Taxation on Firm Leverage after Matching - Intensity - Italy

Dependent Variable	Financial leverage			Book leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Italy	0.072***	0.071***	0.070***	0.112***	0.112***	0.109***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Debt bias	0.000***	0.000***	0.000***	0.001***	0.001***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		0.192***	0.192***		−0.085***	−0.085***
		(0.005)	(0.005)		(0.006)	(0.006)
Profitability		−0.028	−0.028		−0.055	−0.055
		(0.025)	(0.026)		(0.047)	(0.048)
Firm Size		0.008***	0.008***		−0.005***	−0.005***
		(0.001)	(0.001)		(0.001)	(0.001)
Net Operating Loss		−0.009**	−0.009**		−0.001	0.001
		(0.004)	(0.004)		(0.007)	(0.007)
GDP per capita growth			−0.000			0.002***
			(0.000)			(0.000)
Inflation			0.003***			0.011***
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	535,361	535,361	535,361	535,361	535,361	535,361
Adjusted R^2	0.503	0.536	0.536	0.913	0.914	0.914

Note: The above regressions are estimated using a matching differences-in-differences (MDID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 22: Impact of Taxation on Firm Leverage - DID - Portugal

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Portugal	0.062***	0.058***	0.055***	0.085***	0.081***	0.081***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Time	−0.046***	−0.044***	−0.023***	−0.012***	−0.009***	−0.014***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ACE	0.013***	0.006***	0.002*	−0.032***	−0.027***	−0.026***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tangibility		0.095***	0.096***		0.311***	0.311***
		(0.003)	(0.003)		(0.002)	(0.002)
Profitability		−0.315***	−0.321***		−0.204***	−0.203***
		(0.013)	(0.014)		(0.009)	(0.009)
Firm Size		−0.020***	−0.020***		0.022***	0.022***
		(0.001)	(0.001)		(0.000)	(0.000)
Net Operating Loss		−0.088***	−0.087***		−0.049***	−0.049***
		(0.002)	(0.002)		(0.002)	(0.002)
GDP per capita growth			0.003***			0.001***
			(0.000)			(0.000)
Inflation			0.012***			−0.003***
			(0.000)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	677,351	677,351	677,351	677,351	677,351	677,351
Adjusted R^2	0.862	0.867	0.868	0.552	0.616	0.616

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 23: Heterogeneous Impact of Taxation on Firm Leverage - DID - Portugal

Dependent Variable	Book leverage					
	Small enterprises			Medium-sized enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Portugal	0.063***	0.056***	0.052***	0.065***	0.057***	0.055***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)
Time	−0.048***	−0.043***	−0.022***	−0.040***	−0.040***	−0.025***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
ACE	0.013***	0.004**	−0.001	0.012***	0.011***	0.008***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Tangibility		0.119***	0.119***		0.021***	0.022***
		(0.003)	(0.003)		(0.007)	(0.007)
Profitability		−0.326***	−0.333***		−0.317***	−0.320***
		(0.009)	(0.009)		(0.050)	(0.050)
Firm Size		−0.033***	−0.033***		−0.033***	−0.033***
		(0.001)	(0.001)		(0.002)	(0.002)
Net Operating Loss		−0.096***	−0.095***		−0.057***	−0.055***
		(0.002)	(0.002)		(0.007)	(0.007)
GDP per capita growth			0.003***			0.002***
			(0.000)			(0.000)
Inflation			0.013***			0.009***
			(0.000)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	551,663	551,663	551,663	125,688	125,688	125,688
Adjusted R^2	0.861	0.868	0.868	0.869	0.874	0.874

Note: The above regressions are estimated using a differences-in-differences (DID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage is defined as the ratio of debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EC definition. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.

Table 24: Probit for Portuguese and Spanish Firms

Variable	Coefficient	(Std. Err.)
Tangibility	0.015	(0.039)
Profitability	−0.007	(0.090)
Firm Size	−0.009	(0.007)
Publicly Listed	−0.326	(0.572)
Net Operating Loss	−0.057**	(0.025)
Industry dummies	Yes	
Observations	25.764	
Log-Likelihood	−17719.088	
Pseudo R^2	0.003	

Note: The figure displays the estimation results of a probit regression in the year before ACE reform is implemented. Data source is the AMADEUS firm database. The dependent variable takes the value one if a firm is located in the treatment country, and zero otherwise. Publicly quoted is a binary variable equal to one if the firm is listed on the stock exchange. Firm size is the natural logarithm of total assets. Industry dummies refer to industrial sector fixed effects for two-digit NACE Rev. 2 codes. The different levels of significance are characterized according to the p-values: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 25: Impact of Taxation on Firm Leverage after Matching - DID - Portugal

Dependent Variable	Book leverage			Financial leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Portugal	0.065***	0.062***	0.060***	0.085***	0.082***	0.082***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Time	−0.066***	−0.068***	−0.065***	−0.015***	−0.016***	−0.026***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
ACE	0.023***	0.022***	0.022***	−0.010***	−0.012***	−0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Tangibility		0.091***	0.091***		0.272***	0.272***
		(0.007)	(0.007)		(0.005)	(0.005)
Profitability		−0.396***	−0.399***		−0.301***	−0.298***
		(0.021)	(0.021)		(0.014)	(0.014)
Firm Size		−0.011***	−0.012***		0.021***	0.021***
		(0.001)	(0.001)		(0.001)	(0.001)
Net Operating Loss		−0.074***	−0.074***		−0.049***	−0.049***
		(0.004)	(0.004)		(0.003)	(0.003)
GDP per capita growth			0.001***			0.000**
			(0.000)			(0.000)
Inflation			0.003***			−0.006***
			(0.001)			(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	168,093	168,093	168,093	168,093	168,093	168,093
Adjusted R^2	0.887	0.891	0.891	0.634	0.678	0.679

Note: The above regressions are estimated using a matching differences-in-differences (MDID) strategy and ordinary least squares (OLS). Standard errors are robust in the presence of firm-level clustering. Book leverage and financial leverage are defined as the ratio of debt respectively financial debt over the book value of total assets. Time is a binary variable equal to one after the start of treatment, and zero otherwise. ACE is equal to one if the firm is located in the treatment country during the reform, and equal to zero afterwards. Firm size is the natural logarithm of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Net operating loss is a dummy that indicates whether firms are making losses. Industry dummies refer to industrial sector fixed effects for two-digit NACE codes. Individual firm-level data are taken from the AMADEUS database, macro variables (per-capita GDP growth and inflation) are obtained from the Worldbank national accounts data. P-values are denoted by: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are given in parentheses.