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Savina Princen

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Abstract

In this paper, I use difference-in-differences regressions to measure how the debt tax shield affects the capital structure of a company. By comparing the financial leverage of treatment and control companies before and after the introduction of an equity tax shield, I infer the impact of the tax discrimination between debt and equity. Consistent with the theoretical prediction, the estimated results show that the introduction of an equity tax shield has a significant negative effect on the financial leverage of a company. This effect amounts to approximately 2-7%, meaning that a classical tax system encourages companies to use on average 2-7% more debt than when there is an equal tax treatment of debt and equity.

JEL-Code: G300, H250, K340.

Keywords: allowance for corporate equity, corporate financing decisions.

Savina Princen
Louvain School of Management
Accounting and Finance Department
Catholic University of Louvain
Place des Doyens 1
B – 1348 Louvain-la-Neuve
Belgium
savina.princen@uclouvain.be

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1 Introduction

Twenty years ago MacKie-Mason (1990) raised the question whether taxes affect corporate financing decisions. After decades of research strong evidence answering this question was still not found. Based on Modigliani and Miller (1958, 1963)'s work, Stiglitz (1973) and King (1974) focused on the tax discrimination between debt and equity and theoretically showed that the cost of capital is dependent on the mode of financing, if tax differentials exist between those modes. Their work triggered an important number of studies, empirically testing the finding and measuring the impact of the unequal tax treatment of financing modes on a firm's financial decisions. Early research work tried in vain to find empirical support for this theoretical result (a.o. Marsh (1982), Bradley, Jarrell and Kim (1984), Long and Malitz (1985), Titman and Wessels (1988)). It was suggested that the use of debt was influenced more by its other non-tax functions, such as a signal of firm quality, an antitakeover device or a means of restricting managerial discretion, than by its related tax advantage (see Harris and Raviv (1990) for a literature review). Those studies which found evidence that the tax benefits of debt influence a company's capital structure (a.o. MacKie-Mason (1990), Graham (2000), Gordon and Lee (2001)), needed to assume restrictive conditions to measure the impact of the tax benefits of debt in an accurate way. MacKie-Mason (1990), for instance, limited his sample to less profitable companies to find evidence that taxation impacts a company's debt policy. He found that a one-standard-deviation increase in a non-debt tax shield, e.g. depreciation and investment tax credits, reduces the percentage of debt issues by about 10 percentage points. Graham (2000) uses simulation methods for the period 1980-1994 to show that the tax benefit of debt amounts to about 9-10% of firm value. Moreover, a large strand of this literature uses differences in marginal tax rates to measure the impact of tax shields, in order to cope with the limited variation in accessible tax variables.

By using a different approach for studying the impact of taxation on capital structure, this paper provides significant evidence of how tax benefits influence corporate financial decision-making. The paper goes back to the experimental ideal for evaluating the impact of taxes on corporate debt policy, i.e. analyzing a tax system which attributes a similar tax deductibility to the return on equity as the generally implemented deductibility for interest expenses on debt. As such, tax neutrality between the two sources of finance is ensured and corporate taxation no longer favors debt over equity. Such a tax system is based on the theoretical concept of a neutral "pure profits" tax as developed by Boadway and Bruce (1984). They advocate to tax only the returns on investment above the costs of capital, which requires to tax the sources of finance equally. Devereux and Freeman (1991) suggested to put this idea into practice by providing companies with an 'Allowance for Corporate Equity'(ACE), i.e. an equity tax relief. Empirical testing of this theoretical system, however, was until now not possible due to a lack of faithful implementation of all aspects of this tax feature or due to a lack of relevant data. The introduction of the tax deductibility of equity costs in Belgium in 2006, offers the experimental ideal for testing how tax benefits affect the capital structure of a company. Unlike other implementations, this equity tax reform includes most of the basic and powerful features of the theoretical taxation system as developed by Devereux and Freeman (1991) and therefore, approaches tax neutrality very closely. As a result the studied tax shield is labeled 'full' system versus 'partial' systems. Since all of the latter systems are guided by different rules, studies related to those systems did not allow to draw a general conclusion about the system's impact (o.a. Staderini (2001), Klemm (2007))[1]. In addition to a different approach of the topic, this paper offers the benefit of analyzing a large dataset, as the tax reform automatically applies to all companies filing a corporate tax return in the country. Moreover, as the equity tax shield

[1]Other countries in and outside the EU (Croatia (1994), Brazil (1996), Italy (1997) and Austria (2000)) chose to introduce an Allowance for Corporate Equity, although they implemented the system differently. Croatia included most of the features of the theoretical tax as developed by Devereux and Freeman (1991). Brazil limited the application of the system to dividends paid out to shareholders instead of applying it to the total amount of equity as suggested by the theoretical model. Italy and Austria lowered the tax rate on equity returns but did not exempt them from taxation. The empirical studies evaluating those ACE systems are not unanimously convincing. Keen and King (2002) analyze the Croatian implementation of ACE, but do not have the necessary data to study the impact of the Croatian system on the leverage of companies. Klemm (2007) studied Brazilian data and noted no significant change of the capital structure of Brazilian companies. Staderini (2001) analyzed the impact of the Italian system and found, however, that the leverage of companies decreased following the introduction of the system. Based on these results, it is hard to conclude on the system's efficiency. An explanation, however, could be that altering basic and powerful characteristics of the theoretical proposition and hence the implementation of a partial ACE system, was not an efficient choice. Three countries, Croatia, Italy and Austria, decided to abolish the system few years after its introduction. In Croatia and Austria, the desire to cut the overall corporate tax rate most probably explains the decision to eliminate the system.

studied in this paper was only introduced in 2006, some theoretical studies (Gerard (2006a), Gerard (2006b)) but few empirical analyses studying its capital structure implications are available so far.

I develop a simple model to show what changes the introduction of an equity tax shield is expected to produce. The model predicts that further to equalizing the tax treatment of debt and equity, a company lowers its debt ratio. To quantitatively test this prediction and in order to measure the impact of taxation on corporate financing decisions, I use in this paper a difference-in-differences identification strategy, comparing the capital structure of treatment and control companies before and after the tax reform. Belgian firms are considered the treatment companies; French firms play the role of control companies. The data related to the period 2001-2005 are the pre-treatment data; those related to the period 2006-2007 the post-treatment data. The sample includes individual company information of 3,332 treatment companies and 17,100 control companies. In order to ascertain the comparability of both groups of companies, capital structure trends are analyzed and a propensity score method is applied to match treatment and control firms. Consistent with the theoretical prediction set out in the model, the empirical results provide considerable evidence of a significant negative effect of the equity tax shield on the leverage of a company. This means that the debt tax shield, proper to a traditional tax system, affects a company's capital structure. The main results are robust to several robustness tests. By generating the same analysis for a different control group (26,241 German companies), I assess whether the results are not country-specific. For both control groups, I find that the estimated impact is highly significant and that it amounts economically to a leverage ratio decrease of approximately 2-7%. Further extension of the analysis reveals that, consistent with the financial constraint theory, the capital structure of large companies is more affected by the introduction of an equal tax treatment of debt and equity than the capital structure of small and medium enterprises.

The paper proceeds as follows. Section 1 presents the institutional background and the principal characteristics of the tax reform. Section 2 discusses the theoretical framework. Section 3 presents the empirical methodology and shows how it applies to the introduction of an equity tax shield. Section 4 describes the data set and presents the construction of an adequate control group. Section 5 discusses the main results, produces some robustness checks and considers some further extensions of the analysis. Section 6 concludes.

2 Institutional Background

Belgian corporate tax rules can be considered as a traditional tax system (Graham (2003)). Companies are taxed on their profits, i.e. the business income less the costs to generate that income. Those business related costs include the interest paid as return to the creditors. Since these interest expenses reduce taxable income, they are said to be tax deductible. The return to shareholders or dividends, however, are included in the taxable base and are taxed. From January 1, 2006 on, Belgian companies or foreign companies permanently established in Belgium can deduct from their taxable income what is called a "Risk Capital Deduction", which is an amount computed as the fictious interest cost of the adjusted equity of a company. Hence, not the actual equity cost, i.e. the return to shareholders, but an estimated equity cost is tax deductible. From that moment on, however, debt and equity can be considered receiving the same tax treatment. As both means of financing reduce the taxable income of a company, they can be seen as providing a corporate tax shield.

The main goal of the measure is to promote equity funded activities and to encourage companies to strengthen their capital structure. Even if the first goal of the measure is not to increase investments, it seeks to maintain earnings in the country, which could later on be used to finance new investments. With this measure, policymakers tend to reduce the tax discrimination between debt and equity, but also to offer an alternative to the abolished special tax regime for coordination centers. The latter regime granted attractive tax advantages [2] to MNEs' subsidiaries [3] that offered financial and business services to

[2]Instead of being taxed on its business profits, coordination centres were taxed on 4% to 10% of their business expenses, which excluded salary and financial costs. Moreover, no withholding taxes were levied on dividends, interests and royalties distributed to group companies. Finally, coordination centres were exempted from property tax and from registration duties on subscriptions and on increases of capital.

[3]The status of coordination centre was subject to conditions of size. It was granted only to an entity that is part of a multinational group with subsidiaries in at least 4 different countries. Furthermore, the multinational group needed to have a total consolidated equity of at least 25 million euro and a total consolidated turnover of at least 250 million euro. Moreover, the entity was required to have at least 10 employees by the second year of operations.

other companies in the group. The regime was gradually withdrawn since it was qualified as 'unfair tax competition' by the European Code of Conduct and considered breaking European State Aid legislation in 2003. From January 1, 2011 on, coordination centres could no longer benefit from this favourable tax regime.

The equity taken into account to determine the equity tax shield is the shareholder's equity, i.e. the equity hold by external shareholders and adjusted by subtracting certain items to avoid abuse and double deductions. Starting point of the computation is the equity mentioned in the opening balance sheet for the taxable period. This equity is adjusted for the net tax value of own shares, of non-portfolio participations, and of shares issued by investment companies producing taxable revenues. Moreover, the remaining equity is reduced by the net equity assigned to foreign permanent establishments or real estate property or rights, by the net book value of tangible fixed assets, which costs do unreasonably exceed professional needs or which are considered as an investment not acquired in order to produce a regular income and by tax-free revaluation gains and capital subsidies. Worthwhile noting is that the adjusted equity consists of both existing and new equity.

The fictious interest rate is determined annually and is equal to the average return of the 10-year linear state bond of the year two years prior to the tax year concerned. As a result, a company's equity will, for corporate tax purposes, be treated as debt with the same annual interest rate as a 10-year state bond. Moreover, this equity tax shield includes several features to facilitate and encourage its use. First, the deduction automatically applies to all companies filing a Belgian corporate tax return. Furthermore, it can be carried forward to the next seven years, no thin capitalization rules apply to the adjusted equity and no withholding tax is levied on the fictious interest deduction. Finally, no investment in tangible or intangible assets is required. Except for the latter feature, this equity tax shield or Allowance for Corporate Equity represents the features of the theoretical tax as developed by Devereux and Freeman (1991). The new tax law does not require an equity increase to correspond to the acquisition of a new asset so that the deductible amount can remain stable from one year to another. The theoretical taxation system, however, supposes the existence of fixed assets depreciated over several years and assumes therefore a decreasing deductible amount.

As already mentioned, the control companies used in the subsequent empirical analysis are firms incorporated in France; a second control group is constructed, containing German companies. Both France and Germany have a traditional tax system, providing for the tax deductibility of interest expenses but not of the capital cost of equity.

3 Theoretical Framework

To clarify the impact of the tax neutrality between debt and equity, I develop a simple model showing how the introduction of an equity tax shield affects the capital structure of a company. Assuming a world without risk, inflation, and taxation, a firm investing in an asset of value I seeks to maximize its present value (PV). Suppose the assets of the firm are financed for a fraction b by debt and a fraction $(1-b)$ by equity, where $b \geq 0$. It was under these assumptions that Modigliani and Miller (1958) developed their major prediction, i.e. that the financing mode is irrelevant with respect to the value of the firm.

Taking into account a traditional corporate tax system, the trade-off theory of capital structure (Kraus and Litzenberger (1973), Scott (1976), Bradley, Jarrell and Kim (1984), but also Jensen (1976), Myers (1977)) shows that a firm's leverage is determined by the trade-off between the tax benefits of debt and the costs of additional financial constraints and bankruptcy triggered by an increased leverage. Leaving bankruptcy costs aside, the subsequent model focuses on the impact of the financing mode on the value of the firm. It assumes a tax system in which a firm is taxed on its end-of-period wealth after deduction of interest expenses and which is based on a constant marginal tax rate (τ_c). Investors are subject to a constant withholding tax on dividends (τ_d) and on interests (τ_i), where $\tau_d \geq 0$, $\tau_i \geq 0$ and $\tau_d \neq \tau_i$. Considering that the time period tends to infinity, the company's objective function can be modeled as follows:

$$\max_b \; PV = \frac{(1-\tau_c)y(I)}{r} + (1-b)\frac{\tau_i - \tau_d}{1-\tau_d}I + b\tau_c I \tag{1}$$

where $y(I)$ is an increasing and concave function of investment and stands for the end-of-period earnings before interest and taxes, and r is the real interest rate and discount rate. In this equation, the first term represents the present value of the taxable base before interest (there is no depreciation allowances in this model) and the following terms the tax advantage respectively related to equity financing and debt financing. The tax advantage of equity is derived from the arbitrage made by the investor between

debt and equity returns. An investor will acquire shares only if the dividends D he receives are at least as high as the return he could obtain from an equally risky loan, i.e. $(1-\tau_d)D \geq (1-\tau_i)rI$. As such the tax advantage of equity can be expressed as $(1-b)\frac{\tau_i-\tau_d}{1-\tau_d}I$. The tax advantage of debt is derived from the value of debt and expressed as $b\tau_c I$. When maximizing the objective function with respect to debt, the first order condition becomes:

$$\frac{dPV}{db} = -\frac{\tau_i - \tau_d}{1-\tau_d}I + \tau_c I \tag{2}$$

It follows from equation (2) that the optimal debt usage is undefined. Assuming then that equation (2) is strictly positive, as it is the case in Belgium, a company will maximize its debt usage to optimize its present value. Accordingly, the financing mode affects the value of the firm, since debt is favored for corporate tax purposes.

When an equity tax shield is introduced into the traditional tax system, the market value of equity is affected. As for debt, the firm now also enjoys a tax benefit for equity amounting to the return of an equally risky loan. Therefore, an additional tax advantage related to equity $(1-b)\frac{\tau_c(1-\tau_d)}{1-\tau_d}I$ increases the firm's present value. The present value of the firm becomes:

$$PV = \frac{(1-\tau_c)y(I)}{r} + (1-b)\frac{(\tau_i-\tau_d)+\tau_c(1-\tau_d)}{1-\tau_d}I + b\tau_c I \tag{3}$$

Defining leverage as the ratio of total debt to the present value, $L = \frac{bI}{PV}$, the impact of an equity tax shield can be measured by optimizing leverage with respect to this tax shield, yielding:

$$\frac{dL}{d[\tau_c(1-\tau_d)]} = \frac{-b\frac{1-b}{1-\tau_d}I}{PV^2} \tag{4}$$

As total debt and the withholding tax rates are positive, equation (4) is strictly negative. As a result, the introduction of an equity tax shield encourages companies to lower their debt usage. In order to measure the extent to which the tax benefits of debt influence corporate financing decisions, this paper is based on the following implication. Further to equations (2) to (4), when an equity tax shield is introduced, the tax-favored treatment of debt is reduced and possibly offset, and the capital structure rebalanced, i.e. the debt usage lowered. Hence, the new capital structure reflects the optimal mix of debt and equity for the company and may be freed of tax interference. The empirically testable prediction can then be stated as follows:

Prediction: *Further to equalizing the tax treatment of debt and equity, a company lowers its debt ratio.*

Consequently, it is expected to observe a significant negative effect of the tax reform on the leverage of treated companies. I test this prediction empirically in the following sections.

4 Empirical Methodology

Ideally, the impact of a tax reform is assessed by using a random experiment. Random assignment of firms to a policy change, would allow controlling for all relevant (observable and unobservable) covariates, affecting the outcome of interest. Moreover, in such a random setting no outcomes are favored over others and selection bias is inexistent. To approach this experimental ideal, a natural experiment needs to be found to mimic random assignment. Considering the tax reform as an exogenous event, I can, by determining a treatment and control group, assume the existence of a natural experiment to test the effect of equalizing the tax treatment of debt and equity. Accordingly, the fact of being subject to the tax reform is the treatment, the treatment group comprising the companies established in the experimental country, the control group including the companies established in a non-experimental country. Because pre- and post-reform data are available, I can use a difference-in-differences identification strategy. This panel data technique consists in comparing the years before and after the adoption of the tax reform for both treated and control groups. Estimating the impact of the tax reform through such a difference-in-differences strategy, however, is only possible if two key assumptions hold. The first assumption requires that capital structure trends before the introduction of the tax reform are similar in both groups. Hence, treatment and control groups should present the same trend over time in the absence of treatment.

Therefore, country and time fixed effects have to be controlled for. The second assumption requires treatment and control groups to have exactly the same pre-treatment characteristics. As a result, the only relevant difference between the two groups would be their access to the equity tax shield. Their difference in outcome would then be entirely attributable to the tax reform. Thus, the validity of the difference-in-differences methodology depends on whether the experience of the control group accurately represents how the treatment group would have done in the absence of the tax reform. Before applying this difference-in-differences approach, I need to control whether the two basic assumptions are verified.

I investigate the equal pre-treatment trend assumption by analyzing graphically how the capital structure of companies evolves over time in the treatment and the control group. To make sure that the assumption of equal pre-treatment characteristics holds, I use a propensity score method to match the treatment and control groups. By stratifying each covariate and pairing a treatment firm and a control firm when they fall in the same category for each covariate, matching balances the observed covariates between treatment and control groups. As a result, a selection of the control group (counterfactual) is made which is similar to the treated group in all pre-treatment features and the second assumption is thus verified. To ease matching when the number of covariates is large, Rosenbaum and Rubin (1983) suggested to use a propensity score $p(X)$, summarizing all the observable firm characteristics into a single index. This propensity score or conditional probability that firm i with observable characteristics X_i is subject to the equity tax shield ACE_i is a scalar function of covariates expressed as:

$$p(X) \equiv E[ACE_i|X_i] = Prob[ACE_i = 1|X_i] \tag{5}$$

Consequently, this evaluation technique commonly used in policy analysis, makes it sufficient to compare firms with similar propensity scores instead of comparing firms with identical observable characteristics X_i.

Once a satisfying control group is selected, a difference-in-differences model can be set up. Let C_c (or Country) be a fixed country effect dummy (equal to one if an experimental country, equal to zero if a non-experimental country), T_t (or Time) be a fixed year effect dummy (equal to one if after the tax reform, equal to zero if before the tax reform) and X_{ict} be the individual controls. The leverage of a company i in country c at time t can be estimated by using an Ordinary Least Squares (OLS) regression analysis, which takes the following specification for a difference-in-differences estimation:

$$Y_{ict} = \alpha + \gamma\, C_c + \lambda\, T_t + \delta\, X_{ict} + \rho\, C_c \cdot T_t + \epsilon_{ict} \tag{6}$$

where γ are time-invariant country effects, λ are country-invariant time effects and ρ is the causal effect of interest. The coefficient ρ captures the variation in the outcome of interest in the experimental country (relative to the non-experimental country) in the years after the tax reform (relative to the years before the tax reform). Hence, it measures the marginal difference between the pre and post period with respect to the introduction of an equity tax shield and determines the economic importance of this difference.

5 Data

The AMADEUS database (Bureau van Dijk) comprises balance sheet and income statement information on public and private companies in 41 European countries. The database version used contains data for 15 million companies from the year 2001 on. These companies are non-financial firms and the effects on the financial sector will therefore not be treated in the subsequent analysis. The standard format used to register the information, allows to compare cross-border financial data easily. Analyzing a 2006 tax reform in Belgium, I select a sample of Belgian and French companies active during at least one year in the time period 2001-2007, as such constructing an unbalanced panel of company data. In this sample, Belgian firms are considered the treatment companies; French firms the control companies. The data related to the period 2001-2005 are the pre-treatment data; those related to the period 2006-2007 the post-treatment data. Data for one particular company in one particular year constitute the observational unit. As in previous capital structure literature, the sample is limited to companies which are active in the industrial sector (SIC code 2000-5999), excluding the real estate industry, financial services, the public and primary sector. Outliers are controlled for by deleting observations if the book value of fixed assets or of total debt is more than 100% or less than 0% of total assets, leaving me with a sample of 18,322 Belgian and 91,814 French company-year observations. For robustness purposes, I construct a sample of Belgian and German companies, in the same way as I did for the sample containing Belgian and French data. The second sample includes, in addition to the 18,322 Belgian company-year observations,

32,931 German ones. It appears, however, that this sample contains only part of the German companies. This is due to the compliance rate of filing national accounts at the national bank, which is almost 100% in Belgium, 65% in France, and only 3% in Germany. Those highly differing compliance rates are due to the different type of data providers: private rating agencies in Germany and public institutions in Belgium and France.

The data collected are used to construct the capital structure measure and the control variables needed for the empirical analysis. Working with unconsolidated financial account information of both listed and non-listed companies, I use book values to construct the variables. This is also the case for the dependent variable, for which I use two different definitions. First, I define leverage as is done commonly in the capital structure literature (Rajan and Zingales (1995), Graham and Harvey (2001), Ortiz-Molina (2007)). What is called 'book leverage' is measured as the ratio of total non-equity liabilities to total assets. Total non-equity liabilities or total debt is the sum of long-term debt and current liabilities. As the purpose of this paper is related to the tax advantage of debt, I use in a second set of regressions financial leverage as dependent variable, given that only interest related to financial debt is tax deductible. Financial leverage is defined as the ratio of financial debt, i.e. long term debt and loans, to total assets (Rajan and Zingales (1995)). According to the capital structure literature (a.o. Bradley, Jarrell and Kim (1984), Long and Malitz (1985), Titman and Wessels (1988), Harris and Raviv (1991)), the main covariates of the model include tangibility, firm size, and profitability. Tangibility is defined as the book value of tangible fixed assets over the book value of total assets. Firm size is measured by the natural logarithm of total assets. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to the book value of total assets. The industry dummy variables are based on two-digit SIC codes. Inflation is the annual percentage of inflation in consumer prices as measured by the World Bank. GDP Growth is the annual percentage of GDP per capita growth as measured by this same institution.

5.1 Summary Statistics

Descriptive statistics of the sample are reported in Table 1. The table provides means and standard deviations for the main variables used in the analysis, as well as for some additional firm characteristics. These statistics are given for the full sample, the treatment and the control group.

As mentioned above, the use of a difference-in-differences methodology is conditioned by two assumptions. The first condition states that during the pre-reform period, the debt ratio of the treatment and the control group follow a common trend. In order to determine whether the equal pre-treatment trend assumption is verified, graphical analysis is used to study the annual evolution of leverage. In Figure 1, I plot the average leverage of both groups for the time period 2001-2007. The figure shows that disregarding the 2005 treatment data, which could be affected by an announcement effect, the average leverage of the treatment and control groups before the 2006 tax reform follow a similar trend. From 2005 on, the leverage of Belgian companies decreases, whereas the leverage of control companies increases. This relative decline in the treatment group provides significant evidence that the introduction of an equity tax shield in Belgium has affected the capital structure trend.

The second assumption on which the difference-in-differences identification strategy is based, is that treatment and control groups have the same characteristics in the absence of the treatment, i.e. the equity tax shield. In order to verify this assumption, Table 1 compares the characteristics of the treatment and control companies for the pre-treatment year 2004, reporting the differences in means of both groups for balance sheet and profit and loss items. Table 1 describes the statistics for the Belgian and French data. Those summary statistics show that the comparison group differs significantly from the treatment group with respect to several characteristics. Regarding their profile, companies in the control group tend to have significantly more employees (252 versus 193). As to the balance sheet structure of the companies, Table 1 shows that there are highly significant differences between treatment and control companies. Firms in the treatment country have a smaller amount of total assets (46 million versus 51 million), which is not surprising as France is a larger economic player than Belgium. Likewise, the leverage of treatment companies (63%) is systematically larger than the leverage of control companies (58%) and hence the latter have a more balanced capital structure than the former. As regards the profit and loss account, I observe that treatment companies tend to generate less sales (65 million versus 78 million) than control companies. All those highly significant differences justify the use of a matching method to adjust the imbalance of covariates between groups and to correctly implement a difference-in-differences strategy.

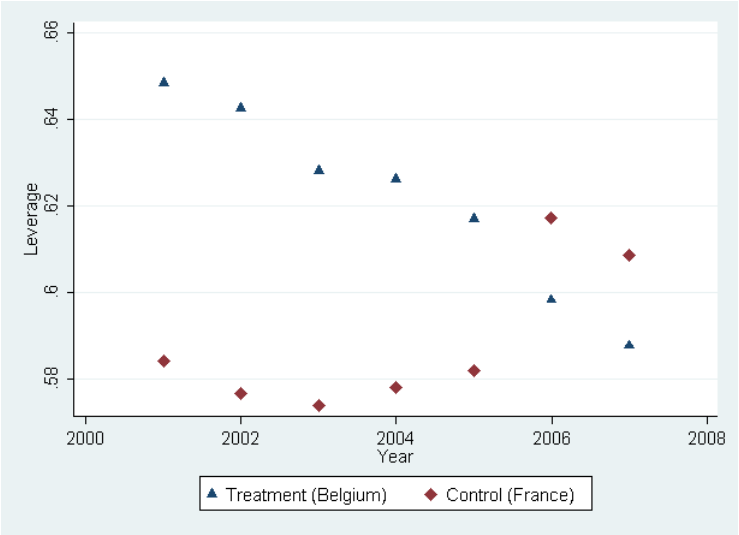
Table 1: Descriptive Statistics and Means Differences

The table provides means and standard deviations for the main variables used in the paper, as well as for some additional firm characteristics. Pre-treatment (2004) data for the treatment and control groups are used. Employees is the number of employees. Total Assets are total assets (in millions of EUR). The current ratio is the ratio of current assets over current liabilities. The liquidity ratio is the ratio of current assets, other than inventories, over current liabilities. The solvency ratio is the ratio of shareholder funds over total assets. Leverage is the book leverage, i.e. total debt (long term debt plus current liabilities) over total assets. Investment (in millions of EUR) is the change in fixed assets (tangible and intangible fixed assets) over total assets. Tangibility is the ratio of tangible fixed assets over total assets. Profitability is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) over total assets. Return on equity is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) over shareholder funds. Profit margin is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) over sales. Net Operating Loss is a dummy variable that takes one if the company is loss-making, zero otherwise. Inventories Turnover is the ratio of sales over inventories. Sales are the sales (in millions of EUR). $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% level.

	Full Sample		Treated		Control		
Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Means Diff
Profile							
Employees	241	(1144)	193	(445)	252	(1245)	59**
Balance Sheet							
Total Assets (millions)	50.028	(418.754)	45.923	(125.612)	50.796	(453.004)	4.872
Current Ratio	3.695	(237.333)	12.999	(596.190)	1.954	(18.713)	-11.045**
Liquidity Ratio	3.324	(237.336)	12.642	(596.197)	1.581	(18.719)	-11.061**
Solvency Ratio	0.338	(0.200)	0.338	(0.212)	0.337	(0.198)	-0.001
Leverage	0.585	(0.204)	0.626	(0.214)	0.578	(0.201)	-0.048***
Investment (millions)	21.700	(302.000)	23.400	(93.400)	21.400	(326.000)	-2.000
Tangibility	0.180	(0.164)	0.243	(0.200)	0.168	(0.154)	-0.075***
P&L Account							
Profitability	0.113	(0.117)	0.134	(0.118)	0.109	(0.116)	-0.025***
Return on Equity	0.734	(26.386)	0.763	(7.567)	0.728	(28.562)	-0.035
Profit Margin	0.063	(1.015)	0.089	(0.169)	0.059	(1.098)	-0.031
Net Operating Loss	0.186	(0.389)	0.193	(0.394)	0.185	(0.388)	-0.008
Inventories Turnover	102.339	(1298.701)	98.705	(799.352)	102.943	(1364.186)	4.238
Sales (millions)	76.230	(708.698)	65.013	(145.425)	78.183	(765.490)	13.200
N	17,200		2,711		14,489		

Figure 1: Evolution of the Leverage Trend over Time

The figure plots the annual mean leverage of both the treatment and the control group before matching for the time period 2001-2007. The use of a difference-in-differences strategy requires the treatment and control group to follow a common trend during the pre-treatment period. Hence, treatment and control groups should present the same trend over time in the absence of treatment.



5.2 Matching Treatment and Control Observations

Because treatment and control companies need to have identical characteristics in the absence of treatment, a reorganization of the control group is made in an attempt to make the control observations similar to the treatment observations, except for the treatment. This reorganization is called 'matching'. To this end, the covariates are balanced between the two groups of observations based on pre-treatment sample data. 2004 observations were preferred to 2005 data as basis to perform this balance in that the latter could be affected by the tax reform announcement. Three steps are used to adequately adjust the control group and to make it comparable to the treatment group.

First, I construct a tool to compare the two groups, i.e. the propensity score or the estimated probability of being subject to the treatment, given observable characteristics. The propensity score is estimated, using a probit model which limits the predicted probabilities to the [0,1] interval and which is based on variables that potentially determine leverage. Hence, the control variables include tangibility, firm size, profitability, and industry, as well as dummies reflecting whether the company is publicly listed and whether it is loss-making. For each of the observations, the propensity score thus summarizes all the information of the control variables into a single index. Estimation results are presented in Table 2.

A second step consists in assessing the overlap of the two groups in terms of propensity score, which is done visually by checking the region of common support (Figure 2). The boxplots in Figure 2 represent the propensity score distributions of the treatment and control groups and provide a comparability check of those groups. Although it cannot be ascertained that a control observation can be found for every treatment observation, the overlap of the boxplots (i.e. the area between the whiskers) seems important enough to match the treatment and the control observations.

In a third and last step, treatment and control companies are paired up according to their propensity score. Because the probability of finding a control and treatment company with an identical propensity score is very small, an algorithm is used to find the best fitting match. Here, a nearest neighbor algorithm is selected, matching each treatment observation with the closest control observation as regards propensity score. This algorithm allows to match one control observation with several treatment observations. Because the control group is larger than the treatment group, the control observations which are not matched with a treatment observation are dropped. As shown by Table 3, matching allows to largely reduce the differences between the treatment and the control group and consequently, to make the groups more comparable. The first three columns of Table 3 present the means and means differences between the treatment and the control group before matching; the last three columns of Table 3 show the means and mean differences after matching. The mean differences between the groups, which are statistically

Table 2: Probit for the Probability of Treatment

The table presents the probit estimation results of the propensity to be subject to the equity tax shield. Firm characteristics, influencing the capital structure of companies, are used to estimate the model. The dependent variable takes value one if the company is subject to the tax reform, zero otherwise. The estimation is based on pre-treatment data, i.e. 2004 observations. $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% level.

Variable	Coefficient	(Std. Err.)
Tangibility	1.521***	(0.076)
Profitability	1.112***	(0.121)
Log(Size)	0.026***	(0.008)
Listed	-0.284	(0.409)
Net Operating Loss	0.109***	(0.035)
Industry dummies	Yes	
N	17,196	
Log-likelihood	-6,937.113	
Pseudo R^2	0.0742	

different from zero in the unmatched sample become statistically equal to zero in the matched sample, indicating that the adjusted control group now closely resembles the treatment group.

The control group adjusted, an average treatment effect can be estimated. Having both pre- and post-treatment data and given a treatment and control group with similar pre-treatment trend and characteristics, a difference-in-differences strategy can be setup, allowing to control for country and time effects. The latter are measured by the variables Country and Time. Country is a dummy variable that takes one if the company is located in an experimental country, zero otherwise. This variable captures the country-specificities of leverage. Time is a dummy variable that takes one if the company observation is done after the tax reform, zero otherwise. This variable captures the time-specificities of leverage. Both variables are proper to the implementation of a difference-in-differences estimation. The variation in leverage due to the tax reform is captured through the dummy variable ACE, that takes one if the company is located in an experimental country and if the observation is done after the tax reform, zero otherwise.

6 Results

A first subsection reports the basic regressions testing the impact of an equity tax shield on the capital structure of companies. Then, the robustness of these results is checked by using raw unmatched data and by using an additional control group. Third, the consistency of the results with the financial constraint theory is verified, by making the same analysis after splitting the sample into small and medium enterprises (SME) and large companies. Finally, policy implications are discussed.

6.1 Impact of Taxation on a Company's Capital Structure

Table 4 reports the basic regression estimations, using a difference-in-differences strategy after having matched treatment and control companies. Both coefficients and standard errors are reported. Standard errors are robust for firm specific clustering. As mentioned above, two measures of leverage are used, i.e. book leverage and financial leverage. Book leverage is measured as the ratio of the book value of total debt to the book value of total assets. Financial leverage is defined as the ratio of financial debt, i.e. long term debt and loans, to total assets.

Regressions (1) to (4) of Table 4 use book leverage as dependent variable. Regression (1) regresses the outcome variable on a country-specific dummy, a time-specific dummy, a dummy reflecting the existence of the tax reform, tangibility, profitability, firm size, and industry. In this basic regression, the variable of interest ACE has an estimated negative coefficient of -0.071 and is significant at the 1% level. This result is consistent with the theoretical prediction that taxation has an effect on the capital structure of companies, given that introducing an equity tax shield lowers the debt usage. It suggests that adopting the same tax favourable treatment for equity as for debt, reduces the debt ratio of companies with more

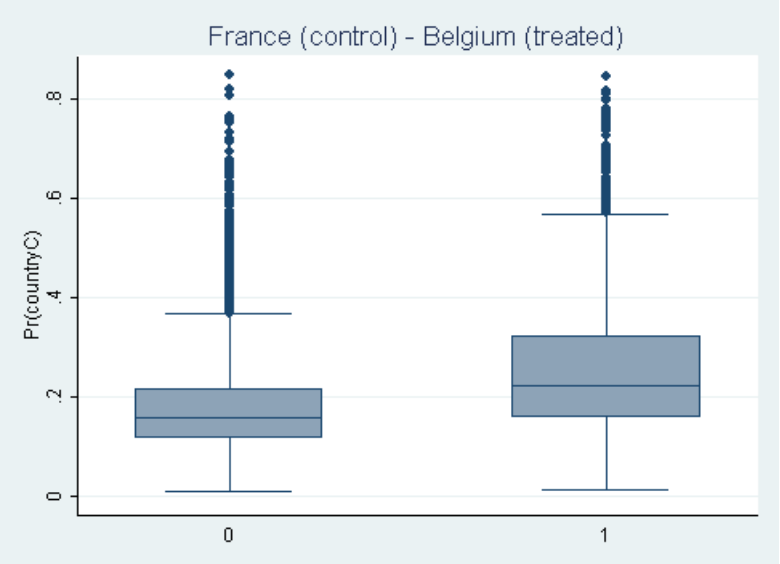
Table 3: Mean Differences Before and After Matching

The table provides mean and standard deviation for the main variables used in the paper, as well as for some additional firm characteristics. Pre-treatment (2004) data for the treatment and control group are used. Total Assets are total assets (in millions of EUR). The current ratio is the ratio of current assets over current liabilities. The liquidity ratio is the ratio of current assets, other than inventories, over current liabilities. The solvency ratio is the ratio of shareholder funds over total assets. Leverage is the book leverage, i.e. total debt (long term debt plus current liabilities) over total assets. Investment (in millions of EUR) is the change in fixed assets (tangible and intangible fixed assets) over total assets. Tangibility is the ratio of tangible fixed assets over total assets. Profitability is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) over total assets. Return on equity is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) over shareholder funds. Profit margin is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) over sales. Net Operating Loss is a dummy variable that takes one if the company is loss-making, zero otherwise. Inventories Turnover is the ratio of sales over inventories. Sales are the sales (in millions of EUR). $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% level.

	Unmatched Sample			Matched Sample		
Variable	Treated	Control	Difference	Treated	Control	Difference
Profile						
Employees	193	252	59**	226	261	35
Balance Sheet						
Total Assets (millions)	45.923	50.796	4.872	45.190	50.053	4.863
Current Ratio	12.999	1.954	-11.045**	18.032	1.609	-16.423
Liquidity Ratio	12.642	1.581	-11.061**	17.671	1.240	-16.431
Solvency Ratio	0.338	0.337	-0.001	0.333	0.333	0.000
Leverage	0.626	0.578	-0.048***	0.632	0.580	-0.052
Investment (millions)	23.400	21.400	-2.000	23.301	20.886	-0.415
Tangibility	0.243	0.168	-0.075***	0.178	0.180	0.002
P&L Account						
Profitability	0.134	0.109	-0.025***	0.105	0.111	0.006
Return on Equity	0.763	0.728	-0.035	0.653	0.410	-0.243
Profit Margin	0.089	0.059	-0.031	0.071	0.067	-0.004
Net Operating Loss	0.193	0.185	-0.008	0.191	0.186	-0.005
Inventories Turnover	98.705	102.943	4.238	97.019	91.480	-5.539
Sales	65.013	78.183	13.200	67.213	88.100	20.887
N	2,711	14,489	(17,200)	2,703	2,129	(574)

Figure 2: Boxplots of the Estimated Propensity Score

The figure shows boxplots of the propensity score distributions of the treatment and control groups after balancing the covariates. For each distribution, the lower and upper quartiles (25th and 75th percentiles) form the bottom and top of the box. The horizontal line within the box indicates the median (50th percentile) and the ends of the whiskers represent the maximum and minimum of the sub-sample. The observations lying outside the whiskers are considered outliers. The boxplots provide a comparability check for the treatment and control group in terms of observable characteristics. The overlap in the distributions (area between the whiskers) indicates how well a matching strategy can be implemented. The wider the overlap, the better treatment observations and control observations can be matched.



than 7%. The coefficient on Country, returning one if the observation is related to a company located in the treatment country, is positive (0.076) and highly significant (1% level). This suggests that in the absence of the tax reform, there are substantial country-specific effects determining the book leverage of a company. The same is true with respect to time effects. The positive and significant coefficient (0.034) on Time, returning one if the observation is post-reform, indicates that the time period is an important factor explaining the leverage of a company. However, with respect to the control variables, only the impact of profitability is consistent with the theoretical predictions. Previous capital structure research (Rajan and Zingales (1995)) finds that leverage decreases with profitability, since financing with retained earnings is prefered over debt financing for profitability purposes. Contrary to what theory predicts, tangibility and firm size have a negative effect on leverage. The negative impact of firm size would mean that size reflects the information of outside investors who prefer equity over debt (Rajan and Zingales (1995)). A possible explanation for the negative impact of tangibility comes from the fact that leverage may be influenced more by tax purposes than by finance purposes as debt and fixed assets both offer tax deductible expenses (DeAngelo and Masulis (1980), Huizinga, Laeven and Nicodeme (2008)). Further to the R^2 statistic, this set ofvariables explains 9.9% of the variation in book leverage. Moreover, that both firm size and tangibility present a negative relationship instead of an expected positive one, suggests a missing variable bias.

Therefore, regression (2) uses the same specification as regression (1) but adds a non-debt tax shield variable, i.e. Net Operating Loss (NOL) to the control variables. Net Operating Loss is a dummy variable that takes one if the company is loss-making, zero otherwise. Hence, it proxies the presence of tax losses carry forward, which offer the possibility to offset taxable profits. The coefficient of the NOL variable (0.059) is significant at the 1% level. The R^2 statistic (0.1087), however, did not increase much and the coefficients of firm size and tangibility remain negative.

Regression (3) uses the same specification as regression (1) but adds the variable Non-Debt Tax Shield (NDTS), defined as the ratio of depreciation costs over total assets. This additional variable could indicate whether the negative coefficient of tangibility might be explained by the tax shield related to depreciation. Although the coefficient of NDTS (0.599) is significant at the 1% level, it does not change

Table 4: Impact of Taxation on a Company's Capital Structure

The table reports the leverage regression estimations, using a difference-in-differences strategy for Belgian and French data. The regressions are estimated by Ordinary Least Squares (OLS). Two dependent variables are used. Book leverage is measured as the ratio of total debt to the book value of total assets. Financial leverage is the ratio of financial debt to the book value of total assets. Country is a dummy variable that takes one if the company is located in an experimental country, zero otherwise. Time is a dummy variable that takes one if the company observation is done after the tax reform, zero otherwise. ACE is a dummy variable that takes one if the company is located in an experimental country and if the observation is done after the tax reform, zero otherwise. Tangibility is defined as the book value of tangible fixed assets over the book value of total assets. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization to the book value of total assets. Firm size is measured by the natural logarithm of total assets. Net Operating Loss is a dummy variable that takes one if the company is loss-making, zero otherwise. Non-Debt Tax Shield is defined as the ratio of depreciation costs over total assets. Inflation is the annual percentage of inflation in consumer prices as measured by the World Bank. GDP Growth is the annual percentage of GDP per capita growth as measured by the World Bank. The industry dummy variables are based on two-digit SIC codes. Both coefficients and standard errors are reported. Standard errors are robust for firm specific clustering. $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% level.

Dependent Variable	Book Leverage				Financial Leverage		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country	0.076***	0.074***	0.035***	0.037***	0.105***	0.098***	0.100***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.003)	(0.005)	(0.005)
Time	0.034***	0.036***	0.033***	0.031***	0.025***	0.025***	0.027***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
ACE (-)	-0.071***	-0.069***	-0.062***	-0.062***	-0.047***	-0.046***	-0.043***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Tangibility (+)	-0.075***	-0.093***	-0.121***	-0.121***	0.199***	0.194***	0.194***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)
Profitability (-)	-0.209***	-0.122***	-0.271***	-0.270***	-0.163***	-0.173***	-0.173***
	(0.024)	(0.021)	(0.031)	(0.031)	(0.018)	(0.020)	(0.020)
Firm Size (+)	-0.009***	-0.009***	-0.013***	-0.013***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Net Operating Loss (NOL)	-	0.059***	-	-	-	-	-
		(0.004)					
Non-Debt Tax Shield (NDTS)	-	-	0.599***	0.597***	-	0.103*	0.098*
			(0.066)	(0.066)		(0.0053)	(0.053)
Inflation (-)	-	-	-	-0.007***	-	-	-0.004**
				(0.002)			(0.002)
GDP Growth (+)	-	-	-	0.000	-	-	-0.005***
				(0.001)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	86,931	86,931	86,135	86,135	86,931	86,135	86,135
R^2	0.0986	0.1087	0.1157	0.1158	0.1124	0.1125	0.1127

the direction in which tangibility affects book leverage. The economic significance of the variable of interest ACE is slightly altered, as introducing an equity tax shield now lowers a company's leverage on average with 6% instead of 7%. Adding the NDTS variable, however, improved the goodness of fit of the model. The R^2 statistic indicates that the model now explains 11.6% of the leverage variation.

This same estimation of 6% is found when some macroeconomic variables, which allow to control for major economic differences between the treatment and the control group, are introduced (regression (4)). As suggested by Huizinga, Laeven and Nicodeme (2008), inflation may lead to higher risk premiums and nominal interest rates, which discourages the use of debt. Hence, Inflation is expected to be negatively related to leverage. GDP Growth proxies the growth opportunities of a company. As a company with high hopes for future growth will need to invest, GDP Growth is expected to be positively related to leverage (Frank and Goyal (2004)). In regression (4) Inflation has a statistically significant impact (1% level) of -0.007 on the debt ratio, GDP Growth has no effect.

Regressions (5) to (7) use financial leverage as endogenous variable. Regression (5) shows that the estimated ACE coefficient is lower using this leverage measure compared with using the book leverage as dependent variable (-0.047 versus -0.071). The coefficient of the ACE variable remains highly significant (1% level). This indicates that, following the introduction of the equity tax shield, companies also decreased their trade debt and not only their financial debt which generate tax deductible interests. Moreover, the impacts of tangibility and firm size are now consistent with the theoretical predictions. As in previous capital structure research (Rajan and Zingales (1995)) leverage increases with tangibility, since fixed assets serve as debt collateral, and with firm size, since large firms can more easily contract for credits. As book leverage, financial leverage decreases with profitability. All three estimated coefficients are significant at the 1% level. The R^2 statistic shows that 11.2% of the financial leverage variation is explained by this set of variables.

Regression (6) of Table 4 again includes the Non-Debt Tax Shield variable. Once more the estimated ACE coefficient is significant, both from a statistical (1% level) as from an economic point of view (-0.046).

Regression (7) adds the macroeconomic variables Inflation and GDP Growth. Both variables have a negative impact on the financial leverage of a company. This impact is statistically significant (5% and 1% respectively). The estimated coefficient of the variable of interest is in line with what was found for regression (6).

Whether for book leverage or for financial leverage, all specifications report a quite unanimous evaluation of the tax reform with respect to capital structure. The introduction of an equity tax shield significantly lowers the use of debt, which economically amounts to a decrease of leverage of 4-7%. These results provide strong evidence that taxes do affect corporate financing decisions.

6.2 Robustness

In order to verify the robustness of the results, two additional sets of regressions are generated. First, I produce the results for unmatched data, in view of excluding the hypothesis that matching may have altered the regression outcomes. Second, I generate the results for an additional control group, to assess whether the results are not country-specific. German companies constitute the additional control group. Table 5 reports the results of the robustness tests.

Regressions (1) to (6) of Table 5 use book leverage as endogenous variable. In order to control whether matching may have altered the estimations, regressions (1) to (3) use unmatched data for Belgium and France. I find very similar, almost identical, results compared to the basic results of regression (1) of Table 4, both for the coefficients of the dependent variable as for the coefficients of the control variables. This same analysis can be made with respect to regressions (2) and (3). Regression (2) adds the Non-Debt Tax Shield variable. Regression (3) completes with the macroeconomic variables Inflation and GDP Growth. As with regression (1), I obtain almost identical results without matching as with matching, which suggests the robustness of the results.

Using German companies as control units, instead of French firms, and book leverage as dependent variable, I find ACE coefficients which are weaker than those for the French control group. Regressions (4) to (6) show ACE coefficients of approximately -0.020, whereas identical specifications for the French control group provide ACE coefficients of approximately -0.060. All the results are still highly significant (1% level). Regarding the coefficients of the explanatory variables, I observe that, consistent with the theoretical predictions, tangibility has a positive effect on leverage and profitability a negative one. Firm size, on the contrary, influences leverage negatively. As mentioned above, size would in this case reflect the information of outside investors who prefer equity over debt (Rajan and Zingales (1995)).

Table 5: Robustness

The table reports the leverage regression estimations, using a difference-in-differences strategy to test the robustness of the results. The regressions are estimated by Ordinary Least Squares (OLS). The dependent variable, Book leverage, is measured as the ratio of total debt to the book value of total assets. Total debt is the sum of the book value of long-term debt and of current liabilities. Regressions (1) to (3) are based on unmatched data; regressions (4) to (6) are based on Belgian-German data. Country is a dummy variable that takes 1 if the company is located in an experimental country, zero otherwise. Time is a dummy variable that takes one if the company observation is done after the tax reform, zero otherwise. ACE is a dummy variable that takes one if the company is located in an experimental country and if the observation is done after the tax reform, zero otherwise. Tangibility is defined as the book value of tangible fixed assets over the book value of total assets. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization to the book value of total assets. Firm size is measured by the natural logarithm of total assets. Non-Debt Tax Shield is defined as the ratio of depreciation costs over total assets. Inflation is the annual percentage of inflation in consumer prices as measured by the World Bank. GDP Growth is the annual percentage of GDP per capita growth as measured by the World Bank. The industry dummy variables are based on two-digit SIC codes. Both coefficients and standard errors are reported. Standard errors are robust for firm specific clustering. $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% level.

Dependent Variable	Book Leverage					
	Unmatched Data			Belgian-German Data		
	(1)	(2)	(3)	(4)	(5)	(6)
Country	0.073***	0.029***	0.031***	0.081***	0.080***	0.089***
	(0.004)	(0.006)	(0.006)	(0.005)	(0.007)	(0.007)
Time	0.036***	0.033***	0.029***	-0.018***	-0.018***	-0.001
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.005)
ACE (-)	-0.074***	-0.061***	-0.061***	-0.018***	-0.018***	-0.026***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Tangibility (+)	-0.116***	-0.160***	-0.160***	0.055***	0.057***	0.058***
	(0.009)	(0.009)	(0.009)	(0.013)	(0.014)	(0.014)
Profitability (-)	-0.197***	-0.280***	-0.280***	-0.006	-0.006	-0.006
	(0.019)	(0.026)	(0.026)	(0.004)	(0.004)	(0.004)
Firm Size (+)	-0.005***	-0.015***	-0.015***	-0.009***	-0.009***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Non-Debt Tax Shield (NDTS)	-	0.680***	0.677***	-	-0.013	-0.019
		(0.065)	(0.065)		(0.0065)	(0.065)
Inflation (-)	-	-	-0.011***	-	-	-0.003
			(0.002)			(0.002)
GDP Growth (+)	-	-	0.000	-	-	-0.007***
			(0.001)			(0.001)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	106,685	104,603	104,603	54,273	53,307	53,307
R^2	0.0972	0.1267	0.1268	0.1042	0.1025	0.1028

Overall, the robustness tests are conclusive, as neither the matching of treated and control companies, nor the use of a different control group, statistically alters the baseline results. From an economic point of view, though, it might be considered that the impact of the introduction of an equity tax shield amounts to approximately 2-7% rather than 4-7%.

6.3 Impact on Small and Medium Enterprises versus Large Companies

To determine which type of companies experience the highest impact from the introduction of an Allowance for Corporate Equity, the sample is split into two subsamples: small and medium enterprises (SME) and large companies. This split-up is done based on the SME definition of the European Commission. Small and medium sized enterprises are defined as those having less than 250 employees and total assets which do not exceed EUR 43 million. Large companies are defined as those exceeding one of those thresholds. The results of Table 6 show how the equity tax shield differently affects SMEs and large firms with respect to financial leverage.

Regressions (1) to (3) of Table 6 use the SME subsample; regressions (4) to (6) of Table 6 use the large company subsample. Comparing the ACE coefficients of the former with those of the latter, I observe that the impact of the tax reform on large companies has been slightly more substantial than the impact on SMEs. SMEs reduced their debt ratio with approximately 4.6%, whereas large companies lowered their leverage with approximately 4.9%. Furthermore, all results are statistically significant at the 1% level. These results are consistent with the financial constraint theory (a.o. Erickson and Whited (2000), Almeida and Campello (2007)), predicting that small firms are more financially constrained than large comapnies. Small firms are often younger and face more important credit constraints than large firms. Hence, they cannot be as reactive to equity incentives as larger firms. According to this theory it is therefore not surprising to observe a higher leverage decrease for large firms than for small and medium firms following the introduction of an equity tax shield (ACE variable). The R^2 statistic of the specifications indicates that the model better fits the large company data than the SME data.

6.4 Policy implications

As aforementioned, the introduction of an Allowance for Corporate Equity in Belgium actually served two goals. The official goal was to make capital structure decisions more tax-neutral. The results obtained according to the above estimations clearly show that companies adjusted their debt policy and balanced their capital structure further to the ACE introduction. I found that the ACE system encouraged companies to decrease their leverage by approximately 2 to 7%. Based on these results, it can be ascertained that the measure had the requested effect. The unofficial goal of the ACE system was to offer an alternative to the abolished special tax regime for coordination centers. Hence, it was intended to hold back multinational companies which established a coordination center in Belgium by offering them an equivalent tax advantage. The results found show that the tax reform has a more substantial impact on large companies than on small and medium enterprises. This provides some evidence that the Belgian government continues to favor MNEs.

The tax favor granted to MNEs is one of the reasons why the ACE measure has been criticised. From a theoretical point of view, similar results could probably be obtained by using a Comprehensive Business Income Tax (CBIT), disallowing the tax deduction of interest payments on debt. For a small economy, however, the latter system is not feasible as long as surrounding countries do not introduce a similar measure. The introduction of a CBIT system in a single country would potentially drain companies away. This argument leads to the idea of a combined ACE-CBIT system, which would grant partial but equal tax deductibility for the costs of both financing modes.

Another common criticism of the ACE system is related to its considerable cost for the Belgian public finances. Since the foregone tax revenues do not seem to boost the economy or serve any employment objective, the credibility of the measure is somewhat undermined in the eyes of the public. A simple analysis of the impact of the equity tax shield on investment does not provide significant results. Table 7 reports the results of regressing the investment ratio (i.e. investment over capital stock as defined in Eisner and Strotz (1963)) on country, time and ACE dummies as well as on sales growth, the debt ratio and the cash flow ratio. As none of the ACE coefficients are statistically significant, no clear-cut impact of ACE on investment can be determined. This is not surprising given that both new and old equity are used to compute the tax advantage. Hence, a company does not need to generate new investments to benefit from the tax reform. From a policy point of view this could be a painful aspect, especially in the aftermath of the crisis guided by fiscal consolidation.

Table 6: Small and Medium Enterprises versus Large Companies

The table reports leverage regression estimations, using a difference-in-differences strategy, to compare the impact on small and medium enterprises versus large companies. The regressions are estimated by Ordinary Least Squares (OLS). The dependent variable, Financial Leverage, is the ratio of financial debt to the book value of total assets. Country is a dummy variable that takes one if the company is located in an experimental country, zero otherwise. Time is a dummy variable that takes one if the company observation is done after the tax reform, zero otherwise. ACE is a dummy variable that takes one if the company is located in an experimental country and if the observation is done after the tax reform, zero otherwise. Tangibility is defined as the book value of tangible fixed assets over the book value of total assets. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization to the book value of total assets. Firm size is measured by the natural logarithm of total assets. Non-Debt Tax Shield is defined as the ratio of depreciation costs over total assets. Inflation is the annual percentage of inflation in consumer prices as measured by the World Bank. GDP Growth is the annual percentage of GDP per capita growth as measured by the World Bank. The industry dummy variables are based on two-digit SIC codes. Both coefficients and standard errors are reported. $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% level.

Dependent Variable	Financial Leverage					
	Small and Medium Enterprises			Large Companies		
	(1)	(2)	(3)	(4)	(5)	(6)
Country	0.092***	0.082***	0.083***	0.149***	0.148***	0.150***
	(0.003)	(0.005)	(0.005)	(0.010)	(0.008)	(0.014)
Time	0.029***	0.029***	0.031***	0.017***	0.016***	0.017***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.008)	(0.004)
ACE (-)	-0.048***	-0.047***	-0.044***	-0.051***	-0.050***	-0.046***
	(0.003)	(0.003)	(0.004)	(0.009)	(0.008)	(0.009)
Tangibility (+)	0.248***	0.240***	0.241***	0.088***	0.087***	0.087***
	(0.010)	(0.010)	(0.010)	(0.026)	(0.008)	(0.025)
Profitability (-)	-0.143***	-0.156***	-0.156***	-0.263***	-0.265***	-0.264***
	(0.018)	(0.021)	(0.021)	(0.029)	(0.008)	(0.028)
Firm Size (+)	-0.001	-0.001	-0.001	0.017***	0.017***	0.017***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.008)	(0.005)
Non-Debt Tax Shield (NDTS)	-	0.150***	0.145***	-	0.011	0.004
		(0.053)	(0.053)		(0.186)	(0.187)
Inflation (-)	-	-	-0.003	-	-	-0.009
			(0.002)			(0.006)
GDP Growth (+)	-	-	-0.005***	-	-	-0.006**
			(0.001)			(0.003)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	70,871	70,170	70,170	16,072	15,970	15,975
R^2	0.1096	0.1104	0.1107	0.1696	0.1689	0.1695

Table 7: Impact of an Equity Tax Shield on Investment

The table reports investment regression estimations, using a difference-in-differences strategy. The regressions are estimated by ordinary least squares. The dependent variable is the ratio of investment over capital stock. Country is a dummy variable that takes one if the company is located in an experimental country, zero otherwise. Time is a dummy variable that takes one if the company observation is done after the tax reform, zero otherwise. ACE is a dummy variable that takes one if the company is located in an experimental country and if the observation is done after the tax reform, zero otherwise. Sales Growth t-1 is the ratio of the change in sales over shareholder funds for the previous year. Cash flow ratio t is the ratio of cash flow over shareholder funds. Debt ratio t-1 is the ratio of total debt over shareholder funds for the previous year. Both coefficients and standard errors are reported. $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% level.

Dependent Variable	Investment Ratio		
	Full Sample	SME	Large Companies
Country	0.751	-0.224	1.634
	(0.692)	(0.189)	(2.282)
Time	-0.364	-0.047	-1.693**
	(0.454)	(0.085)	(1.007)
ACE	0.610	1.094	-0.772
	(1.104)	(3.430)	(2.113)
Sales Growth t-1	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)
Cash Flow Ratio t	-0.268***	-0.358**	0.057
	(0.006)	(0.165)	(0.063)
Debt Ratio t-1	-0.008***	0.103*	0.051***
	(0.001)	(0.061)	(0.013)
Industry dummies	Yes	Yes	Yes
N	32,451	25,837	6,614
R^2	0.1894	0.2511	0.3019

7 Conclusion and further research tracks

The debate on how taxes affect corporate financing decisions was after decades of research still not settled. This paper contributes to this debate by providing strong evidence of the impact of taxation on corporate debt policy. It proposes a new approach to the issue by taking advantage of a 2006 tax reform in Belgium introducing an equity tax shield. Such an equity tax shield or Allowance for Corporate Equity attributes a similar tax deductibility to the return on equity as to interest expenses. Hence, it sets an end to the tax discrimination between debt and equity. Examining the extent to which the removal of this tax discrimination impacts a company's capital structure, goes back to the core of the corporate tax distortion debate and offers therefore a unique opportunity to settle the issue.

To clarify the impact of the tax neutrality between debt and equity, I developed a simple model showing how the introduction of an equity tax shield affects the capital structure of a company. The model predicts that following the introduction of an equal tax treatment of debt and equity, companies lower their debt ratio. This prediction is evaluated quantitatively through the use of a difference-in-differences identification strategy comparing the capital structure of treatment and control companies before and after the tax reform. Hence, the sample consists of pre-treatment (2001-2005) and post-treatment (2006-2007) data for Belgian (treatment) and French (control) companies. In order to ascertain that the control group is adequate, capital structure trends are analyzed and a propensity score method is used to match treatment and control firms.

Consistent with the theoretical prediction, the empirical results report a significant negative impact of the reform on the leverage of companies subject to the equity tax shield. I found that the estimated impact is highly significant and that it amounts economically to a leverage decrease of approximately 2-7%, meaning that a traditional tax system encourages companies to use on average 2-7% more debt than when there is an equal tax treatment of debt and equity. Further extension of the analysis reveals that large companies experience a higher effect from the equity tax shield than small and medium companies.

Having established a strong relation between taxation and debt policy, it would be interesting to study the channels through which the ACE system affects a company's leverage. To explore these channels, additional data related to dividends and retained earnings should be collected, as they are not available in the current database. Moreover, in order to control for the potential effect of the former coordination center regime, it would be useful to identify those companies in the sample which benefited from the regime during the period 2001-2007. A relevant research track would also be to expand the analysis to the impact of the tax reform on the debt level of a company. This would allow to measure the effect of the treatment in absolute terms rather than in relative terms. Furthermore, in the wake of the financial crisis, it would be interesting to study the impact of the tax discrimination between debt and equity on the banking sector.

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