The Latvian Allowance for Corporate Equity

Analysis of Effects on Firm Leverage Using Differences-in-Differences

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The Latvian Allowance for Corporate Equity — Analysis of Effects on Firm Leverage Using Differences-in-Differences

Master Thesis

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List of Abbreviations

ACC	Allowance for Corporate Capital
ACE	Allowance for Corporate Equity
AGI	Allowance for Growth and Investment
ATAD	Anti Tax Avoidance Directive
BEPS	Base Erosion and Profit Shifting
CBIT	Comprehensive Business Income Tax
C(C)CTB	Common (Consolidated) Corporate Tax Base
CIT	Corporate Income Tax
CFT	Cashflow Taxation
DID	Differences-in-Differences
(D)BEIT	(Dual) Business Enterprise Income Taxation
EATR	Effective Average Tax Rate
EBIT	Earnings before Interest and Taxes
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization
EC	European Commission
ECB	European Central Bank
EATR	Effective Average Tax Rate
EMTR	Effective Marginal Tax Rate
EMU	European Monetary Union
ESR	Earnings-stripping Rules
EU	European Union
EUROSTAT	Directorate General in charge of European Statistical Information
GDP	Gross Domestic Product
IMF	International Monetary Fund
MNE	Multinational Enterprise
OECD	Organization for Economic Cooperation and Development
PIT	Personal Income Tax
SME	Small- and Medium-sized Enterprises
TCR	Thin Capitalization Rules

1 Introduction

Classical corporate tax systems typically favour debt finance over equity. In the absence of legal and economic justifications, the resulting debt bias unnecessarily leads to over-leveraged firms and potentially weakens their resilience in times of financial stress. Various proposals to eliminate the corporate debt bias exist, and some have been applied. They differ in their comprehensiveness, practical applicability and effectiveness. A prominent example of a tax scheme that neutralizes the tax treatment of the different modes of financing is the Allowance for Corporate Equity (ACE). It foresees a notional deduction of the cost of equity from the corporate tax base. Hence it grants a similar tax treatment to equity as to corporate debt. In practice, however, its implementation can differ widely and yields different advantages and disadvantages. This raises the need for comparative policy evaluation.

In this work, I examine the Latvian variant of an ACE, which was implemented in 2009 and ended in 2014. It allowed the deduction of notional interest on new equity, i.e. retained earnings from the last tax period after 2009. To this end, I make use of a firm-level dataset on financial and accounting values, complemented by ownership characteristics and macroeconomic information. My empirical approach combines both matching methods and differences-in-differences analysis to identify the impact of the tax reform on leverage levels of Latvian firms vis-à-vis a control group of Lithuanian and Estonian firms. My examination focuses on the particular effects on different types of firms and over time. I also control for firm-specific characteristics and the macroeconomic environment.

Results indicate that the Latvian ACE was not effective in reducing overall corporate leverage. Moreover, my results suggest a positive reform impact on leverage, which is inconsistent with expected theoretical results. This finding might stem from either or both the chosen identification method and the particularities of the Latvian ACE. However, when taking into account firm heterogeneity and possible lagged effects, I show that the policy had different effects alongside firm-specific characteristics and over time. I find that larger, multinational and public-limited companies reacted stronger to the implementation of the Latvian ACE than smaller, domestic and private-limited companies. Moreover, I show that a possible debt-reducing effect of the Latvian ACE did materialize only in the long-term, and that it was stronger for financial leverage than for a larger aggregate, book leverage.

This work proceeds as follows: section 2 reviews the literature on tax-induced corporate debt bias and presents possible solutions. In section 3, I review the empirical evidence of existing ACE schemes. Section 4 then turns to the Latvian ACE reform. Subsection 4.1 explains the policy implementation. Moreover, it provides background information about the corresponding economic environment in the Baltic states. In subsection 4.2 I derive the theoretical effect that the Latvian ACE should have on firm leverage. Section 5 then deals with the empirical examination hereof. Subsection 5.1 outlines the identification strategy, subsection 5.2 presents the data, subsections 5.3 and 5.4 the corresponding methodology and basic results. More detailed analysis of firm heterogeneity and possibly lagged effects follows in subsections 5.5 and 5.6. Section 6 provides space for an in-depth discussion of the results and the limitations of the empirical approach. I also hint to possible policy implications in the context of other ACE experiences, and suggest further research paths. Section 7 concludes.

2 Tax-induced Debt Bias and Possible Solutions

The influence that tax policy may have on corporate decisions has long been discussed in the economic literature. Initial work by Modigliani and Miller (1958) and Stiglitz (1973) showed theoretically that corporate financial structures should be influenced by the tax structure. In particular, by only deducting interest on debt from taxable income, corporate taxation might create a debt-equity bias by driving a wedge between the different modes of financing. However, they also hinted to the relevance of the interplay between the personal and corporate tax code, with its various deductions and exceptions. Since then empirical research remains inconclusive, with some finding confirmation in the data (i.e. Gordon and Lee (2001)) but others finding none (i.e. Graham (2000)). Instead, both theoretical and empirical work suggested that a main driver of corporate choice of financing results out of asymmetric information between firm stakeholders and agents or between firms and other market actors (cf. Myers and Majluf (1984) for theoretical intuition and Titman and Wessels (1988) for empirical evidence). While it is not clear to which extent exactly the debt-equity bias contributes to the fragility of economies, apart from its effect via the financial sector (Langedijk et al. (2014)), the tax preference for debt seems to be the result of neither legal nor economic considerations (Devereux and Gerritsen (2010)). Even less so in an age where the existence of hybrid financing instruments further blurs the distinction between both financing modes (de Mooij (2012)). Moreover, the dimensionality of a possible debt-equity bias is extended by the emergence of multinational corporate tax planning. As noted by de Mooij (2012) and Devereux (2012), existing differences in tax treatment of debt induce multinational enterprises (MNE's) to shift debt to subsidiaries located in countries with high statutory rates. Equity would instead be allocated to low-tax countries. Using a micro-level dataset linking MNE's to their subsidiaries, Huizinga et al. (2008) find that corporate tax rates indeed determine inter-country profit-shifting, albeit their effect on leverage seems to be rather small.

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 even multilateral coordination. Others 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 capitalization rules (TCR) or earnings-stripping rules (ESR). TCRs restrict the deductibility of interest from taxable corporate income if company leverage is above a pre-defined level. Empirical evidence by Blouin et al. (2014) 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 between debt and equity while maintaining the core properties of classical, accounting-based tax systems. There exist three broad possibilities to do so. A first variant was proposed as the so-called Comprehensive Business Income Tax (CBIT) by the U.S. treasury department in 1992. It foresees the elimination of the tax deductibility of interest. This implies a shift of the tax burden from the pure profit of capital invested to the normal return at the business level. The implied enlargement of the relevant tax base could ensure a compensatory decrease in statutory rates. However, de Mooij and Devereux (2011) argue that effective marginal tax rates unlikely remain fully compensated despite

tax rate cuts following CBIT reform. This would reduce capital investment. However, highly productive investment may also increase as it faces lower effective tax rates when statutory rates are lower. Implementing a CBIT would further require grandfathering of pre-existing debt to prevent substantial distortions in business financing strategies during the transition. Additionally, Mirrlees et al. (2011) hint to the difficulties of integrating the financial sector under the CBIT without either threatening its viability or shifting the tax burden on the non-financial sector and international competitors (de Mooij (2012) and de Mooij and Devereux (2011). In effect, the CBIT has never been put to practice, also due to these unsolved questions and the required yet complicated international coordination.

A second possibility to reduce or eliminate the debt bias is the so-called Allowance for Corporate Equity (ACE), initially proposed by Devereux and Freeman (1991). Contrary to the CBIT, it 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 (cf. section 4.2). With respect to the determination of the deductible amount, Hebous and Ruf (2015) broadly categorize 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 Croatia. 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 to the deduction (i.e. Italy and Austria). Section 3 offers an overview of the different ACE schemes in practice.
If correctly applied, the ACE eliminates the tax-induced corporate debt bias. It also reduces the effective marginal tax rate (EMTR) to zero. This implies that the intensity of corporate investment choices remains unaffected from taxation. By including inflation in the notional rate, the ACE renders corporate finance decisions also robust to price changes (Klemm (2007) and Isaac (1997)). Moreover, the correct implementation of an ACE implies that the timing of depreciation schedules becomes irrelevant. Hence, it is neutral with respect to inter-temporal firm financing decisions under tax schedules that imperfectly approximate true economic depreciation. This feature, however, may not hold true if tax and accounting practices are misaligned (Zangari (2014)). Among the disadvantages, implementing an ACE schemes diminishes the corporate tax base. Under revenue neutrality, this must be counter-acted by an increase in statutory rates or a shift of the tax burden to other areas. This can imply redistribution effects and potential political frictions (Isaac (1997)). Second, de Mooij (2012) emphasizes that an ACE system which allows different rates between equity and debt financing may give rise to an increase in hybrid financing for tax purposes. Third, the implementation of an ACE has multiple international consequences. For instance, unilateral implementation of an hard ACE might be regarded as a measure to intensify tax competition by other countries. That is, granting a deduction on the full, already existing stock of equity implies windfall revenues to firms. Yet it achieves no superior neutralization of corporate finance decisions than incremental ACE schemes. Moreover, ACE schemes can also act as a vehicle for intra-company tax optimisation strategies (cf. Belgian ACE in section 3). Yet while a smaller tax base can attract firms via a lower effective average tax rate (EATR), de Mooij

and Devereux (2011) argue that compensatory higher statutory rates may also increase out-of-country profit shifting. Under the general trend of decreasing statutory tax rates, however, the decrease in tax bases under an ACE could actually increase a country's relative attractiveness with respect to EMTR considerations. Devereux and Sørensen (2006) further note that a compensatory increase in statutory rates under the ACE *ceteris paribus* targets highly profitable firms more than those simply re-obtaining the risk-adjusted nominal return on equity. As such, they argue that this possibly distorts location decisions of highly profitable, internationally mobile companies (see also Bond (2000)).

A third variant proposed by Boadway and Bruce (1984) foresees to allow an equal tax deduction on both the cost of equity and debt. This so-called Allowance for the Cost of Capital (ACC) can be seen as a combined version of both the ACE and the CBIT proposals. It guarantees a common notional rate deduction of capital to both sources of finance. As noted by Kleinbard (2015), by only granting a deduction on the notional amount and not on the actual interest payments incurred by the firm, unlike an ACE the ACC removes incentives to issue equity-flavoured debt instruments under notional interest rate mismatches. While the ACC achieves financing neutrality between debt and equity, its effect on investment depends on the correspondence between the notional rate and the true normal return to capital. If the chosen tax deduction rate is below the true normal rate, investment will face taxation at the margin (and vice versa), implying lower investment than under non-distorting taxation.
The ACC also constitutes a central pillar of an alternative tax scheme that, unlike the proposals discussed so far, integrates both firm and investor taxation in a single system. That is, in his proposal for a business enterprise income tax (BEIT), Kleinbard (2015) defines the taxable amount at the corporate and investor level simultaneously. In essence, his envisioned tax design grants a so-called Cost of Capital Allowance (COCA) to firms, equivalent to the ACC mentioned above, with the goal of neutralizing finance. But Kleinbard's proposal goes further in adding the COCA to the taxable base at the level of personal income. As such, the BEIT succeeds in taxing normal returns at the investor level and profits at the corporate level. Like the CBIT, the BEIT hence targets the full return on capital but does so in a differentiated (and possibly less distorting) way. A further extension, the Dual BEIT (DBEIT), aims at taxing returns to capital differently at the personal level than other forms of income. Possible incentive distortions for e.g. small business entrepreneurs, whose income type is flexible between both modes, need to be counteracted however by disentangling the different income sources.

A more radical approach to tackle the tax debt bias altogether with the problem of determining economic depreciation correctly is so-called cash flow taxation (CFT). Its primary distinction from classical tax systems arises from providing an immediate outlay of investment expenditures and subsequent taxation of full investment returns without further (interest) deductions. First proposed by Meade and IFS (1978), different variants of it occur. R-based cash flow taxation would abolish allowances for capital cost and depreciation and instead grant deductions on real investment at occurrence. As such, it treats the cost of capital equal, irrespective of the financing mode. Ultimately, by guaranteeing an initial outlay of investment the R-based CFT only taxes economic rents, not normal returns. However, like the CBIT proposal, R-based cash flow taxation suffers from an incompatibility with the financial sector, since it only considers real investment as tax deductible. Moreover, since interest payments would not be deductible under the R-based tax, its unilateral implementation would likely lead to international disadvantages due to the mobility of capital and the likely occurrence of crediting problems. The inclusion of financial flows into an augmented R+F-based cash-flow tax could circumvent both

deficiencies by additionally taxing the inflow of capital (i.e. borrowing) irrespective of financing source, and granting a deduction on its outflow. As such, it taxes net cash flows to shareholders and targets economic rent, which is a feature that it has in common with the ACE in a classical system. Bond and Devereux (2003) show that this feature also ensures its neutrality of financing between debt and equity, even under uncertainty and inflation (Boadway and Bruce (1984)). However, the R+F-based CFT also requires special treatment of the financial sector (Boadway and Bruce (1984)) and of pre-existing debt, similarly to the CBIT. Additionally, (correct or incorrect) expectations of tax rate changes can further distort the timing of firms' investment decisions (Devereux and Sørensen (2006)). An economically equivalent tax to the R+F-based CFT is the S-based CFT, which taxes net flows between firms and shareholders and exists in Estonia since 2000 (Ernst and Young (2015)).

The above alternatives to classical corporate taxation all imply a neutralization of the debt-equity bias. As already noted by Devereux (2012) however, global convergence of corporate tax systems is unlikely to happen in the near future. Moreover, Devereux (2012) and Mirrlees et al. (2011) emphasize that unilateral implementation of tax systems in a step-wise approach, albeit the politically most feasible procedure in an international context, implies the difficulty of further losing proximity to a theoretically existing, ideal tax system. Yet, apart from current attempts to pursue a coordinated approach to international taxation at a multilateral level, i.e. the CCCTB in the EU, effective comparison of the different alternative tax systems presented above requires practical implementation. In the absence of an experimental setting, the evaluation hereof is further complicated by strong and growing interdependence between tax systems. This work adds to the existing literature on these natural policy experiments by first reviewing the empirical evidence of ACE schemes so far, and then examining the Latvian experience with the ACE.

3 The Allowance for Corporate Equity in Practice

As highlighted above, the actual shape an ACE can take in practice is far from homogeneous. Based on the categorisation by Hebous and Ruf (2015), this section summarizes the experience with both hard and soft ACE schemes, their particularities and economic effects.

The first country to implement an ACE in practice was Croatia 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 equalled 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 yet also the administrative burden (Keen and King (2003)). As noted above, an equivalence of the Croatian notional interest rate to the true risk-adjusted rate on equity was necessary to eliminate the debt bias and achieve an effective marginal tax rate on investment of zero. In their study of the Croatian ACE, Keen and King (2003) note that a such a determination was difficult to achieve in practice at the time due to structural post-communist transformation of the Croatian economy still underway. While usually yields on long-term government bonds provide an approximation of the domestic riskless interest rate, the underdeveloped domestic credit market led to government debt being owned predominantly by domestic banks — providing no guarantee that actual interest rates where necessarily close to the true rate in the absence of secondary security markets. By comparing the Croatian notional interest rate to the lower bound of rates in the domestic financial market, Keen and King (2003) note that it seemed reasonably accurate. With respect to the results of

the Croatian ACE, Keen and King (2003) refrain from an elaborate empirical analysis due to the lack of adequate data. Yet they note that from 1996 until 1999, foreign direct investment in Croatia was substantially higher than in almost all of its neighbouring countries. Moreover, the Croatian experience with foreign investors did not substantiate prior concerns expressed by e.g. Isaac (1997) about the international acceptance of the ACE as a CIT. From a fiscal point of view, Keen and King further note that as the Croatian ACE was granted to the full stock of equity, it came at substantial financial cost to the government. The Croatian ACE was abolished in 2000 due to the general international trend towards tax rate cut cum base broadening policies.

Another prominent and widely studied example of an 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 MNE's (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 SME's. Albeit the introduction of the ACE reduced the debt bias in Belgian corporate taxation, it did not eliminate it. Despite a considerable decrease in the EMTR of equity from 33.1% to 12.5% in 2006, the implicit subsidy for debt finance was still considerably larger, with an EMTR of then -29.4% (ZEW (2012), pg. 22-24). This was likely due to an imperfect approximation of the true interest rate on equity (European Commission (2012), pg. 70). Moreover, with the onset of the financial crisis in 2009, the gap between both financing modes reportedly increased again, as the Belgian government capped the notional interest rate at 3% (Aus dem Moore (2014)) and the deductible equity stock became subject to further restrictions.
Various studies analysed the ACE effect on corporate financial structures. Performing DID 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. Only considering small firms, van Campenhout and van Caneghem (2013) find no effect on corporate leverage. Regarding SMEs, Kestens et al. (2012) find significantly negative effects on leverage ratios. Utilizing a variety of estimation techniques and control groups from multiple countries, 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.
Shedding further light on the international implications of introducing an ACE, Hebous and Ruf (2015) emphasize that due to a lack of adequate provisions (e.g. concerning real investment) the Belgian ACE system incentivized corporate tax planning. They demonstrate that equity finance of German MNE's to their Belgian subsidiaries tripled between 2006 and 2007. Moreover, they show that this increase was driven by passive instead of active investment, indicating tax-optimizing behaviour. In this context, Zangari (2014) admonishes that so-called double-dipping, which is intra-group conversion of partially non-deductible equity into debt with the sole purpose of tax base shrinking, is not effectively counter-

acted under the Belgian ACE. Likewise, tax cascading, which is the multiple intra-group deduction of equity in the absence of adequate tax base consolidation, remains possible under Belgian legislation. Konings et al. (2016) focus explicitly on the implications of the ACE introduction for the Belgian economy. Using affiliates of the Belgian MNE's in other European countries as a control group, they find that the ACE decreased leverage ratios of Belgian MNE's and increased local employment.
It remains to mention that Liechtenstein also introduced a hard ACE in 2011. Apart from anticipative simulations using pre-reform data, however, to my knowledge there exist no relevant empirical studies, nor would respective findings be generalizable due to its particular setting.

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 taxation 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 Italian ACE were multiple: boosting firm investment and reducing firm leverage at low fiscal cost while staying internationally competitive by achieving lower EATR's. 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 corporate 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 capitalization rules, which aim at limiting debt finance at smaller fiscal cost (cf. Massimi and Petroni (2012) and section 2).
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 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 EMTR's 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. Contrary to 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.

Austria had an ACE system from 2004 until 2004, based on new equity and a notional interest rate. The rate was calculated as the interest rate of government bonds in secondary markets plus a risk premium of 0.8% (Hebous and Ruf (2015)). Like in Italy, a reduced tax rate applied to the deduction. As noted by Frühwirth and Kobialka (2011), the Austrian ACE differed from other incremental systems like e.g. the Italian system 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. Even though this feature and the reduced applicable tax rate may have decreased incentives by firms to use the ACE system, Frühwirth and Kobialka (2011) find an effect on different definitions of financial leverage. Moreover, this effect is estimated to be more pronounced for smaller than for larger firms. They find no effect on overall leverage and attribute this to short-term liabilities being less subject to planning of financial structures. The Austrian ACE was abolished in 2004.

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. Likewise TCR-like requirements on the deductible amount apply. Third, the equity deduction is taxed at reduced rates, depending on the type of tax payer. While interest in the ACE might have been fostered by the expectation to increase investment, inflation likely also contributed to it. Before the ACE reform, the Brazilian fiscal system relied on a special definition of 'fiscal reference units' to prevent additional debt finance incentives that arose from nominal interest deductions being deductible — which were sizeable in the presence of high inflation rates (cf. Klemm (2007)).
In his examination of the Brazilian ACE, Klemm (2007) differentiates between firms that, for structural reasons, have dividend payout ratios either above or below the full notional return to equity. From a corporate tax payer perspective, firms with high payout-ratios became indifferent between equity and debt finance after the reform, both at the margin and on average. Another ACE-type feature was that the EMTR on equity decreased to zero. Investment by low-type firms became neutralized with respect to the debt-equity choice and also effectively subsidized through the tax system. However, by requiring the distribution of dividends, the tax reform strongly discriminated against retained earnings (EMTR gap of roughly 40% between retained earnings and debt). From a personal income tax perspective, reform results change insofar as the remuneration of equity by low-payout firms is treated as interest income and hence taxed at a higher rate than dividends. This leads to an increase in EMTR's for low types, while high-type firms become effectively subsidized at the margin by the tax system. Since Klemm (2007) estimates the majority of Brazilian firms to belong to the low type, he concludes

that the Brazilian reform led less to ACE-type properties but instead to those of corporate dividend deductibility. He moreover shows that pay-off ratios increased after the 1996 reform. When analysing capital structures, however, he finds that not only investment but also leverage ratios increased after the reform. In another empirical approach, Laureano and Portal (2016) approximate the ACE effect by the interest rate applied to the notional deduction. They also find a positive effect of the Brazilian ACE on leverage. They identify two factors possibly contributing to this unintuitive result: the first relates to the imperfections of capital markets. Under perfect capital markets, firms could distribute dividends up to the full notional return and issue new equity in a compensatory way. But if the tax deductibility of dividends is granted for sure, while the substitutability of distributed and new equity is not guaranteed and financial constraints exist, firms may effectively end up with lower equity ratios. A similar reasoning also underlies the separation of firms into low and high payout types by Klemm (2007). Second, Laureano and Portal (2016) refer to the heterogeneity among final tax rates of equity holders. Hereby, they primarily differentiate between firms being controlled by other firms and those being owned by institutional investors. Depending on the legal types, equity interest of the former may even receive double taxation if the controlling firm network is extensive, yielding disincentives to make use of the ACE.

Beyond the examples of the implemented ACE schemes presented above, others remain to mention. Portugal introduced an incremental ACE scheme in 2010, particularly targeting SME's. Empirical analyses have not been conducted to my knowledge, 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 SME's any more. In 2015, Turkey also implemented a soft ACE scheme. 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. Moreover, empirical results differ substantially with respect to underlying data quality and range, the variables considered and the methodology utilized (cf. table 6). In the following section, I present the Latvian ACE and the economic and policy background before and during its implementation. I also derive its theoretical effect on firm leverage.

4 The Latvian Allowance for Corporate Equity

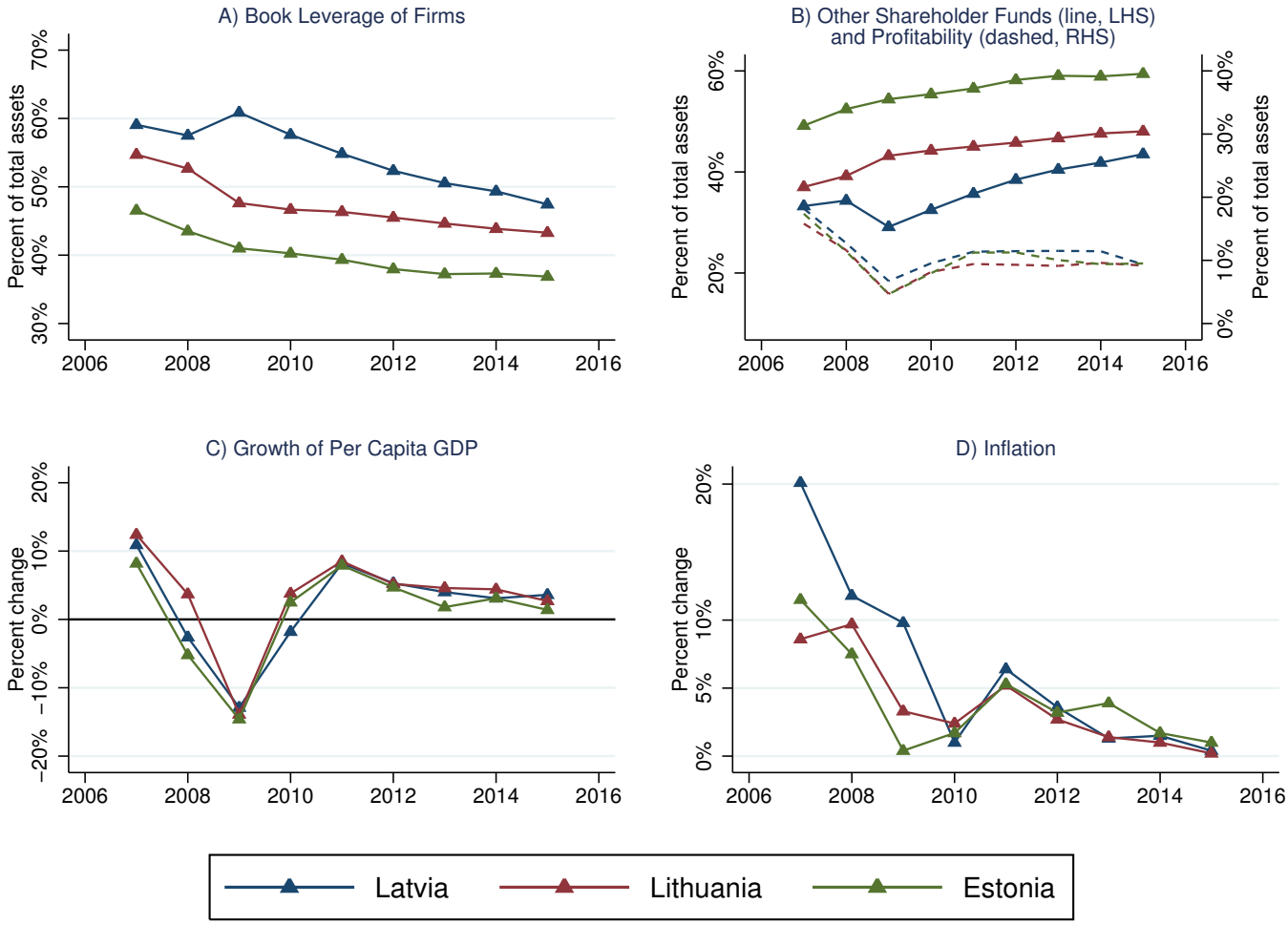
4.1 Policy Background

The Latvian ACE was adopted in the end of 2008 and came into effect on 1 January 2009. It foresaw 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 (cf. panel D, figure 3). A further requirement for the deduction was that the company would not be distributing 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. During the considered time period, the Latvian tax system further possessed the characteristics of a classical tax system: tax credits were granted on foreign income. Dividend payments to companies were exempt from withholding tax while those to resident shareholders taxed at low rates. TCR's existed yet were full of exceptions. The Latvian ACE ended in 2014.

The implementation of the Latvian ACE coincided with two developments: first, since the late nineties, Latvia and the two other Baltic states, Estonia and Lithuania, considerably changed their domestic tax structures. The theoretical appeal of the flat tax had a strong influence in moving the bulk of taxation from direct to indirect taxation (European Commission (2008)). This increased their international competitiveness especially with respect to corporate taxation, albeit at the cost of increasing domestic inequalities (European Commission (2012), pg. 93). Also, the newly acceded EU member states adapted to the EU and its common market regulations, harmonizing mostly indirect taxation measures. As can be seen on panel A of figure 3, statutory corporate tax rates in the Baltic economies are considerably below EU average, adding to accusations of unfair tax competition by larger EU member states. This claim is further substantiated by large gaps between statutory and implicit tax rates on capital. The latter measures the share of actual capital tax revenues over aggregate capital in the economy (cf. European Commission (2012), pg. 20). Following Langedijk et al. (2014), the low level of statutory rates further suggests that a possible tax debt shield should be lower in Latvia *a priori* 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. This argument is supported by the (in an international context) low EMTR's on investment financed by equity. A comparison of EMTR's 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)). The small size of the Baltic economies and their openness further suggest that the perspective of the resident shareholders may be less relevant than the one of international investors when determining the impact of CIT on corporate financial structures (cf. Klemm (2007), pg. 6).

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

Figure 1: Macroeconomic Development in the Baltic Economies



Note: The figure shows the behaviour of firm aggregates (Panels A and B) and the macroeconomy (Panels C and D). Panel A displays average book leverage of firms. Panel B plots the mean share of other shareholder funds (solid line, left hand side) as a percentage of total assets and firm profitability. Besides retained earnings (i.e. undistributed profit), 'other shareholder funds' also includes reserve capital and minority interests. Profitability (dashed line on the right-hand side) is defined as the ratio of profits before tax over the book value of total assets. Data for panels A and B are from the AMADEUS database. Data for panels C and D are downloaded from the World Bank national accounts data, available online.

Second, the onset of the financial crisis in 2008/2009 led to an abrupt halt of the formerly thriving Baltic economies. Both economic growth and tax revenues plummeted (panel C, figure 1 and panel B, figure 3). Likewise inflation decreased considerably during this period, later also influenced by the oncoming introduction of the Euro in Latvia (2014) and Lithuania (2015) (cf. panel D of figure 1). Even though all Baltic economies were hit hard by the crisis, the Latvian economy was the most vulnerable due to its high levels of leverage and dependence on foreign finance. After the largest Latvian bank required privatization in 2008, Latvia was effectively cut off from international financial markets, as formerly substantial capital inflows reversed. As a reaction, 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 a commitment by the Latvian government to develop a comprehensive strategy for restructuring private sector debt (cf. International Monetary Fund (2009), pg. 65). 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 (cf. panel D, figure 3).

The reactions of firms to the crisis were different between the three countries at first glance. Latvian firms incurred a jump in their book leverage-ratios in 2009, defined as total liabilities over total assets. The respective ratios of Estonian and Lithuanian companies fell during the same period. However, total liabilities in Latvia also declined from 2008 until 2009. But this decrease was overcompensated by an even stronger decrease in the book value of the firm asset base, i.e. the leverage denominator. Since 2008-2009, growth has remained stable yet subdued, as all three economies deleveraged from former levels (cf. panel A on figure 1). Latvian firms remain stronger leveraged than their Estonian and Lithuanian counterparts, although the gap closed considerably since 2009. Estonia achieves exceptionally low firm debt levels also because of its tax system, which refrains from taxing dividends as long as these are not distributed (cf. S-based CFT in section 2). This also explains the higher level of the aggregate of 'other shareholder funds', which also includes retained earnings. As for book leverage levels, Latvian firms incur a transitory opposite effect on this aggregate than their Lithuanian and Estonian counterparts. The following surge in 'other shareholder funds' after 2009 is then particularly remarkable given the similar development of firm profitability between the three countries.

4.2 Theoretical Effect on Leverage

In the following, I derive the expected effect of the Latvian ACE on firm leverage. To this end I utilize a theoretical model developed by Sørensen (2015). Sørensen considers firms in a small and open economy, which fits well with the Latvian policy background. As such, I abstract from personal income taxation. From a theoretical perspective, and under omission of potential agency conflicts, firms should choose a leverage level such that their discounted net present value is maximized. 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 I 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, 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, and also in Latvia. Another deficiency of the Latvian ACE was that unlike e.g. in Belgium, where the rate is determined two years in advance, the Latvian rate was published in the same year as the deduction was granted. As such it did not increase investor certainty about expected returns.

[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 $\lim_{k\to 0} F'(k) = \infty$.

Before the analysis of the Latvian ACE below, two aspects 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 dividend 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. I 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. I take first as given that there exists a strictly positive stream of profits in the future such that profits are actually distributable. Second, I assume an infinite time horizon, $T \longrightarrow \infty$, such that the differences in starting points become irrelevant. Third, I 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 neutralize 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 the Latvian ACE variant 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 5, a possible leverage-reducing effect through the Latvian ACE is likely small, given the low statutory tax rates and the required build-up of retained earnings by Latvian firms during the considered time period.

5 Empirical Analysis

5.1 Identification Strategy

My empirical analysis centres on regarding the introduction of the ACE in Latvia as a quasi-natural experiment by applying a differences-in-differences (DID) approach to the Baltic economies. The outcome of interest is a possible effect of the ACE on the leverage levels of Latvian firms. Latvia is considered as the country of treatment, with the period of treatment ranging from 2009 until 2014. Technically, the 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, I still look for possible effects on leverage in 2014. The control group consists of Estonia and Lithuania. I combine these two countries into a common control group because they share certain characteristics concerning tax policy, structural development and the macroeconomic situation with Latvia before and during the period of study, as argued for in section 4.1.
To analyse the policy's effect on corporate financial structures, I use a firm-level dataset containing information on corporate accounts and financials as well as firm ownership and complementary macroeconomic data. In order to ensure comparability of the aggregates, I then match single firms using the propensity score method. After the matching procedure, I analyse the impact of the ACE on firm leverages from three perspectives, using standard DID. First, I calculate baseline results for the matched aggregate. Second, I explore the heterogeneity of firms by restricting the sample according to size, ownership and legal status. Third, I examine the temporal structure of a possible policy impact, i.e. whether the ACE effect increased over time.
The remaining procedure is as follows: section 5.2 explains the dataset, its sources and restrictions. In section 5.3, I develop the matching methodology and present the matching results. Section 5.4 explains the DID approach and presents first results on matched data and robustness checks. Succeedingly, sections 5.5 and 5.6 deal with possibly heterogeneous and temporal effects. Section 6 reviews the ensemble of results and the underlying assumptions.

5.2 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. I complement my dataset by adding data on macroeconomic development from the Worldbank, public finance records from Eurostat and tax policy developments from the European Commission. Overall, 180,293 observations are gathered this way, with proportional shares for each of the three countries of interest. However, data quality varies across countries and is inferior to datasets utilized e.g. by Princen (2012) for Belgium. The reason is twofold: first, Bureau Van Dijk works with domestic credit rating agencies in these countries. They are hence 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.

Table 1: Mean Differences Between Firms by Country

	Full Sample	Latvia	Lithuania	Estonia
Variable	Mean/Std dev	Mean/Std dev	Mean/Std dev	Mean/Std dev
Profile				
Employees	78	84	110	51
	(233)	(121)	(366)	(107)
Multinational Enterprise	0.259	0.292	0.153	0.365
	(0.438)	(0.455)	(0.360)	(0.482)
Large Firm	0.073	0.079	0.126	0.033
	(0.260)	(0.271)	(0.332)	(0.177)
Public Limited Company	0.216	0.069	0.045	0.395
	(0.411)	(0.253)	(0.206)	(0.489)
Balance Sheet				
Total Assets (millions)	5.196	5.979	7.353	3.346
	(28.338)	(31.529)	(41.131)	(9.337)
Current-ratio	2.752	2.203	2.471	3.169
	(4.043)	(2.708)	(3.995)	(4.453)
Liquidity-ratio	2.072	1.437	1.897	2.413
	(4.987)	(2.051)	(4.924)	(5.746)
Solvency-ratio	0.509	0.422	0.480	0.563
	(0.239)	(0.224)	(0.227)	(0.240)
Book Leverage	0.491	0.578	0.520	0.437
	(0.239)	(0.224)	(0.227)	(0.240)
Financial Leverage	0.182	0.194	0.223	0.161
	(0.188)	(0.191)	(0.168)	(0.191)
Tangibility	0.305	0.307	0.295	0.311
	(0.248)	(0.242)	(0.218)	(0.270)
PL Account				
Profitability	0.126	0.141	0.131	0.117
	(0.228)	(0.156)	(0.142)	(0.292)
Return on Equity	0.221	0.315	0.243	0.168
	(0.536)	(0.477)	(0.426)	(0.617)
Net Operating Loss	0.105	0.065	0.091	0.132
	(0.307)	(0.247)	(0.288)	(0.338)
Profit Margin	0.076	0.063	0.063	0.090
	(0.725)	(0.078)	(0.074)	(1.050)
Inventories Turnover	110.553	109.294	109.012	112.059
	(683.553)	(553.390)	(769.077)	(681.447)
Sales (millions)	8.466	10.292	11.494	5.586
	(25.528)	(25.460)	(37.275)	(10.509)
Observations	2,979	554	1,011	1,414

Note: The figure provides the means and standard deviations (in parentheses) of three sets of firm variables by country. Data source is the AMADEUS firm database. The data are from the year 2008, i.e. the last pre-treatment period. Profile variables: multinational enterprise is the share of firms of which at least 50% of shares are ultimately owned by a single non-resident owner. Large firms is the share of firms for which total assets are above EUR 43 million and/or above 250 employees. Public limited company is the share of firms with this legal status. Balance sheet variables: the current ratio is defined as the ratio of current assets over current liabilities. The liquidity ratio is the ratio of current assets except stores over current liabilities. The solvency-ratio is the ratio of shareholder funds over total assets. Book and financial leverage are the ratios of total respectively financial debt over the book value of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profit-and-Loss account: profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Return on equity is measured as the ratio of EBIT over shareholder funds. Net operating loss is the share of firms which have negative profitability in the sample. Profit margin is the ratio of EBIT over sales. Inventories turnover is calculated as the ratio of sales over inventories.

In order to ensure comparability between firms I conduct a cleaning procedure of the dataset, based on various approaches in the literature. In a first step, I follow Kalemli-Özcan et al. (2015) in eliminating observations which include missing values for total assets, turnover, sales and employment. I also exclude firms from the sample which feature negative values for total assets, employment, sales or tangible fixed assets. Second, I adapt the procedure by Princen (2012) in excluding firms from the primary, public, financial and real estate sector, which beforehand accounted for roughly 16 percent of the sample.[3] Third, I drop observations from the year 2015 and 2016, since both are beyond the time period of interest for this study. I also exclude inactive firms (due to e.g. solvency) and cases where reported equity is larger than total assets. I also eliminate observations who do not include data for the main variable of interest, book leverage, and those companies which have negative financial or book leverages. Moreover, I restrict the sample to private and public limited companies, hereby excluding e.g. non-profit organizations and public authorities, as defined by their legal status. In a fourth step, I 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). I also eliminate all values of balance sheet items and turnover that are smaller than zero or larger than total assets.[4] Finally, I restrict the sample to those firms for which observations are available for all relevant years, i.e. from 2007 until 2014. This last step reduces the observations in my dataset from 66,411 to 23,832, with the relative share of Estonian firm increasing from about 40% to 50%. The Latvian and Lithuanian relative shares decrease, which seems to be due to a decrease in data quality during 2008-2009.

The resulting mean values for firms from the three countries are listed on table 1 for the year 2008. Certain structural characteristics of each country are also visible in the firm aggregates. For instance, the notion that Lithuania is the largest yet least open country is exemplified by its higher numbers of employees and total assets as well as its smaller share of multinational firms. The reverse holds true for Estonia. One can moreover observe that Latvian firms were leveraged at a higher level than their counterparts in Estonia and Lithuania.

5.3 Matching Firms

The envisioned empirical analysis of the Latvian ACE combines two common methods for microeconometric policy evaluation: matching methods and differences-in-differences analysis. This section is devoted to explaining and conducting the former. The concept behind matching stems from the insight that comparability between treated and controlled firm must be ensured in order to evaluate the treatment effect (i.e. the introduction of the ACE). This requires to find firms in the control group which are sufficiently similar to firms in the treatment group before treatment (i.e. in year 2008). Then a difference in outcomes (i.e. leverage levels) after the treatment can be attributed solely to the policy change. Using notation from Blundell and Costa Dias (2009), let y^1 be the post-treatment outcome, i.e. leverage after the ACE introduction, for firms in the treatment group. Ideally, one observes all necessary explanatory variables, X, in order to create the counterfactual outcome, y^0, among the

[3] Excluded sectors 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)

[4] 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.

control group firms. One can then evaluate the policy effect by comparing the post-treatment outcome of a firm in the treatment group with the respective outcome of a similar firm in the control group.

The above necessitates two fundamental assumptions: first, the conditional independence assumption states that an observable set of explanatory variables X exists that 1) correctly explains which firms in the control group are similar to those in the treatment group and 2) explains the outcome of interest. Second, the overlapping common support assumption requires that there exist firms in both the treatment and control group which share a set of characteristics within the set of explanatory variables, X. This implies that the causal relationship between X and treatment status is not complete. Blundell and Costa Dias (2009) emphasize that a combination of DID and matching methods, coined by the term MDID, has another advantage. It is common that the observed set of explanatory variables required for constructing the untreated counterfactual is not the complete one, i.e. there exist unobserved explanatory variables. Having longitudinal data (i.e. multiple single-firm observations over time) weakens this deficiency as long as these unobservables stay constant over time. In the concrete context, the two assumptions above result in the necessity to above all find such a set of explanatory variables that allows to both correctly assign Lithuanian and Estonian companies to the Latvian firms and to explain the leverage outcome. Afterwards, one must validate whether the resulting set of Lithuanian and Estonian firms is actually sufficiently similar to the Latvian firm group.

To this end, various matching procedures can be used, dating back to Rubin (1979). In this work, I follow Princen (2012) in utilizing the propensity score method. It bases on the notion that assigning a firm from the control group to a firm from the treatment group can be difficult when X is multidimensional. In order to simplify the analysis, propensity score matching implements the idea of reducing dimensions by generating a simple score. The score then indicates the probability with which a certain firm belongs to the treatment group. In practice I estimate a probit regression on the set of firms available for the year 2008, i.e. the last pre-treatment period. The probit model assumes a non-linear relationship between the explanatory variables and the probability of a firm to be among the treated (i.e. Latvian). This relationship is given by a cumulative Gaussian distribution function, G, which is calculated based on the standardised explanatory variables in the set X:

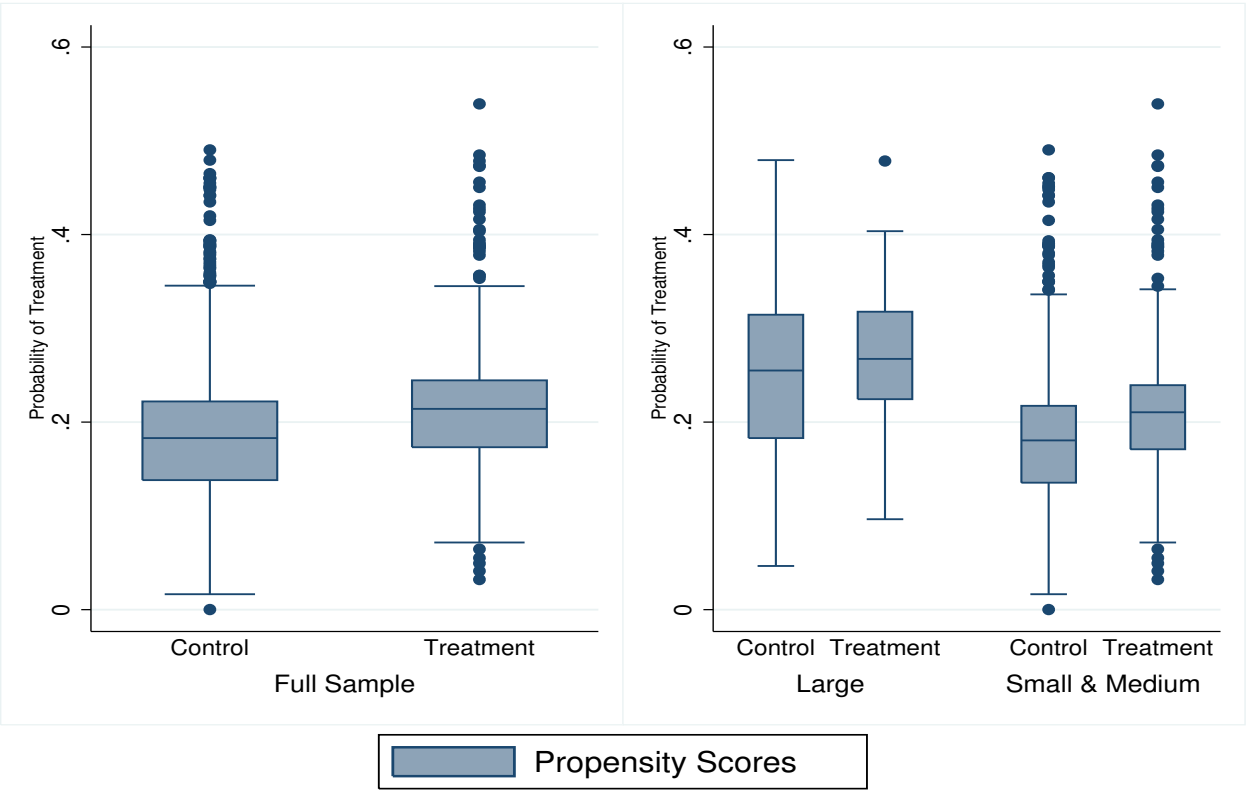
$$P(x) = G(\beta_0 + \beta_1 x_1 + ... + \beta_k x_k) \ . \tag{9}$$

The dependent variable here is a binary variable being equal to one if the country is Latvia, and zero if not. The explanatory variables are tangibility, profitability, the natural logarithm of firm size and two binary variables, indicating whether a firm is loss-making and whether it is publicly listed on the stock exchange. Table 7 displays the results. Both firm size and net operating loss significantly determine the firm treatment status in 2008. Through prediction of the respective probabilities to belong to the treatment group, I obtain propensity scores for each firm in the sample. Based on these, firms from the treated group are matched to firms from the control group with similar propensity scores. This similarity is determined by an algorithm. One possibility is to apply the so-called nearest neighbour matching algorithm. Among control group firms, it selects those with the closest propensity scores to a treatment firm in order to match. For each match with a treatment firm, it then assigns a weight equal to one to the firm in the control group. Alternatively, the kernel matching algorithm chooses a neighbourhood of similar firms in the control group. Kernel matching then assigns positive weights to all of them, albeit decreasing with increasing distance from the treated firm's propensity score. A

practical advantage of kernel matching is that it is more precise than if a single control firm is matched to multiple treated firms under the nearest neighbour procedure (cf. Blundell and Costa Dias (2009)). Yet it also implies a higher risk to end up with non-suitable firms influencing results. This could occur in the concrete case since the control group of Estonian and Lithuanian firms is not substantially larger than the Latvian treatment group. I hence follow Princen (2012) in applying the nearest neighbour method. Firms who do not have corresponding matching partners in the the opposite sample are discarded, as can be seen on figure 4 in the appendix. Likewise, firms from the control group that are particularly close in characteristics to treatment firms might receive multiple matches from the treatment group. They will then receive larger weights than simple one-to-one matches in later regressions.

On figure 2, the displayed boxplots show that propensity scores overlap significantly between control and treatment firms in the unmatched sample. Moreover this similarity seems to hold also within the groups of large firms and SME's. This strengthens the above assumption that an overlapping common support exists. In order to further evaluate this assumption, the post-matching changes in mean differences of explanatory variables between treated and controls are given on table 2. Differences between firms for the relevant variables in X, e.g. profitability and net operating loss, vanish. Differences in firms' financial ratios persist. However this should pose less of a problem to the analysis, since these are closely related to the outcome variable, leverage. Moreover, the higher share of e.g. public limited companies among the control group firms will be captured by country fixed-effects in the DID analysis below, as these are time-invariant characteristics of firms.

Figure 2: Boxplots of the Estimated Propensity Score



Note: The figure shows boxplots of the estimated propensity scores for the treatment and control group. On the right-hand side they are shown separately for large firms and SME's.

Table 2: Mean Differences Before and After Matching

	Unmatched Sample			Matched Sample		
Variable	Treated	Control	Diff	Treated	Control	Diff
Profile						
Employees	84	76	−8	84	115	31
Multinational Enterprise	0.292	0.249	−0.043*	0.290	0.254	−0.036
Large Firm	0.079	0.071	−0.008	0.080	0.076	−0.004
Public Limited Company	0.069	0.249	0.180***	0.069	0.276	0.207***
Balance Sheet						
Total Assets (millions)	5.979	5.017	−0.962	5.964	8.058	2.095
Current-ratio	2.203	2.878	0.675***	2.198	2.965	0.767***
Liquidity-ratio	1.437	2.236	0.799***	1.434	2.115	0.681***
Solvency-ratio	0.422	0.529	0.107***	0.421	0.536	0.115***
Book Leverage	0.578	0.471	−0.107***	0.579	0.464	−0.115***
Financial Leverage	0.194	0.179	−0.015*	0.194	0.177	−0.017
Tangibility	0.307	0.304	−0.002	0.307	0.305	−0.002
PL Account						
Profitability	0.141	0.123	−0.018*	0.141	0.136	−0.005
Return on Equity	0.315	0.199	−0.116***	0.315	0.248	−0.067**
Net Operating Loss	0.065	0.115	0.050***	0.065	0.056	−0.009
Profit Margin	0.063	0.079	0.016	0.063	0.072	0.009
Inventories Turnover	109.294	110.904	1.609	109.494	166.598	57.104
Sales (millions)	10.292	8.049	−2.243*	10.282	9.333	−0.949
Observations	554	2,425	2,979	553	449	1,002

Note: The figure shows means and mean differences between treated (Latvia) and control group (Estonia and Lithuania) for the unmatched and matched sample in 2008, the last pre-treatment period. Data source is the AMADEUS firm database. Three sets of firm variables are shown. Profile variables: multinational enterprise is the share of firms of which at least 50% of shares are ultimately owned by a single non-resident owner. Large firms is the share of firms for which total assets above EUR 43 million and/or above 250 employees. Public limited company is the share of firms with this legal status. Balance sheet variables: the current ratio is defined as the ratio of current assets over current liabilities. The liquidity ratio is the ratio of current assets except stores over current liabilities. The solvency-ratio is the ratio of shareholder funds over total assets. Book and financial leverage are the ratios of total respectively financial debt over the book value of total assets. Tangibility is the ratio of tangible fixed assets over the book value of total assets. Profit-and-Loss account: profitability is calculated as the ratio of Earnings before Interest and Taxes (EBIT) over total assets. Return on equity is measured as the ratio of EBIT over shareholder funds. Net operating loss is the share of firms which have negative profitability in the sample. Profit margin is the ratio of EBIT over sales. Inventories turnover is calculated as the ratio of sales over inventories. The asterisks denote the respective p-values of rejecting the null hypothesis that mean differences are equal to zero: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5.4 Baseline Results

This section develops the basic differences-in-differences approach that I 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 control group and treatment group must follow a common trend in the absence of treatment. Unfortunately, assessing such a common trend for a considerable period length before the policy implementation is not possible due to data limitations. Panel A on figure 1 shows that leverage trends nevertheless seem to be aligned from 2007 until 2008, the last pre-treatment period. In 2009, the first period of treatment, however, one can observe a sharp increase in leverage of Latvian firms vis-à-vis control firms. This is likely caused by the particular effect that

the financial crisis had on Latvia (cf. section 4.1). Still, as can be seen on panel C of figure 1, the overall macroeconomic shock as well firm profitability developments were shared by the control group countries. Section 5.6 presents ways by which to test for the existence of such a common trend, while in section 6 I will further discuss this assumption and propose alternative evaluation methods.

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 more certainty directly after its inception. That is, the further time advances, the more other policy changes might blur the picture. Panel D on figure 3 shows that indeed multiple changes occurred to tax policy after 2009, both in Latvia and the control group of Estonian and Lithuanian firms. The most substantial fiscal measure adopted during this period in Latvia was the extension of the loss carry-forward. This undoubtedly achieved an ease of taxation, and possibly contributed to firm deleveraging. Yet the Latvian ACE was the only measure that explicitly targeted the firm financing choice. The uniqueness assumption is further antagonized by the theoretically derived properties of the Latvian ACE (cf. section 4.2). In particular, I expect the effect of the Latvian tax reform to increase over time. In section 5.6, I deal with this aspect of the analysis in more detail. The baseline DID regression that is to be estimated in this section can be given by

$$Y_{it} = \gamma_0 + \gamma_1 \mathrm{LT}_i + \gamma_2 \mathrm{LV}_i + \gamma_3 \mathrm{Time}_t + \gamma_4 \mathrm{ACE}_{it} + \sum_j^J \phi_j X_{jit} + \sum_l^L \mu_l \mathrm{Ind}_{li} + u_{it} \ , \tag{10}$$

where the subscripts i and t denote the observation of firm i in year t. Y is the dependent variable, leverage. As shown in section 3 its choice can have an impact on policy evaluation. I follow Princen (2012) in varying between 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. Among the independent variables of the model, the differences-in-differences components are the three binary variables LV (Latvia), Time and ACE. The former two take the value one if a firm is located in Latvia and if the firm observation occurred after 2008. Both variables are zero otherwise. ACE is the product of Latvia and Time, i.e. [Latvia x Time]. As such, γ_4 measures the ACE reform impact on leverage. The variable LT (Lithuania) is a country fixed effect, since the control group consists of two countries. By X two sets of additional explanatory variables are included step by step, which shall control for changes in the economic environment. The underlying reasoning is that despite firm matching in section 5.3, the strong change in macroeconomic circumstances was not captured by any set of explanatory variables in 2008. 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 (cf. table 3). The second set includes macroeconomic control variables, namely growth of per capita GDP and inflation. '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).

The financial and macro variables are included in a step-wise procedure to differentiate between the pure treatment effect and the effect when controlling for individual firm effects and trends in the firm aggregate. Hypotheses about the signs of coefficients are reported on table 3. Positive signs are expected for tangibility and firm size, as both imply larger securities 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. My approach does not control for a possible non-debt tax shield, as done in Princen (2012). The main reason is that the accounting standards in Latvia and Lithuania do not allow for the underlying variable, i.e. depreciation costs, to be reported within the standardised AMADEUS setting. Similarly, the non-availability of depreciation costs and amortization requires that the included financial ratios are calculated based on EBIT instead of EBITDA (i.e. profitability and net operating loss). This approximation seems to be sensible since it still captures the main determinants of profitability in the economic sense. Second, Graham (2003) argues that non-debt tax shields are less of an approximation of substitution effects for debt interest deductions and more of an income effect of profitability. Third, the inclusion of a non-debt tax shield indicator by Princen (2012) only yields marginal improvements to the explanatory power of her econometric model. Moreover, the coefficient of interest (ACE) did change insignificantly when controlling for a possible non-debt tax shield.

Results on table 3 seem counter-intuitive. Instead of identifying the expected (albeit small) negative effect of the ACE reform on corporate book leverage in Latvia, my estimations yield a significantly positive effect. This effect remains positive throughout the different specifications, including both firm-specific and macroeconomic control variables. Financial leverage, however, is much closer to the expected sign. It is insignificantly negative before including the control variables. A side note of my results is that, while the coefficient of interest is hardly explicable for the moment, 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's work 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). This 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 hypothesized relationship falls short of the true relationship, or that additional complementary covariates are required (or both).

The above results only change marginally for an unmatched sample of firms, or for a matched sample that also includes only temporarily available firm observations (cf. table 13). De Mooij (2011) and Frühwirth and Kobialka (2011) further emphasize that the choice of leverage definition can be important when determining a possible effect of taxation. As noted on table 6, existing studies on the ACE use a multitude of different leverage definitions. I include some of these on table 14. However, there is no change in the obtained coefficients for the ACE effect. The unexpected sign of the ACE coefficient can further be due to multiple reasons. As indicated in section 4.1, the leverage increase of Latvian firms in 2009 could have been caused by the particular circumstances surrounding the IMF intervention. This suggests that the measured effect in 2009 was heavily confounded by such a crisis effect, despite the macroeconomic control variables. Including a general year fixed effect for 2009 does neither seem adequate, as such an effect is supposed to be uniform across countries. The inclusion of a year fixed effect does indeed not further change the ACE coefficient, and it also becomes insignificant once inflation and growth are controlled for.

Table 3: Impact of Taxation on Firm Leverage

Dependent Variable		Book leverage			Financial leverage		
	Hypothesis	(1)	(2)	(3)	(4)	(5)	(6)
Latvia		0.149***	0.158***	0.119***	0.029**	0.031***	0.006
		(0.016)	(0.015)	(0.015)	(0.013)	(0.012)	(0.012)
Lithuania		0.094***	0.103***	0.105***	0.026	0.025	0.029*
		(0.021)	(0.020)	(0.020)	(0.016)	(0.015)	(0.015)
Time		−0.070***	−0.094***	−0.057***	−0.004	−0.018**	0.006
		(0.006)	(0.006)	(0.007)	(0.008)	(0.008)	(0.009)
ACE	(-)	0.029***	0.028***	0.060***	−0.005	0.004	0.026***
		(0.009)	(0.009)	(0.008)	(0.010)	(0.010)	(0.010)
Tangibility	(+)		0.006	0.002		0.235***	0.231***
			(0.031)	(0.031)		(0.026)	(0.026)
Profitability	(-)		−0.553***	−0.557***		−0.264***	−0.263***
			(0.032)	(0.032)		(0.026)	(0.026)
Firm Size	(+)		−0.031***	−0.030***		−0.009**	−0.008*
			(0.006)	(0.006)		(0.005)	(0.005)
Net Operating Loss	(-)		−0.084***	−0.089***		−0.044***	−0.051***
			(0.013)	(0.013)		(0.010)	(0.011)
GDP per capita growth				−0.001***			−0.002***
				(0.000)			(0.000)
Inflation				0.006***			0.004***
				(0.000)			(0.000)
Constant		0.445***	0.626***	0.573***	0.017	0.114***	0.077***
		(0.016)	(0.021)	(0.022)	(0.013)	(0.016)	(0.017)
Industry dummies		Yes	Yes	Yes	Yes	Yes	Yes
Observations		8,016	8,016	8,016	6,849	6,849	6,849
Adjusted R^2		0.138	0.217	0.222	0.087	0.193	0.200

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. Latvia and Lithuania are country fixed effects. Time is equal to one starting from 2009, and equal to zero before. ACE is equal to one if the firm is located in Latvia starting from 2009 and equal to zero afterwards. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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.

5.5 Effect under Firm Heterogeneity

Empirical evidence indicates that tax reforms seldom have an uniform effect on treated entities. As argued for in section 3, 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) for general empirical results and Santoro (2005) for relevant experience with the Italian ACE). In the Latvian context, small firm entrepreneurs might also face personal credit constraints that induce them to extract retained earnings despite the existence of the notional interest deduction.

In this work, I consider three dimensions of heterogeneity: size, multinational affiliation and the legal status of a firm. There exist various ways to account for heterogeneity among firms. 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, I 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. The respective results on table 4 indicate that a possible debt-reducing effect of the ACE was more pronounced among large firms, albeit the coefficient is still (insignificantly) positive. By considering financial leverage as the dependent variable instead, I find that the differences between large firms and SME's decrease. However I still obtain a positive coefficient for the ACE. A side-feature of the analysis is that the econometric model seems to explain leverage variations more adequately for large firms than for smaller ones, as indicated by the adjusted R^2 of 0.47 versus 0.22.

The second dimension that I consider relates to the possibly multinational nature of a company. There exists considerable evidence that multinational enterprises react to tax incentives which affect the effective average tax rate (cf. Buettner and Ruf (2007)). In a meta-study, de Mooij (2011) moreover finds that the financial structure of these companies is more responsive to tax incentives internally than externally. Huizinga et al. (2008) and de Mooij (2011) argue, however, that the general responsiveness of corporate financial structures becomes less pronounced under low tax rates. With respect to the low level of statutory tax rates in the Baltic countries, the reaction of Latvian MNE's to domestic tax changes might then be dominated by more relevant changes in the overall group tax structure. This multitude of arguments suggests that multinational companies in the Baltic states might react differently to tax reforms than domestic ones. I hence separate the sample into multinational and domestic companies. I use the same definition of a multinational enterprise as utilized by Huizinga et al. (2008): a company with a single non-domestic shareholder possessing more than half of the company's shares is considered to be a subsidiary of a multinational enterprise. The information hereof stems from the variables on global ultimate ownership and firm independence in the AMADEUS database. Table 10 displays the results. As for firm size, splitting up the sample by multinational affiliation yields equally different effects: domestic Latvian firms feature a strong increase in leverage through treatment. The increase for multinational companies is much lower instead.

Third, the legal status of a company has implications for the existing surveillance mechanisms. For instance, public limited companies are required to install a board of directors that oversees the company's activities, whereas private limited companies are not. This separates the ownership from the management structure and might give rise to agency conflicts. The resulting effects on the sources of financing are dealt with extensively in the respective literature (cf. Myers and Majluf (1984) and Köthenbürger and Stimmelmayr (2013) in an ACE context). Public limited companies might also otherwise react differently to the ACE introduction than e.g. private limited companies. One reason could be that the establishment of a public limited company usually requires a higher degree of professionalism than a small, privately owned enterprise. This may also lead to higher incentives to profit from marginal changes in the tax code. Additionally, the decision to retain earnings is less dependent on the personal financial situation of single shareholders because more stakeholders are involved and

Table 4: Effect on Book Leverage of SME's and Large Companies

Dependent Variable	Book leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Latvia	0.151***	0.161***	0.121***	0.115*	0.106*	0.098
	(0.017)	(0.016)	(0.016)	(0.062)	(0.061)	(0.060)
Lithuania	0.107***	0.113***	0.115***	0.028	0.031	0.032
	(0.022)	(0.020)	(0.020)	(0.075)	(0.069)	(0.069)
Time	−0.073***	−0.097***	−0.058***	−0.053**	−0.070***	−0.063**
	(0.007)	(0.007)	(0.007)	(0.022)	(0.025)	(0.028)
ACE	0.033***	0.031***	0.065***	0.009	0.018	0.025
	(0.010)	(0.009)	(0.009)	(0.033)	(0.034)	(0.033)
Tangibility		0.039	0.035		−0.293***	−0.295***
		(0.031)	(0.031)		(0.098)	(0.100)
Profitability		−0.564***	−0.567***		−0.301**	−0.306**
		(0.032)	(0.033)		(0.128)	(0.132)
Firm Size		−0.035***	−0.033***		−0.038**	−0.038**
		(0.006)	(0.006)		(0.018)	(0.018)
Net Operating Loss		−0.090***	−0.095***		−0.037	−0.038
		(0.014)	(0.014)		(0.031)	(0.031)
GDP per capita growth			−0.001***			−0.000
			(0.000)			(0.001)
Inflation			0.006***			0.001
			(0.000)			(0.002)
Constant	0.643***	0.783***	0.729***	0.064	0.339***	0.331***
	(0.005)	(0.031)	(0.031)	(0.075)	(0.095)	(0.098)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,422	7,422	7,422	594	594	594
Adjusted R^2	0.135	0.219	0.224	0.394	0.474	0.472

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. Latvia and Lithuania are country-fixed effects. Time is equal to one starting from 2009, and equal to zero before. ACE is equal to one if the firm is located in Latvia starting from 2009 and equal to zero afterwards. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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.

supervisory controls in place. I thus estimate the baseline regression separately for private and public limited companies. Again, results on table 11 show that there are significant differences in the ACE effect between these two legal types. The ACE effect on leverage of public limited firms seems to be even slightly negative before controlling for macroeconomic factors.

5.6 Temporal Structure of Effect

So far, I modelled the treatment effect through the ACE as a constant shift in leverage levels between 2009 and 2014. In line with DID methodology, this assumes that right after the start of the reform, its effect should have been immediately measurable. Yet in section 4.2, I derived that the effect depended on certain conditions, none of which was likely to be fulfilled in 2009. First, I showed that an eventual elimination of the debt bias would occur gradually over time. Second, this feature would still be subject to the profitability of a company, and the correct expectations hereof by investors. Panel B of figure 1 displays the average movement of "other shareholder funds" of firms, containing retained earnings. With respect to the Latvian trend, the year of the ACE implementation coincides with an all-time low

in this firm sub-aggregate. The macroeconomic circumstances at its inception then suggest that the effect of the ACE should have been even more delayed than under normal circumstances. That is, firms first needed to accumulate positive profits which could then be retained and deducted from taxable corporate income. As argued above, the standard DID analysis conducted in sections 5.4 and 5.5 is not adequate to control for such a pattern. In order to capture the expected shape of the policy effect, I instead employ a generalised version of DID analysis. Following Vandenberghe (2017), its functional specification is equal to

$$Y_{it} = \gamma_0 + \gamma_1 \text{LT}_i + \gamma_2 \text{LV}_i + \sum_{k}^{K} \theta_k \text{Year}_t[k] + \sum_{k}^{K} \lambda_k \text{LV}_i \text{ x } \text{Year}_t[k] + \sum_{j}^{J} \phi_j X_{jit} + \sum_{l}^{L} \mu_l \text{Ind}_{li} + u_{it}, \quad (11)$$

where k and K denote the beginning and end of treatment, respectively. Here, the formerly unitary term 'Time' is split up into a series of single-year fixed effects. Likewise, the former interaction term between the 'Time' and the LV variable, which captured the treatment effect of the ACE, is now replaced by a series of interaction terms between these year fixed effects and the country fixed effect for Latvia. The other variables of this regression stay unchanged with respect to equation (10). Table 5 shows the respective results for two different ranges of k and financial leverage as the dependent variable. The three columns on the right side display the coefficients for the specification $2009 \leq k \leq 2014$. Hence, λ_{2014} captures the effect of the ACE five years after its introduction, indicated by the term Latvia x Year[2014] for the different sets of control variables. For the year 2009, the treatment effect is strongly positive. As argued before, this is not surprising given the events at the time of policy implementation. However, there is a monotonic decrease over the following years. The first negative treatment effect occurs in 2011, and this effect turns significantly negative in 2013 and 2014. The long-run effect of the Latvian ACE might have thus led to a reduction in financial leverage of up to 4%. For robustness purposes, I regress the above equation on alternatively restricted samples like on table 13. I find a slightly smaller effect (about 2%). Regressions with book leverage as a dependent variable (table 12) are not yielding a significantly negative result. However the long-run trend is similar.

The three columns on the left side include additionally the year 2008 among the year effects and interaction terms, i.e. $2008 \leq k \leq 2014$. This way, I can control for the assumption whether the last pre-treatment period indicates a deviation from a common trend before the start of treatment, as discussed in section 5.4. As can be seen on table 5, the coefficients of Latvia x Year[2008] are insignificant for the complete set of control variables, indicating that a common trend exists right before treatment. The same holds true for book leverage as an alternative dependent variable. The treatment effect in each year, however, cannot be inferred directly from the respective coefficient λ_k any more. This is because it now also includes the effect of the last pre-treatment period. Instead, the effect of ACE in e.g. 2014 must be calculated as the difference $\lambda_{2014} - \lambda_{2008}$. The row 'treatment effect in 2014' displays the respective values for the year 2014, and the row below the corresponding p-values. Again, the above finding that there exists a long-run negative effect of the Latvian ACE on corporate leverage is confirmed. Once again, this effect is more significant for financial leverage than for book leverage.

Table 5: Temporal Structure of Effect on Financial Leverage

Dependent Variable	Financial leverage					
	Controlling for common trend			Increasing effect of ACE after 2009		
	(1)	(2)	(3)	(4)	(5)	(6)
Latvia	0.026*	0.028**	0.021	0.029**	0.031***	0.048***
	(0.014)	(0.012)	(0.024)	(0.014)	(0.012)	(0.013)
Lithuania	0.026	0.024	0.004	0.026	0.024	0.018
	(0.016)	(0.015)	(0.017)	(0.016)	(0.015)	(0.016)
Year[2008]	0.003	−0.009	0.074***			
	(0.006)	(0.006)	(0.026)			
Year[2009]	0.021**	−0.010	0.156***	0.019**	−0.005	0.009
	(0.009)	(0.009)	(0.056)	(0.008)	(0.008)	(0.009)
Year[2013]	−0.017*	−0.029***	0.013	−0.019*	−0.025***	−0.042***
	(0.010)	(0.010)	(0.025)	(0.010)	(0.009)	(0.011)
Year[2014]	−0.017	−0.030***	0.006	−0.018*	−0.026***	−0.049***
	(0.011)	(0.010)	(0.027)	(0.010)	(0.010)	(0.013)
Latvia x Year[2008]	0.006	0.007	0.014			
	(0.008)	(0.007)	(0.016)			
Latvia x Year[2009]	0.038***	0.048***	0.044***	0.035***	0.045***	0.047***
	(0.013)	(0.012)	(0.013)	(0.011)	(0.011)	(0.011)
Latvia x Year[2010]	0.007	0.020*	0.052*	0.004	0.017	0.005
	(0.013)	(0.012)	(0.028)	(0.012)	(0.011)	(0.013)
Latvia x Year[2011]	−0.008	0.005	0.004	−0.011	0.001	−0.014
	(0.014)	(0.013)	(0.024)	(0.013)	(0.012)	(0.014)
Latvia x Year[2012]	−0.008	−0.001	−0.005	−0.011	−0.004	−0.023
	(0.013)	(0.013)	(0.025)	(0.013)	(0.012)	(0.015)
Latvia x Year[2013]	−0.015	−0.010	−0.020	−0.018	−0.013	−0.039**
	(0.013)	(0.012)	(0.029)	(0.012)	(0.011)	(0.017)
Latvia x Year[2014]	−0.027**	−0.019	−0.016	−0.030**	−0.022*	−0.040***
	(0.013)	(0.013)	(0.025)	(0.012)	(0.012)	(0.015)
Tangibility		0.230***	0.229***		0.230***	0.229***
		(0.026)	(0.026)		(0.026)	(0.026)
Profitability		−0.261***	−0.261***		−0.260***	−0.262***
		(0.026)	(0.026)		(0.026)	(0.026)
Firm Size		−0.007	−0.007		−0.007	−0.007
		(0.005)	(0.005)		(0.005)	(0.005)
Net Operating Loss		−0.052***	−0.052***		−0.052***	−0.052***
		(0.011)	(0.011)		(0.011)	(0.011)
GDP per capita growth			0.007***			0.002***
			(0.002)			(0.001)
Inflation			−0.001			−0.003**
			(0.002)			(0.001)
Constant	0.016	0.115***	0.062*	0.017	0.110***	0.133***
	(0.013)	(0.017)	(0.034)	(0.013)	(0.016)	(0.020)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,849	6,849	6,849	6,849	6,849	6,849
Treatment Effect in 2014	−0.033	−0.026	−0.030			
P-Value of Treatment Effect	0.009	0.034	0.042			
Adjusted R^2	0.103	0.203	0.204	0.103	0.203	0.203

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. Financial leverage is defined as the ratio of financial debt over the book value of total assets. Latvia and Lithuania are country-fixed effects. Years are year-fixed effects. The display of the years 2010-2012 is omitted due to reasons of space. 'Latvia x year' denotes year-specific treatment effects of the ACE. For the left three columns, the treatment effect after the abolishment of the ACE is given by the term (Latvia x Year[2014]) - (Latvia x Year[2008]), since the treatment started in 2009. The corresponding coefficient and significance test are provided at the bottom of the table under "treatment effect"and its corresponding p-value. For the three right columns, Latvia x Year[2014] indicates the end-of-treatment effect. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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.

6 Discussion and Research Perspectives

My empirical analysis yields a multitude of leverage effects following the ACE reform. Counter to intuition, for a simple set of regressions I find that leverage increased strongly, although the exact extent depends on heterogeneous firm characteristics. This result seems to be due to the simultaneous occurrence of the financial crisis at the start of the ACE reform. Consistent with theoretical reasoning, I then look for a change in treatment effects over time. Employing a generalized DID version to this end, I indeed find a homogeneous leverage-decreasing effect over time, for both short-term and long-term leverage ratios. Yet my results are subject to critique from various angles. Below, I mention different aspects that deserve further consideration. I also compare the insights of my work with other existing ACE schemes, and discuss how it could be improved methodologically.

There exist several major concerns to the analysis. Foremost, the idea of evaluating a policy via DID rests on the notion of considering it as an exogenous natural experiment. In the Latvian context, this exogeneity can hardly be assumed as given, as the 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 then be viewed a response to pre-existing differences in leverage between Latvian and control firms. This would call into question whether the inferred effect stems from an identified causal relationship.
Once the treatment cannot be considered as a random and exogenous event any more, the concern of treatment anticipation may occur. In the concrete context, there arises an admittedly theoretical possibility that Latvian firms run above-optimum leverage levels before 2009 because they expected their succeeding deleveraging to be accommodated by the ACE. Yet a possible anticipation of the ACE by Latvian firms does not pose a serious concern, as the policy was seemingly not discussed before the end of 2008. Moreover, even if firms expected the ACE reform, only retained earnings accumulated after 2008 were admissible for interest deduction. This would have limited an anticipative reaction by firms to the unlikely scenario above.
As stated in section 5.4, two assumptions are further crucial for the validity of standard DID analysis: the existence of a common trend in the absence of treatment and the uniqueness of treatment. Assessing a common trend before treatment between Latvian firms and control group firms firms is difficult due to data limitations. Still, the (visual) divergence in book leverage levels in 2009 suggests that there is no common path in the absence of treatment.
Alternative ways to deal with the absence of a common trend exist. Vandenberghe (2017) describes a method which accounts for 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. This implies an assumption however concerning the shape of these deviations. Imagine that the Latvian ACE started in 2010. One can then regard the 2009 increase in firm book leverage as a pre-treatment deviation from the common trend. This would lead to a linear extrapolation of the leverage development in the absence of treatment that is significantly higher than the actual leverage development — with the consequence of measuring a strongly negative ACE effect on leverage. This effect would be significantly biased downwards because the 2009 leverage increase is hardly sustainable — a similar leverage change as between 2008 and 2009 should not continue to occur in every period. One might instead account for higher-order differences in trends (e.g. a concave development in leverage levels), by taking into account more pre-treatment periods. Yet this procedure could be rightly criticised as a possibly arbitrary way in identifying treatment effects.

With respect to the assumption of uniqueness of treatment, there are several concerns to mention. One question relates to whether the ACE was the only policy measure also affecting leverage levels. This needs to hold true for both the treatment and the control group. As can be seen on figure 3, there seems to be no treatment spillover from Latvia to Lithuania and Estonia. No similar version to the Latvian ACE was adopted by these countries. Yet in Latvia, multiple policy changes occurred simultaneously. An extension of loss carry-forward was enacted in the same year as the ACE. Moreover, this measure had a much larger budgetary impact than the ACE. As such it possibly contributed to the firm deleveraging process — if firms used the increase in non-debt tax shields to pursue a debt-reducing strategy. Yet such a behaviour could only happen if the appreciation of debt finance changed after 2009. This change in preferences for finance modes might be due to the ACE. Alternatively, apart from tax incentives the firms themselves might perceive their 2009 leverage levels to be above the optimum — or lenders simply be unwilling to lend at former (lower) interest rates. The latter would reduce firm leverage levels by a decrease in credit supply.
The identification of a long-term ACE effect in section 5.6 depends on which one of the two channels is more relevant. Theory suggests that there should indeed be a stronger effect of the ACE over time. The change in market circumstances for Latvia should have been strongest in 2009 instead. And as shown on table 5, the treatment effects possibly capturing this movement indeed decrease monotonously to a level considerably below the 2008 mean leverage. In general, possible confounding effects question the validity of the identification of a stronger treatment effect over time. However, in the Latvian case there seem to be both theoretical and empirical arguments that this is not the case.

In comparison with other ACE schemes, a positive aspect of the Latvian ACE is that it gave 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 its incremental nature, the Latvian scheme also was a fiscally favourable measure. It only comprised a minor share of total tax incentives granted (roughly 3% in 2012 according to the Latvian Financial Ministry in 2014). On the negative side, investors in Latvian companies were not granted return security for retained earnings, as the notional interest was not determined in advance. Moreover, the determination of the interest rate essentially exempted economic rent of relatively less risky (larger) firms from taxation, while it possibly did not eliminate the debt bias for riskier (smaller) enterprises.

Improvement to the study design could be conducted in different ways. For instance, alternative measures of the ACE effect could be used. Staderini (2001), Laureano and Portal (2016) and Kestens et al. (2012) employ the effective tax advantage of debt or effective marginal tax rates, possibly differentiated among different firm types (e.g. single-owners versus firm groups). One might also use developments in the notional interest rate, albeit in the Latvian case the non-anticipation of this rate by investors weakens its theoretical connection to changes in leverage. With respect to the measurement of ACE effects, firm leverage might constitute an aggregate that is too sluggish to adequately capture changes in financing incentives. One might alternatively also regard 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. In any case, unambiguous identification of the long-term effect of an Latvian-type ACE scheme would require future policy experiments to be maintained for a longer time horizon under more stable circumstances.

7 Conclusion

In this work, I analysed the effect of the Latvian ACE reform on corporate leverage from 2009 until 2014. After reviewing the relevant literature and summarizing the practical experience with other ACE schemes, I explained the circumstances behind the ACE introduction in Latvia and derived its theoretical effect on leverage. In the succeeding sections, I turned to the empirical analysis. It centred on a DID analysis after propensity score matching of Latvian firms to their Estonian and Lithuanian counterparts. In a baseline specification firm leverage levels were regressed on a set of variables to identify the treatment effect of the ACE. In later sections I looked for differential effects for various types of firms, and for a (theoretically existing) increase in the ACE treatment effect over time. I also controlled for firm-specific and macroeconomic factors that possibly influence firm leverage.

My general results suggest that leverage levels of Latvian firms increased significantly following the ACE reform. This positive effect was much smaller for larger, multinational and public limited companies, however. The measured effect also depended on the chosen leverage measure. The (positive) effect on long-term financial leverage, which is governed foremost by strategic considerations, was much less significant than the effect on a larger aggregate, book leverage. Yet the overall sign of the reform runs counter to the expected theoretical effect. The particular circumstances at the reform implementation suggest that this result was due to the confounding effect of the simultaneously occurring financial crisis. Despite the controlling for macroeconomic factors, this could have significantly biased my results upwards. Yet theory also predicts that any leverage-reducing effect of the Latvian ACE should only occur gradually over time. Hence, by splitting up the treatment identification structure into year-specific components, I find that there indeed is an increasingly negative treatment effect over time. While I do not find a significantly negative effect on book leverage, financial leverage decreased by 2% to 4% four years after the reform.

Overall conclusions from the Latvian ACE can then be summarised as follows: from a theoretical perspective, the Latvian should not have had a large immediate effect on leverage reduction. This is due to various factors: for instance, the Latvian ACE targeted retained earnings. An equally strong effect ACE effect as for example in Belgium would then presuppose a sufficiently long period of positive profits and correct anticipations hereof — which could only have occurred with delay after its inception in 2009. Moreover, a pre-reform debt bias existed, yet it was comparably small due to already low statutory corporate tax rates. Also, a large portion of the initially higher leverage levels of the Latvian companies could be less attributable to an underlying debt bias. They were rather typical signs of an overheated economy being dependent on foreign capital imports. Yet a comparison with other ACE experiences also suggest that the Latvian ACE was adequately designed for its purpose: unlike e.g. the Brazilian ACE, it provided incentives to keep equity within the company — which accommodated the deleveraging of Latvian firms at the time. Unlike full ACE schemes, it also came at low fiscal cost. Naturally, a longer maintenance of the ACE could have increased its effect on leverage levels. Also, an anticipated determination of applicable interest rates might have increased investor certainty and aided the deleveraging process. Despite these and other objections, I conclude that the Latvian ACE did have a small long-term negative impact on the leverage levels of Latvian companies.

References

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.

Blundell, Richard, and Monica Costa Dias. 2009. "Alternative Approaches to Evaluation in Empirical Microeconomics." *Journal of Human Resources* 44 (3).

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, S. R. 2000. "Levelling up or levelling down? Some reflections on the ACE and CBIT proposals, and the future of the corporate tax base." In *Taxing Capital Income in the European Union - Issues and Options for Reform,* edited by Sijbren Cnossen. Oxford University Press, Oxford.

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.

Buettner, Thiess, and Martin Ruf. 2007. "Tax incentives and the location of FDI: Evidence from a panel of German multinationals." *International Tax and Public Finance* 14 (2): 151–164.

de Mooij, Ruud A. 2011. *The Tax Elasticity of Corporate Debt; A Synthesis of Size and Variations.* IMF Working Papers 11/95. International Monetary Fund, April.

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

de Mooij, Ruud A., and Michael P. Devereux. 2011. "An applied analysis of ACE and CBIT reforms in the EU." *International Tax and Public Finance* 18 (1): 93–120. ISSN: 1573-6970.

Devereux, Michael. 2012. "Issues in the Design of Taxes on Corporate Profit." *National Tax Journal* 65 (3): 709–30.

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 Harold Freeman. 1991. "A general neutral profits tax." *Fiscal Studies* 12 (3): 1–15.

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.

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

Ernst and Young. 2015. *Taxation paper No 55: Experiences with cash-flow taxation and prospects. Final report.* Technical report. European Commission.

European Commission. 2008. *Monitoring revenue trends and tax reforms in Member States.* Technical report. Joint EC-EPC 2008 Report, April.

———. 2012. *Tax Reform Trends in EU Member States 2012.* Taxation Paper 34. Directorate General Taxation and Customs Union.

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.

———. 2003. "Taxes and Corporate Finance: A Review." *The Review of Financial Studies* 16 (4): 1075–1129.

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.

Huizinga, Harry, Luc Laeven, and Gaëtan Nicodème. 2008. "Capital structure and international debt shifting." *Journal of Financial Economics* 88 (1): 80–118.

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

Isaac, John. 1997. "A comment on the viability of the allowance for corporate equity." *Fiscal Studies* 18 (3): 303–318.

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.

Kleinbard, Edward. 2015. *Why Corporate Tax Reform can Happen.* USC Law Legal Studies Paper No. 15-5 146 Tax Notes 91. USC Gold School of Law, September.

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.

Köthenbürger, Marko, and Michael Stimmelmayr. 2013. *Corporate Deductibility Provisions and Managerial Incentives.* CESifo Working Paper 4549. Munich: CESifo, December.

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.

Meade, J. E., and IFS. 1978. *The Structure and reform of direct taxation : report / of a committee chaired by professor J. E. Meade* [in English]. viii, 533 p. Allen / Unwin London ; Boston. ISBN: 0043360645.

Mirrlees, James, Stuart Adam, Tim Besley, Richard Blundell, Stephen Bond, Robert Chote, Malcolm Gammie, Paul Johnson, Gareth Myles, and James M. Poterba. 2011. *Tax by design.* September.

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.

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.

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.

Titman, Sheridan, and Roberto Wessels. 1988. "The Determinants of Capital Structure Choice." *The Journal of Finance* 43 (1): 1–19. 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.

ZEW. 2012. *Effective Tax Levels Using the Devereux-Griffith Methodology: 2011 report.* Taxation Studies 0042. 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

$$q = \beta(r + p_d(\beta) - \tau(r + p_d(\beta) + i))) + (1 - \beta)(r + p_e(\beta)) \ . \tag{12}$$

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

$$p(\beta) = (1 - \beta)p_e(\beta) + \beta(1 - \tau)p_d(\beta) \ , \tag{13}$$

which yields a simplified version of the cost of capital as

$$q = r + p(\beta) - \beta\tau(r + i) \ . \tag{14}$$

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

$$p(\beta) \approx p(\beta^*) + \frac{dp(\beta^*)}{d\beta^*}(\beta - \beta^*) + \frac{1}{2}\frac{d^2p(\beta^*)}{d^2\beta^*}(\beta - \beta^*)^2 \ . \tag{15}$$

Now firms aim to minimize their financial costs through their relative shares of equity and debt. Hence the respective first order condition of equation (12) can be given as

$$\frac{dq}{d\beta} = p'(\beta) = \tau(r + i) \ . \tag{16}$$

Similarly, deriving first-order conditions of the polynomial approximation in equation (15) with respect to β yields:

$$\frac{dP(\beta)}{d\beta} = -\tau a + b(\beta - \beta^*) \ , \tag{17}$$

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

$$\beta = \beta^* + \frac{\tau(r + i + a)}{b} \ . \tag{18}$$

With respect to the tax debt shield of the Latvian ACE, I make only one change to the initial equations: I expand the cost of capital in equation (14) by subtracting the term $(1 - \beta)\tau(r + i + \bar{x})$. This leaves me with a changed first-order condition in the form of $\frac{dq}{d\beta} = -\tau\bar{x}$, such that

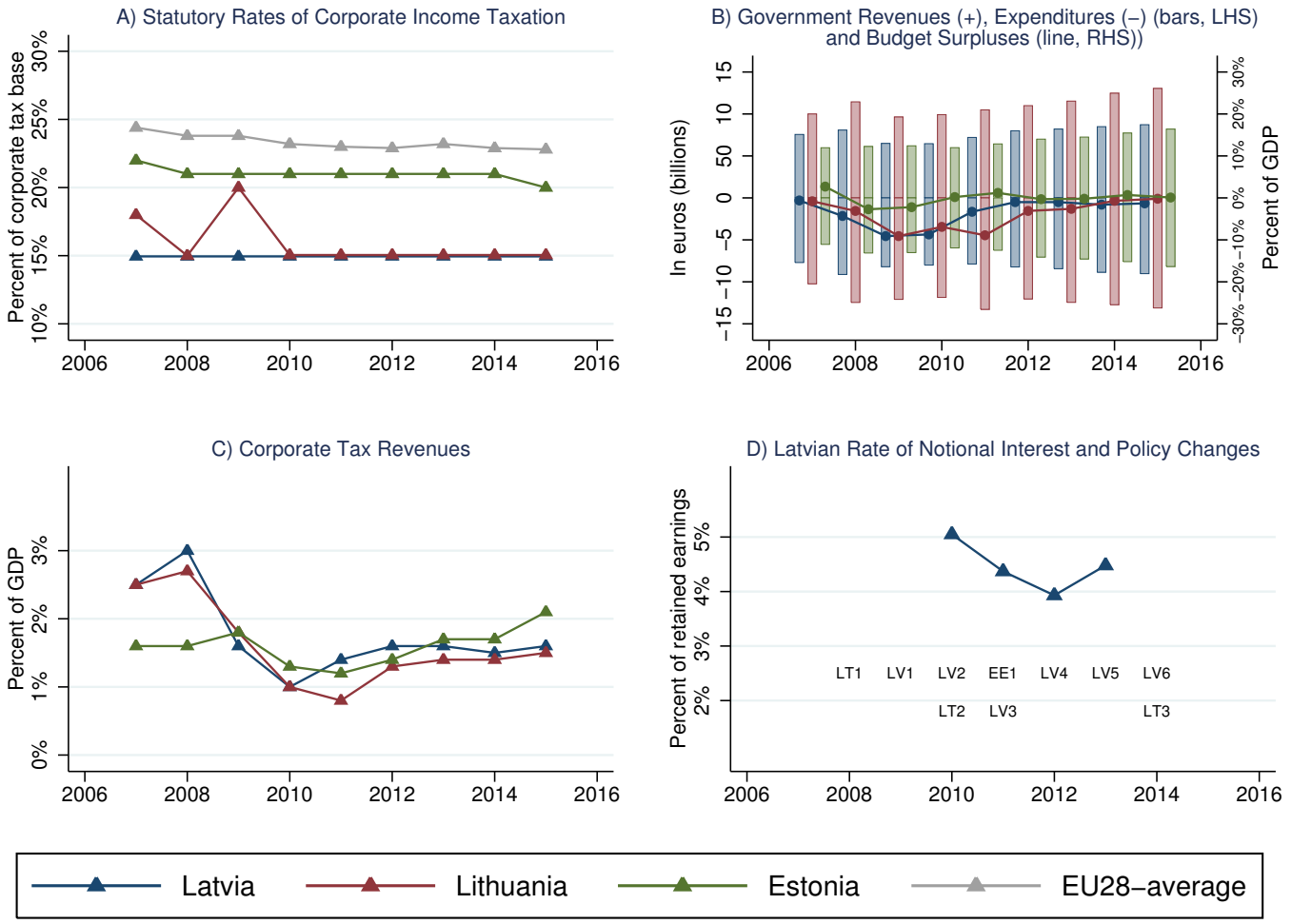
$$\beta = \beta^* + \frac{\tau(p_d(\beta) + \beta p'_d(\beta) - \bar{x})}{p''(\beta)} = \beta^* + \frac{\tau(a - \bar{x})}{b} \ . \tag{19}$$

Table 6: **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	—	—	—

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 3: 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 Statistical Appendix

Table 7: Probit for the Probability of Treatment

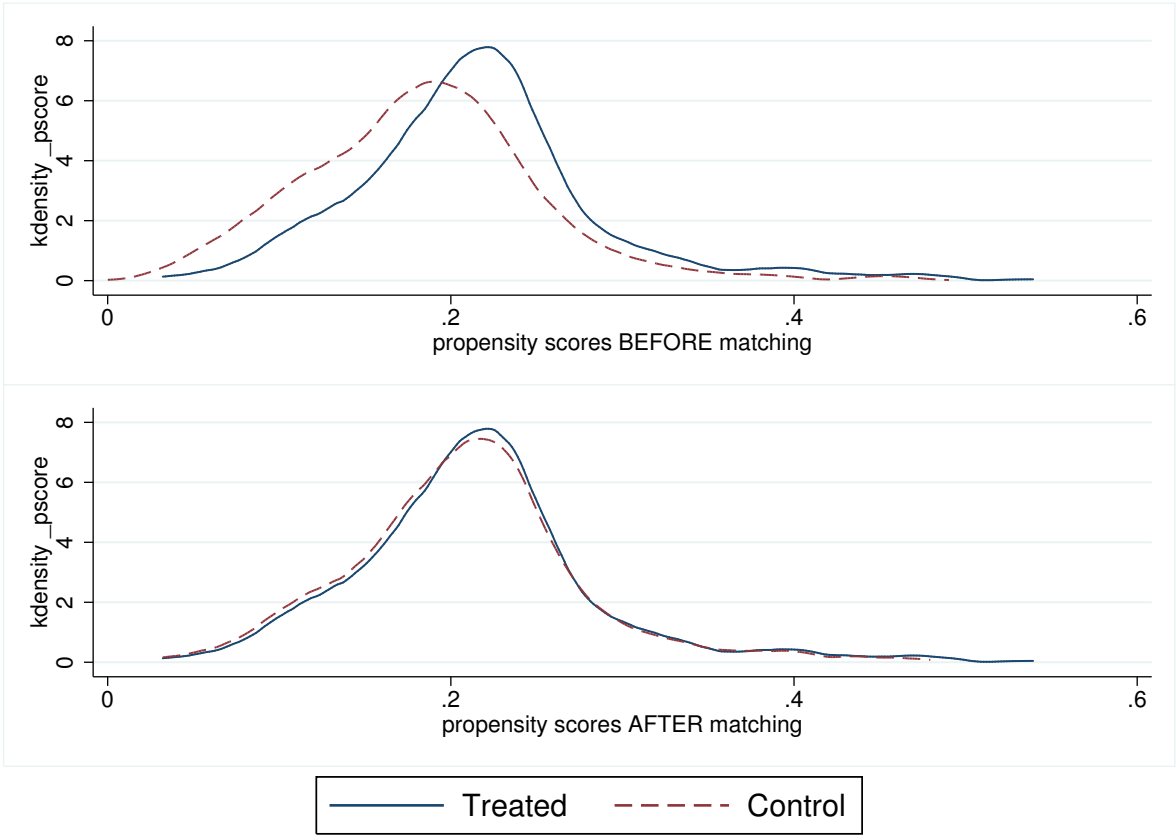
Variable	Coefficient	(Std. Err.)
Tangibility	0.046	(0.135)
Profitability	0.272	(0.198)
Firm Size	0.122***	(0.024)
Publicly Listed	−0.003	(0.530)
Net Operating Loss	−0.245**	(0.109)
Industry dummies	Yes	
Observations	2.928	
Log-Likelihood	−1373.382	
Pseudo R^2	0.033	

Note: The figure displays the estimation results of a probit regression for pre-treatment data in 2008. Data source is the AMADEUS firm database. The dependent variable takes the value one if the firm's country is Latvia, 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 other variables are specified as explained on table 1. The different levels of significance are characterized according to the p-values: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 8: Relationship Between Explanatory Variables

Dependent Variable	Correlations								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Tangibility (1)	1.00								
Profitability (2)	−0.15***	1.00							
Firm Size (3)	0.16***	−0.09***	1.00						
Net Operating Loss (4)	0.06***	−0.47***	−0.05***	1.00					
GDP per capita growth (5)	−0.04***	0.15***	0.05***	−0.18***	1.00				
Inflation (6)	0.05***	0.17***	−0.05***	−0.06***	0.24***	1.00			
Multinational Enterprise (7)	−0.18***	0.02**	0.15***	0.02**	−0.03***	0.01	1.00		
Large firm (8)	0.07***	−0.01	0.48***	−0.02*	0.03***	0.01	0.09***	1.00	
Public limited company (9)	0.08***	−0.07***	0.21***	0.04***	−0.06***	−0.04***	0.11***	0.10***	1.00

Figure 4: Density Distributions of Propensity Scores Before and After Matching



Note: The figure shows the differing distributions of the propensity scores between treatment group (Latvian firms) and control group (Estonian and Lithuanian firms) before and after matching.

Table 9: Effect on Financial Leverage of SME's and Large Firms

Dependent Variable	Financial leverage					
	Small & Medium enterprises			Large enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Latvia	0.027*	0.032**	0.004	0.085**	0.084*	0.081*
	(0.014)	(0.012)	(0.012)	(0.042)	(0.050)	(0.048)
Lithuania	0.028	0.024	0.028*	0.117**	0.114**	0.119**
	(0.017)	(0.016)	(0.016)	(0.051)	(0.052)	(0.052)
Time	−0.004	−0.020**	0.007	0.002	−0.001	−0.006
	(0.009)	(0.008)	(0.009)	(0.023)	(0.024)	(0.028)
ACE	−0.006	0.005	0.028***	0.000	0.002	0.007
	(0.011)	(0.010)	(0.010)	(0.032)	(0.032)	(0.034)
Tangibility		0.257***	0.252***		−0.034	−0.039
		(0.027)	(0.027)		(0.063)	(0.064)
Profitability		−0.265***	−0.263***		−0.136*	−0.149**
		(0.027)	(0.027)		(0.071)	(0.073)
Firm Size		−0.003	−0.002		−0.000	0.000
		(0.005)	(0.005)		(0.013)	(0.013)
Net Operating Loss		−0.045***	−0.053***		−0.021	−0.026
		(0.011)	(0.011)		(0.021)	(0.020)
GDP per capita growth			−0.002***			−0.001
			(0.000)			(0.001)
Inflation			0.005***			0.000
			(0.000)			(0.002)
Constant	0.003	−0.134***	−0.171***	−0.000	−0.062	−0.055
	(0.005)	(0.025)	(0.025)	(0.000)	(0.062)	(0.066)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,306	6,306	6,306	543	543	543
Adjusted R^2	0.081	0.199	0.207	0.298	0.300	0.301

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. Financial leverage is defined as the ratio of financial debt over the book value of total assets. The sample is separated into small & medium and large firms according to the EU definition. Latvia and Lithuania are country-fixed effects. Time is equal to one starting from 2009, and equal to zero before. ACE is equal to one if the firm is located in Latvia starting from 2009 and equal to zero afterwards. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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: Effect on Book Leverage of Domestic Firms and MNE's

Dependent Variable	Book leverage					
	Domestic Firm			Multinational Enterprise		
	(1)	(2)	(3)	(4)	(5)	(6)
Latvia	0.122***	0.134***	0.089***	0.145***	0.148***	0.120***
	(0.025)	(0.024)	(0.024)	(0.036)	(0.033)	(0.032)
Lithuania	0.050*	0.059**	0.062**	0.114**	0.121**	0.121**
	(0.028)	(0.027)	(0.027)	(0.056)	(0.053)	(0.053)
Time	−0.067***	−0.094***	−0.055***	−0.069***	−0.092***	−0.063***
	(0.008)	(0.008)	(0.009)	(0.015)	(0.015)	(0.015)
ACE	0.038***	0.035***	0.073***	0.005	0.007	0.029*
	(0.011)	(0.011)	(0.011)	(0.020)	(0.018)	(0.018)
Tangibility		−0.024	−0.030		0.033	0.031
		(0.040)	(0.041)		(0.062)	(0.062)
Profitability		−0.574***	−0.579***		−0.527***	−0.528***
		(0.041)	(0.041)		(0.060)	(0.061)
Firm Size		−0.030***	−0.029***		−0.016	−0.015
		(0.008)	(0.008)		(0.011)	(0.011)
Net Operating Loss		−0.080***	−0.087***		−0.090***	−0.094***
		(0.017)	(0.017)		(0.025)	(0.026)
GDP per capita growth			−0.001***			−0.000
			(0.000)			(0.000)
Inflation			0.007***			0.004***
			(0.001)			(0.001)
Constant	0.341***	0.735***	0.681***	0.432***	0.791***	0.751***
	(0.025)	(0.034)	(0.034)	(0.011)	(0.035)	(0.036)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,976	4,976	4,976	1,896	1,896	1,896
Adjusted R^2	0.131	0.218	0.224	0.274	0.337	0.339

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. Financial leverage is defined as the ratio of financial debt over the book value of total assets. The sample is separated into domestic and multinational firms. Multinational firms have a single non-domestic ultimate owner who possesses at least 50% of the firm's shares. Latvia and Lithuania are country-fixed effects. Time is equal to one starting from 2009, and equal to zero before. ACE is equal to one if the firm is located in Latvia starting from 2009 and equal to zero afterwards. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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: Effect on Book Leverage of Private and Public Limited Companies

Dependent Variable	Book leverage					
	Other			Public Limited Company		
	(1)	(2)	(3)	(4)	(5)	(6)
Latvia	0.144***	0.159***	0.118***	0.042	0.048	0.019
	(0.022)	(0.020)	(0.020)	(0.044)	(0.044)	(0.043)
Lithuania	0.088***	0.099***	0.102***	0.066	0.103*	0.103*
	(0.025)	(0.024)	(0.024)	(0.063)	(0.056)	(0.056)
Time	−0.074***	−0.104***	−0.067***	−0.058***	−0.064***	−0.036**
	(0.007)	(0.007)	(0.008)	(0.012)	(0.013)	(0.015)
ACE	0.036***	0.036***	0.070***	−0.017	−0.016	0.008
	(0.010)	(0.009)	(0.009)	(0.026)	(0.027)	(0.024)
Tangibility		−0.013	−0.019		0.091	0.093
		(0.033)	(0.033)		(0.074)	(0.074)
Profitability		−0.610***	−0.613***		−0.219**	−0.233**
		(0.032)	(0.033)		(0.107)	(0.109)
Firm Size		−0.027***	−0.026***		−0.024*	−0.024*
		(0.007)	(0.007)		(0.014)	(0.014)
Net Operating Loss		−0.097***	−0.104***		0.006	0.007
		(0.015)	(0.015)		(0.027)	(0.027)
GDP per capita growth			−0.001***			0.001
			(0.000)			(0.001)
Inflation			0.006***			0.004***
			(0.000)			(0.001)
Constant	0.489***	0.579***	0.529***	0.711***	0.203***	0.163***
	(0.021)	(0.023)	(0.023)	(0.044)	(0.048)	(0.050)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,720	6,720	6,720	1,296	1,296	1,296
Adjusted R^2	0.113	0.210	0.216	0.179	0.205	0.206

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. Financial leverage is defined as the ratio of financial debt over the book value of total assets. The sample is separated into private and public limited companies, according to their legal status. Latvia and Lithuania are country-fixed effects. Time is equal to one starting from 2009, and equal to zero before. ACE is equal to one if the firm is located in Latvia starting from 2009 and equal to zero afterwards. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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: Temporal Structure of Effect on Book Leverage

Dependent Variable	Book leverage					
	Controlling for common trend			Increasing effect of ACE after 2009		
	(1)	(2)	(3)	(4)	(5)	(6)
Latvia	0.141***	0.152***	0.166***	0.149***	0.158***	0.168***
	(0.017)	(0.015)	(0.025)	(0.016)	(0.015)	(0.016)
Lithuania	0.094***	0.102***	0.096***	0.094***	0.102***	0.092***
	(0.021)	(0.020)	(0.021)	(0.021)	(0.020)	(0.020)
Year[2008]	−0.030***	−0.048***	−0.024			
	(0.005)	(0.005)	(0.018)			
Year[2009]	−0.069***	−0.115***	−0.073*	−0.054***	−0.091***	−0.031***
	(0.007)	(0.008)	(0.043)	(0.005)	(0.007)	(0.007)
Year[2013]	−0.097***	−0.124***	−0.120***	−0.082***	−0.100***	−0.107***
	(0.009)	(0.010)	(0.022)	(0.009)	(0.009)	(0.011)
Year[2014]	−0.100***	−0.129***	−0.130***	−0.086***	−0.105***	−0.118***
	(0.009)	(0.010)	(0.023)	(0.009)	(0.009)	(0.012)
Latvia x Year[2008]	0.016**	0.011	0.004			
	(0.008)	(0.007)	(0.017)			
Latvia x Year[2009]	0.087***	0.086***	0.081***	0.079***	0.081***	0.076***
	(0.011)	(0.011)	(0.012)	(0.009)	(0.009)	(0.009)
Latvia x Year[2010]	0.059***	0.057***	0.051*	0.051***	0.052***	0.055***
	(0.011)	(0.011)	(0.028)	(0.009)	(0.009)	(0.012)
Latvia x Year[2011]	0.036***	0.031***	0.017	0.028***	0.026***	0.013
	(0.012)	(0.011)	(0.023)	(0.010)	(0.010)	(0.012)
Latvia x Year[2012]	0.023*	0.015	−0.001	0.015	0.010	−0.005
	(0.012)	(0.012)	(0.024)	(0.011)	(0.011)	(0.013)
Latvia x Year[2013]	0.012	0.007	−0.014	0.005	0.002	−0.020
	(0.013)	(0.012)	(0.028)	(0.012)	(0.012)	(0.015)
Latvia x Year[2014]	0.006	0.004	−0.010	−0.002	−0.001	−0.013
	(0.013)	(0.012)	(0.025)	(0.012)	(0.012)	(0.014)
Tangibility		−0.000	−0.000		0.000	−0.000
		(0.031)	(0.031)		(0.031)	(0.031)
Profitability		−0.557***	−0.557***		−0.549***	−0.557***
		(0.032)	(0.032)		(0.032)	(0.032)
Firm Size		−0.029***	−0.029***		−0.029***	−0.029***
		(0.006)	(0.006)		(0.006)	(0.006)
Net Operating Loss		−0.090***	−0.090***		−0.089***	−0.090***
		(0.013)	(0.013)		(0.014)	(0.013)
GDP per capita growth			0.002			0.004***
			(0.002)			(0.001)
Inflation			−0.002			−0.002*
			(0.002)			(0.001)
Constant	0.460***	0.650***	0.647***	0.445***	0.623***	0.631***
	(0.016)	(0.022)	(0.034)	(0.016)	(0.021)	(0.023)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,016	8,016	8,016	8,016	8,016	8,016
Treatment Effect in 2014	−0.010	−0.006	−0.014			
P-Value of Treatment Effect	0.443	0.606	0.310			
Adjusted R^2	0.148	0.225	0.225	0.148	0.224	0.225

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 total debt over the book value of total assets. Latvia and Lithuania are country-fixed effects. Years are year-fixed effects. The display of the years 2010-2012 is omitted due to reasons of space. 'Latvia x year' denotes year-specific treatment effects of the ACE. For the left three columns, the treatment effect after the abolishment of the ACE is given by the term (Latvia x Year[2014]) - (Latvia x Year[2008]), since the treatment started in 2009. The corresponding coefficient and significance test are provided at the bottom of the table under "treatment effect"and its corresponding p-value. For the three right columns, $LatviaxYear[2014]$ indicates the end-of-treatment effect. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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: Robustness of the ACE Effect for Book Leverage

Dependent Variable	Book leverage					
	Pooled sample			Including non-permanent firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Latvia	0.128***	0.146***	0.114***	0.129***	0.141***	0.122***
	(0.011)	(0.010)	(0.010)	(0.007)	(0.007)	(0.007)
Lithuania	0.067***	0.080***	0.081***	0.063***	0.068***	0.067***
	(0.009)	(0.008)	(0.008)	(0.005)	(0.005)	(0.005)
Time	−0.067***	−0.077***	−0.044***	−0.032***	−0.043***	−0.025***
	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)	(0.004)
ACE	0.027***	0.022***	0.049***	0.024***	0.017***	0.034***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.005)	(0.006)
Tangibility		0.044**	0.044**		−0.015	−0.015
		(0.018)	(0.018)		(0.010)	(0.010)
Profitability		−0.337***	−0.340***		−0.375***	−0.377***
		(0.064)	(0.064)		(0.029)	(0.029)
Firm Size		−0.031***	−0.030***		−0.023***	−0.023***
		(0.003)	(0.003)		(0.002)	(0.002)
Net Operating Loss		−0.033**	−0.034**		−0.047***	−0.046***
		(0.014)	(0.014)		(0.008)	(0.008)
GDP per capita growth			−0.000			0.001***
			(0.000)			(0.000)
Inflation			0.005***			0.003***
			(0.000)			(0.000)
Constant	0.260***	0.482***	0.436***	0.119***	0.269***	0.243***
	(0.002)	(0.021)	(0.020)	(0.006)	(0.014)	(0.014)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,832	23,832	23,832	57,218	57,218	57,218
Adjusted R^2	0.092	0.150	0.151	0.078	0.141	0.142

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 total debt over the book value of total assets. Latvia and Lithuania are country-fixed effects. Time is equal to one starting from 2009, and equal to zero before. ACE is equal to one if the firm is located in Latvia starting from 2009 and equal to zero afterwards. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. The left three columns show the estimation over the whole, unmatched sample of Latvian, Lithuanian and Estonian firms. The coefficients in the right three columns are estimated over the pooled sample while including firms for which observations are not available for the whole period of consideration (2007-2014). 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: Robustness Towards Different Leverage Definitions

Dependent Variable	Different leverage definitions				
	Book leverage	Financial leverage	D/E Ratio	Financial D/E Ratio	Long-term L/C Ratio
	(1)	(2)	(3)	(4)	(5)
Latvia	0.119***	0.006	−0.014	−0.698	0.068***
	(0.015)	(0.012)	(0.973)	(0.762)	(0.012)
Lithuania	0.105***	0.029*	0.383	−0.059	0.048***
	(0.020)	(0.015)	(0.400)	(0.292)	(0.013)
Time	−0.057***	0.006	−1.124*	−0.351	−0.029***
	(0.007)	(0.009)	(0.588)	(0.469)	(0.007)
ACE	0.060***	0.026***	1.770**	1.074	0.064***
	(0.008)	(0.010)	(0.841)	(0.677)	(0.009)
Tangibility	0.002	0.231***	−2.541**	0.956***	0.349***
	(0.031)	(0.026)	(1.138)	(0.367)	(0.027)
Profitability	−0.557***	−0.263***	−10.487***	−3.243***	−0.363***
	(0.032)	(0.026)	(1.531)	(0.686)	(0.027)
Firm Size	−0.030***	−0.008*	−0.217	−0.161***	−0.012***
	(0.006)	(0.005)	(0.146)	(0.062)	(0.005)
Net Operating Loss	−0.089***	−0.051***	−1.237***	−0.385	−0.067***
	(0.013)	(0.011)	(0.437)	(0.243)	(0.011)
GDP per capita growth	−0.001***	−0.002***	−0.020	−0.015	−0.001***
	(0.000)	(0.000)	(0.014)	(0.010)	(0.000)
Inflation	0.006***	0.004***	0.164***	0.082***	0.005***
	(0.000)	(0.000)	(0.043)	(0.022)	(0.001)
Constant	0.573***	0.077***	4.010***	1.125	0.015
	(0.022)	(0.017)	(1.054)	(0.767)	(0.017)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	8,016	6,849	8,016	6,849	8,016
Adjusted R^2	0.222	0.200	0.027	0.010	0.305

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. The columns indicate different dependent variables. Book leverage is defined as the ratio of total debt over the book value of total assets. Financial leverage is defined as the ratio of financial debt (loans and long-term debt) over the book value of total assets. D/E and financial D/E ratios denote Debt-to-Equity ratios for overall and financial debt. Long-term L/C ratio is the long-term liabilities to long-term capital ratio at book value. Latvia and Lithuania are country-fixed effects. Time is equal to one starting from 2009, and equal to zero before. ACE is equal to one if the firm is located in Latvia starting from 2009 and equal to zero afterwards. Firm size is the natural logarithm of total assets. The other three firm-specific financial and accounting ratios are explained on table 1. 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.