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Long-Term Effects of Distributed Profit Taxation on Firms: Evidence from Estonia

Master's Thesis

Master in Accounting & Finance (Corporate Financial Management)

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Abstract

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Five keywords:	Corporate taxation, Leverage, Liquidity, Investments, Dividends
Purpose:	The study aims to contribute to a body of research on specific corporate taxation system, distributed profit taxation, by examining whether the system has affected corporate behavior in the long term and if it has, to what extent.
Methodology:	Quantitative research using multivariate regression analysis models based on existing literature.
Theoretical perspectives:	Taxation as a determinant of corporate behavior; determinants of capital structure, liquidity, investment and dividend policies; pecking order theory; trade-off theory; financing costs; information asymmetry
Empirical foundation:	Firm-level panel data for 34.983 private companies from 7 countries for 2010-2016 as well as country-level data for the same period. Firm-level data retrieved from Bureau van Dijk's Orbis database, country-level indicators collected from public sources like the World Bank, OECD, Eurostat.
Conclusions:	The results partly corroborate previous literature but provide new evidence on the long-term effects of distributed profit taxation. We show that compared to classical gross profit taxation, companies operating under distributed profit taxation system have a lower level of external financing; higher levels of cash holdings; and that both cash holdings and investments are financed more from internal cash flows. We do not find distributed profit taxation to have a significant effect on investment activity. Additionally, we provide tentative evidence on dividend policy that indicates private company payout ratios may be negatively affected by the system.

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Introduction

The ways in which corporate taxation affects firm behavior has received a great deal of attention from researchers and policymakers. While the literature on corporate taxation is rich, research on the effects of distributed profit taxation (DPT) is scarce. Given the increasing competition among countries to design attractive tax systems and business environments (Devereux et al., 2002), research into the implications of DPT on firm behavior is relevant, or even especially so: DPT is generally regarded as a tax attractive corporate taxation system that other countries have considered adopting. Under DPT, firms may reinvest profits tax-free and corporate income taxation is imposed only on profit distribution, which is contrary to classical gross profit taxation (GPT) where profits are fully taxed when earned. The DPT system is therefore expected to have the greatest impact on profitable and fast-growing firms by strengthening the equity base and stimulating investment activity.

The DPT system was pioneered in Estonia in 2000, where it has remained in force ever since. The main aim of the reform was primarily to incentivize investments through tax breaks on reinvested profits, and secondly to stimulate the supply of internal and external capital to finance investments. Since its implementation, the system has received ample international attention. Estonia has consistently ranked very high in the International Tax Attractiveness Index as well as in the International Tax Competitiveness Index, with both indices specifically highlighting the favorability of the corporate taxation system. The system has recently been adopted also by Georgia in 2017 and Latvia in 2018, while other countries such as Macedonia and Moldova have shortly experimented with it.

Earlier empirical firm-level research (Masso et al, 2010; Hazak, 2007) has focused on investigating the effects of the tax system change from GPT to DPT on firms' capital structure, liquidity and investment activity by employing difference-in-difference methods. Both of the studies found a significant impact of the DPT on firms' investment activity, capital structure and liquidity. They suggest that the reform led to an increase in investment activity, equity capital and liquidity while decreasing leverage. Neither of the studies were able to address dividend payouts explicitly due to the unavailability of data, although it has been acknowledged this would have been a highly desirable research goal. In addition to empirical firm-level studies, a number of studies have either investigated

the impact of the reform on a macroeconomic level through theoretical modeling (Masso and Meriküll, 2010; Funke and Strulik, 2003) or carried out qualitative research (Jürgenson and Kuusk, 2010; Jürgenson et al, 2010).

While these studies have contributed to the understanding of the effects of DPT, the research in the area is still scarce overall. We believe it is worthwhile taking a fresh look into the effects of DPT for a number of reasons. We are primarily interested in observing whether the impact of DPT is observable today nearly 20 years after the reform and if so, to what extent. Secondly, we take a more thorough look into the ways investments and cash holdings are financed under DPT by using the investment-cashflow and cash-cashflow sensitivity models adapted from Almeida et al. (2004) and D'Espallier et al. (2008) that are based on the financial constraints approach pioneered by Fazzari et al. (1988). Last but not least, we try to investigate the impact of DPT on dividend payout patterns, which to large extent has not been addressed in the literature.

In order to get robust and insightful evidence on the effects, we must address several inter-related fields. We will focus specifically on four areas: capital structure, liquidity, investment and dividends. Because of the stated aims of the DPT system, these areas are the most interesting targets of the study.

Given the focus of the thesis and the uniqueness of the system, the study is designed in a cross-country framework. As the system has only been in effect over a longer period of time in Estonia, all firms exposed to DPT are sampled from there. We use OLS estimation techniques on rich firm-level panel data that consists more than 220.000 firm-year level observations, sampled from seven countries over a period of 2010-2016. Tax system effects are observed through a dummy variable whilst controlling for key firm-, industry- and country-level determinants. Given the study timeframe, we do not employ the difference-in-difference method, which would otherwise be preferable in this type of study.

The paper is composed of seven major sections. First, we give a deeper overview of the nature of the DPT system and its background in Section 1, followed by an overview of the theoretical framework tied with expectations for the outcomes of the empirical analysis of the study in Section 2. We then address our methodological approaches and challenges in Section 3, followed by an overview of the data used in the regression models in Section 4. Section 5 summarizes aspects of the development of firms under DPT in

Estonia since 1996. Section 6 introduces the key results of the regression models in the context of the expectations and literature review. Finally, in Section 7 we summarize important findings as well as outline limitations of the study and propose areas of further research.

1. Distributed profit taxation

The foundation of the current corporate income tax system in Estonia was laid in 2000 when the classical GPT system was replaced by DPT[1] system. The key difference of the DPT in comparison to the GPT system is that the profits are taxed when distributed, not when earned (see Table 1 for comparison of the systems at different dividend payout ratios). In the case of Estonia, corporate income tax (CIT) is levied on various kinds of profits distributions such as dividends, share buy-backs, capital reductions, liquidation proceeds and other profit distributions. While assuming 20% CIT rate, 100% payout ratio and 100 euros of distributable profits, firm operating under DPT system can distribute 80 euros (after-tax) to shareholders whilst paying 20 euros of CIT, payable by the distributing firm. If profits are distributed fully, total taxation or dividends would not differ from the classical GPT assuming equal CIT rate and full dividend tax exemption for the GPT system. If profits are not fully distributed, tax costs for firms operating under DPT are proportionally lower to the extent profits are not distributed. From the Estonian perspective, this tax is still considered CIT and not capital gains tax although the true nature of it is debatable. Dividend payments are limited by the level of retained earnings, availability of liquid funds and can be postponed indefinitely subject to the choice of the shareholder(s). Companies are not subject to separate tax depreciation rules or to investment tax credit or loss carry forward rules.

[1] The reform did not change the taxation of income of natural persons who continued to pay income tax when income was earned.

Table 1. Comparison of DPT and GPT

Pay-out ratio	Scenario 1 0%		Scenario 2 50%		Scenario 3 100%	
	DPT	**GPT**	**DPT**	**GPT**	**DPT**	**GPT**
CIT rate	20%	20%	20%	20%	20%	20%
Earnings before tax	100	100	100	100	100	100
Tax on earnings	0	-20	0	-20	0	-20
Net profit	100	80	100	80	100	80
Pay-out rate (on net profits)	0%	0%	50%	50%	100%	100%
Payable to shareholders	0	0	-40	-40	-80	-80
Tax on distribution	0	0	-10	0	-20	0
Retained earnings end balance	100	80	50	40	0	0
"Tax saving" under DPT	20		10		0	
Retained balance differece	**25%**		**25%**		-	

Source: Author's own calculations
Notes: Full tax exemption of dividends is assumed under GPT.

While some experts (Sander, 2003) argue that Estonian corporate taxation could be viewed as a combination 0% CIT tax and 20% dividend tax, in legislation the tax system is still defined as postponed CIT and full dividend tax exemption. The tax itself is also payable by the distributable company and not the dividend receiver.

1.1. Key implications of DPT

The key benefit of DPT is that reinvested profits are not taxed. If a firm has attractive projects, defined as those equal to or exceeding the required rate of return, it can use more money in investing into these projects than it would under the classical GPT system ceteris paribus. This is illustrated in Table 1. In case a firm is not distributing any dividends (Scenario 1), it will able to save the amount (referred to as "tax saving") which under classical GPT system would be paid for taxes. Hence, the key beneficiaries of DPT system are fast growing and profitable firms. The more profitable investment projects the company has, the larger the relative value gain in comparison to the GPT system. Therefore, firms operating under DPT may have an advantage for development in comparison to the firms operating under GPT, given similar CIT rates. DPT allows the accumulation of more liquid funds which can be deployed when investment opportunities arise, and in principle, it reduces the likelihood of the firm abandoning projects due to the insufficient availability of internal funding. Since the ability to raise external capital often also depends on the extent of internal funds, DPT may also help to raise more external

capital, thereby again allowing to undertake more attractive investment projects than under GPT. DPT may also be beneficial to mature firms, especially for those facing larger information asymmetries, as it enables to build up reserves quicker for future investment projects and reduces the need to raise expensive external financing.

In instances when all profits are paid out, the firm value at investor level is, ceteris paribus, the same under both systems as the total after-tax cash flow is the same (see Table 1, Scenario 1). This has also been shown through theoretical modeling performed by Hazak (2007). In instances where payout ratios are less than 100% DPT system will mechanically increase the share of retained earnings in capital structure when compared to the level of retained earnings under GPT (see Table 1). Therefore, the effect of DPT is most likely to be observed from retained earnings levels.

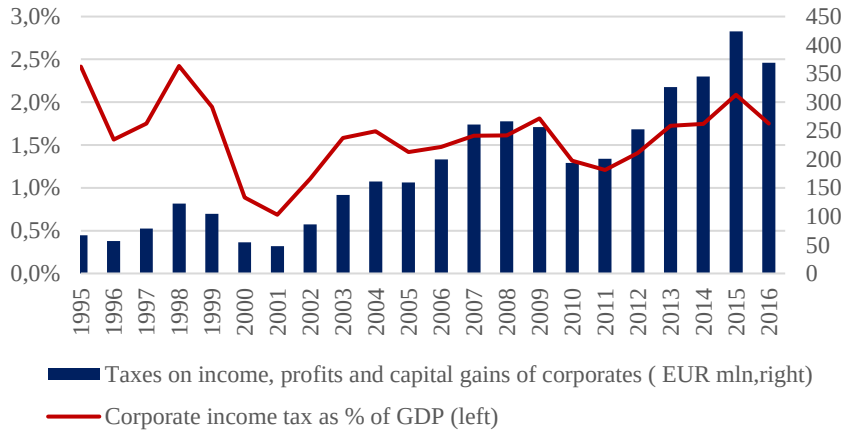
1.2. Background of the reform

In 2000, the tax reform was experimental and novel in its nature – at the time, no other country had implemented a similar system. The central motivation underpinning this reform was to incentivize and facilitate local corporate investment activity as well as attract foreign investment through a favorable business environment. Increased capital inflow was expected to aid job creation, economic development and boost economic growth. Tax reform aimed also to achieve greater tax neutrality and to minimize tax-induced distortions, thereby creating a simple and transparent tax system (Kuldkepp, 2005). The reform also significantly reduced double taxation of profits, reducing the aggregate tax burden. A secondary aim of the reform was to reduce compliance and administration costs on firm as well as state level (Praxis CASS, 2010) as DPT significantly reduces profit tax-related reporting efforts. Interestingly, the government did not carry out any in-depth quantitative macroeconomic analysis of the potential effects of the reform or set any specific measurable goals that the reform should achieve (Jürgenson and Kuusk, 2010).

Although the tax revenues from the corporate income tax were projected to fall, it was expected to be offset by the increased levels of private income and social tax revenues induced by higher levels of private income, and by increased levels of value added tax induced by higher levels of private consumption (Jürgenson and Kuusk, 2010). The

amount of CIT collected did drop noticeably after the reform in 2000 and 2001 before leveling at around 1.5% of GDP[2] during the 2000's (Figure 1).

Figure 1. Corporate taxation in Estonia



Source: OECD, Statistics Estonia

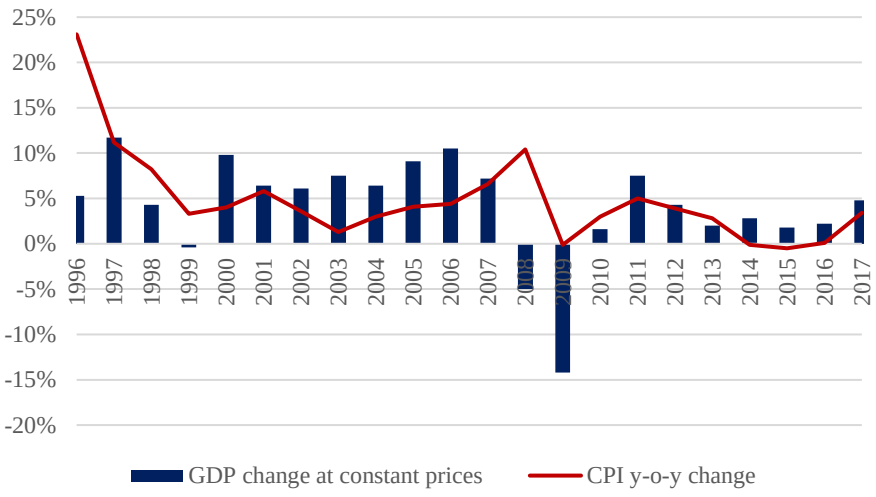
In subsequent years of the tax reform, Estonia went through a period of fast economic development and living standards improved significantly; GDP per capita grew from 45% of the EU27 average in 2000 to 67% in 2008. In 2004 Estonia joined the EU, which further boosted the economic growth. During 2000-2008 the government continued its economic policy that promoted liberal trade and investment laws, the balanced state budget and favorable business climate. Notably, the CIT rate was further gradually reduced by 5% points from 26% to 21%.

During 2000-2008 real GDP grew at around 7% annually (Figure 2) up until the financial crisis. Estonia was severely hit by the crisis with real GDP dropping nearly 15% in 2009. The government decided not to soften the impact of the crisis by issuing government debt, contrary most countries' reaction, but stood by its principle of a balanced state budget with minimum external borrowing. This accelerated the recovery from the crisis and the economy returned to growth in 2010. In 2011 Estonia successfully adopted the euro.

[2] Taxes on dividends made up 70% - 80% on the total corporate income tax paid according to Praxis CASS (2010).

Estonia's own currency, the krona, had been pegged to the euro since 1996 at a fixed rate of 15.6466 EEK/EUR[3].

Figure 2. Estonian GDP Growth and CPI % change 1996-2016



Source: Statistics Estonia

The uniqueness of the tax system makes it difficult to study the macro- and microeconomic consequences of the system. The general sentiment is that the reform did play a role in the economic development, but that the effect was bigger in early years of the reform (Jürgenson and Kuusk, 2010). Funke (2001) and Funke and Strulik (2003) wrote on the expected effects of the Estonian system using partial and general equilibria models. They concluded that the reform would stimulate investment, raise corporate productivity and possibly favor the accumulation of capital. This modeling result was roughly in line with the Cummins et al. (1996) empirical results which showed that investment generally responded favorably to a reduction in tax burden. These results were confirmed by Masso and Meriküll (2010) study which used a theoretical simulation[4] of the neoclassical macroeconomic model to assess the effects of the tax reform. Results indicated that the tax reform led to a 9.1% growth in net capital account, 1.4% growth in consumption and 2.9% growth in GDP.

[3] Prior to 1996 the krona was pegged to the German mark.
[4] The simulation was part of a major study conducted by Praxis and CASS (2010) aimed to assess the effects of the tax reform.

2. Prior research and study expectations

In this section, we will provide an overview of the existing research on the implications of corporate taxation on leverage, liquidity, investment and dividend payouts – areas in the focus of this study. We will also formulate generic expectations for the empirical study based on the discussed theoretical frameworks and literature.

Leverage

Capital structure research is one of the staples of corporate finance literature. Since Modigliani and Miller (1958, 1963) pointed out that their irrelevance theorem does not hold when real world frictions are introduced, taxation has been an integral consideration in research. Despite extensive research, there is no definitive understanding of how companies choose to finance their capital. The central theories addressing capital structure decisions are the pecking order theory (Myers and Majluf, 1984), trade-off theories (Kraus and Litzenberger, 1973) and agency theories, such as market timing theory (Baker and Wurgler, 2002). As market timing relates predominantly to public companies and our analysis centers on private companies, our analysis focuses on the pecking order and trade-off theories in DPT framework.

Pecking order theory suggests that due to progressively costlier capital resulting from information asymmetries, companies tend to finance operations primarily with internal funds and prefer debt to equity finance if external sources must be used. Empirical studies have often found evidence consistent with this hypothesis, e.g. Chaplinsky and Niehaus (1993) who concluded that a strong negative correlation between leverage and free cash flow supports the theory, or Amihud et al. (1990) who observed that firms are more likely to use internal funds than equity in acquisitions.

Conversely, the trade-off theory implies that due to the tax-shield effects of debt, a hypothetical optimal capital structure exists for each company wherein the tax advantage of debt is maximized while bankruptcy costs are minimized. Some evidence for seeking such an optimal capital structure is given by partial adjustment models like Jalilvand and Harris (1984), suggesting that companies' leverage decisions are driven by at least a limited adjustment to long-run financial targets. Using simultaneous equation models,

Shyam-Sunder and Myers (1999) find strong preference for the pecking order while Vogt (1994) fits the two theories effectively together, finding that financing constraints may induce pecking order behaviour but in the absence of information asymmetries may more freely adjust themselves to long-term financial targets, suggesting a trade-off preference.

Prasad et al. (2001) note that while no consensus exists whether either theory is superior, modern empirical research has shown that regardless of capital structure, retained earnings i.e. internal funding is the foremost source of financing in industrialized countries. As a caveat, we note that these findings are not entirely unilateral. Anderson (2002) found a positive link between long-term leverage and holding liquid assets, which they theorized to be related to a corporate strategy of holding predetermined levels of liquid assets and a consequent unwillingness to finance operations with internal finance past such a level. It is possible to relate this to DPT in that companies under this tax scheme would be incentivized to follow such a type of strategy of increased leverage by having access to increased liquidity. It would be surprising to find support for this strategy given the prevalence of pecking order theory, however.

We note that besides tax shields created by the tax deductibility of debt, non-debt tax shields also factor into the relevant implications of our study because it is possible they may be utilized as a substitute or in addition to regular tax shields under DPT framework. DeAngelo and Masulis (1980) noted that that availability of accounting tools such as depreciation deductions, depletion allowances and investment tax credits should affect debt ratios: firms with higher amounts of non-debt tax shields, working as a substitute for tax benefits of debt, elect to have lower leverage. However, there has been some controversy in subsequent research: while Titman and Wessels (1988) found no link between debt ratios and non-debt tax shields, a number of contemporary research papers (Köksal et al., 2013; Harris and Raviv, 1991) have found evidence that the connection exists.

Fitting this evidence into the DPT framework, we would expect to see a reduction of external financing, including debt financing, under both pecking order theory and trade-off theory. Through tax savings on reinvested profits, DPT increases the share of equity financing in total capital structure. Compared to companies using GPT, DPT further enforces the use of internal financing for firms preferring equity financing and reduces the value of debt and non-debt tax shields for firms preferring debt, because the value of

debt and non-debt tax shields is reduced proportionally to the extent to which profits are not distributed. This shifts the hypothetical optimal capital structure towards equity financing.

Liquidity

Opler et al. (1999) write that given market frictions, value-maximizing firms set cash holdings at a level where the marginal benefit of the liquid assets equals the marginal cost of holding them. Holding liquid assets confers a liquidity premium, i.e. the costs incurred by lost opportunity when assets are not invested; on the other hand, the main cost-benefits of holding cash are being able to finance investment readily if other sources are not available or are costlier as well as save in transaction costs that would have incurred by liquidation of assets necessary to finance investment (Keynes, 1936).

Jensen (1986) argues that excessive liquidity may lead to sub-optimal investment decisions by the management, although this hypothesis has received considerable criticism as well (Opler et al., 1999; Chaplinsky and Niehaus, 1993). However, some support for the hypothesis regarding DPT was observed in Masso et al. (2010) whose results show that investments grew more in small firms while productivity grew relatively less, implying that these firms had not invested in the most effective way. Maheshwari and Rao (2017) have demonstrated that cash flow, dividend payments and net debt and equity issuances are major determinants of higher levels of cash holding. Conversely, leverage, capital expenditure and net working capital all had a negative correlation with liquidity, which is also in line with the findings of Opler et al. (1999).

Liquidity also has an integral part in investment literature, especially in empirical research that builds on Fazzari et al. (1988). For instance, Kashyap et al. (1994) demonstrate that liquidity has a strong effect on investment. Other implications are discussed in the investment section below, but we note that in the absence of attractive investment opportunities in the present, firms may still be inclined to accumulate funds in anticipation of future investment opportunities (Opler et al., 1999), due to the relatively higher costs of raising external financing compared to internal financing in the framework of pecking order theory.

Following from above, in the context of DPT, we would expect to see a positive effect on cash holdings related to the tax credits given to retained profits under DPT. Firms operating under DPT are ceteris paribus able to retain more cash and build cash reserves faster than under GPT.

Investment

Modern views on investment policy were shaped by Tobin's (1969) general equilibrium model with Hayashi's (1982) addition of convex adjustment costs, whose contributions are known in current literature as the *q*-theory of investment. Although its use has faced criticism (Erickson and Whited, 2000; Gala and Gomes, 2016), the theory remains a common way to study investment. In the model, *q* represents the ratio of company market value to the book value of assets, which cannot be tested for private companies. However, the implications of extant research on the theory hold for this study inasmuch *q* reflects corporate investment behavior generally.

Fazzari, Hubbard and Petersen (1988) found that including capital market frictions means that cash flow effects in e.g. investment tax credits and depreciation allowances have a significant effect on investment. Assuming rational behavior on the part of management, we expect companies to exploit the unique taxation system where it is beneficial. The key benefit of DPT is the exemption, or postponement, of corporate income tax on reinvested profits. Hence, firms with attractive investment opportunities may gain advantage through improved funding opportunities, as these firms can invest more often or in larger extent than they would under GPT. Furthermore, certain investment projects that would not be attractive under GPT, could become attractive under the DPT owing to the positive value effect of the "tax saving" (see Section 1.1). An additional implication of modern *q*-theory is that debt overhang and the costs of external equity depress investment (Hennessy et al., 2007): we therefore expect the effect of DPT to decrease these constraints on investment, encouraging investment. Although DPT strongly favors profit reinvestment, the extent to which the funds are used in investment projects still depends largely on the availability of investment opportunities.

We note as a caveat that expectation setting with investments are cautious because the prediction of causal investment patterns by regression analysis is especially problematic.

Denis (2015) emphasizes that common investment theory has inherent endogeneity problems in that the negative effect of e.g. leverage on investment is challenging to prove because it is possible that a highly leveraged firm simply operates in an environment of poor growth opportunity and invests less because of that, rather than debt overhang specifically.

Dividends

Lintner (1956) and Miller & Modigliani (1961) have laid much of the current understanding of the determinants of corporate dividend policy. Their work suggests that since stock prices are highly sensitive to any fluctuations in dividend payments, managers tend to plan for long-term payout ratios. Furthermore, they argue that dividends tend to be "sticky" and dividend payments are affected by the investor level taxation. Although dividend policy has been a widely researched topic in the intervening years, no consensus exists on a theoretical optimal payout policy. Furthermore, most of the research has focused on the dividend payment patterns of public firms and the research on the effects of taxation on dividend payouts among private firms specifically is limited.

Major general determinants of dividend policy have been outlined by Barclay et al. (1995). They show that a company's tax position, available investment opportunities, and signaling effects play a role in dividend policy decisions. Corporate and investor level taxation make paying dividends costlier than repurchases; signaling is a traditional way for management to project confidence; and investment opportunities available to a company also depress the dividends they are willing to pay out. The effect of taxation on dividends has also been shown to be significant by Poterba (1987). Takeaways for this study is that previous research shows a negative correlation between dividend payments and the applicable marginal tax rate rather than a connection with the actual method of collection, i.e. with the amount of taxation rather than its timing. Furthermore, the evidence from Barclay et al. (1995) implies that financial constraints may have a negative effect on dividend payment.

A survey conducted by Brav et al. (2005) confirms that maintaining the level of dividends remains a priority for managers in public companies and that taxation questions matter but are a secondary determinant. Importantly to this paper, they also note that the main

difference in private companies arise from a reduced information asymmetry and agency problems, as private companies cut dividends more readily and redirect funds to investment when profitable opportunities arise.

In the context of DPT, the optimal dividend policy may deviate from that under the GPT system by the ability to time tax payments. Optimal dividend policies in DPT framework were investigated by Hazak (2007) through theoretical modeling, which accounted for probability of future losses, company and investor level taxes and investor's consumption levels. He showed that if the probability of future losses is zero, it is optimal under DPT to distribute profit when earned equal to or less than the investor's consumption level. If the probability of future losses is noticeable, in most cases the company value for the investor is maximized if profit is fully distributed when earned, except when investor's consumption level exceeds the dividends received, remains above the discounted amount of potential losses. In the latter case, the company value is maximized when dividend distribution does not exceed the investor's consumption. His theoretical analysis shows that in general DPT appears to motivate firms to retain more profits. Hazak pointed out that retention of profits in the firm and earning interest revenue on the pre-tax profit is preferable to the profit distribution and earning interest revenue on the after-tax profit at the investor level. Furthermore, he also concludes that as the tax payments are decided at the discretion of investors, thereby creating valuable flexibility for investors, which may also lead to emotional decisions to retain profits rather than distribute them.

In the survey-based questionnaire looking into entrepreneurs' judgment on the reform (Jürgenson et al 2010), approximately 40% of the firms claimed that the DPT did impact their payout decisions without identifying the direction of the effect. In conclusion, the effect of DPT system on dividend payouts is difficult to assess given very limited prior research but drawing from somewhat related research and the theoretical modeling of Hazak (2007) it would be hard to find motivation for a positive impact.

2.1. Overview of DPT-related research

Overall, the number of studies on the consequences of DPT on either micro or macro-level is limited. One of the most versatile studies on the effects of DPT on the micro and macro level was conducted by Praxis, a socio-economic research center in Estonia, in collaboration with the Centre for Applied Social Sciences of University of Tartu (Praxis CASS 2010). The study was composed of focus group interviews on the anticipated and realized effects of the reform (Jürgenson and Kuusk, 2010), web-based questionnaire and interviews looking into entrepreneurs' judgment on the reform (Jürgenson et al., 2010), theoretical macroeconomic simulation aiming to assess the effects on macroeconomic level (Masso and Meriküll, 2010), empirical firm-level research (Masso et al., 2010) and study on the effects of tax reform on the state tax revenues (Kaarna and Lasn, 2010). The overall conclusion of the study was that the reform had a positive effect on investment activity, productivity and GDP growth but to a lesser extent than expected. It also highlighted the importance of the 'reporting improvement effect' of the reform. Apparently, the reform reduced significantly the practice of profit hiding in financial reporting, thereby providing a fairer picture of the true financial performance of the firms, which in turn may have affected also the firms' ability to raise external capital.

The key results of the empirical firm-level analysis, which investigated the outcome of the reform on Estonian firms in a difference-in-difference setting by using Latvian and Lithuanian firms as a control group are shown in Table 2. Hazak (2007) conducted a similar before and after tax-reform study without the use of a control group – Masso et al (2010) argue that Hazak's approach of not using the control group may have significantly overestimated the reform effect on liquidity and liabilities to total assets and underestimated the effect on retained earnings.

Table 2. Research findings on the effects of DPT

	Masso et al (2010) Data from 1996-2004	**Hazak (2007)** Data from 1995-2004
Capital structure	The share of liabilities and debt in total capital reduced approximately 10% and 7% respectively. The effect is slightly stronger (+1% point) for small firms*.	The share of liabilities decreased approx. 5.1%, loan liabilities decreased 3.3%.
Liquidity	Increase of cash and equivalents of 2-3%. The effect is twice as large for small firms.	Increase of cash and equivalents of 1.3%.
Capital structure/ Dividend policy**	Share of undistributed profits (retained earnings) and reserves in total capital grew by 15%. The effect is twice as large for small firms.	3.4% increase in the share of retained earnings in the total capital employed.
Investments	Increase in investments by 15%. The effect is significantly stronger among small firms and for very big firms.	Not in the study scope of Hazak (2007).

*Small firms defined those with less than 50 employees

**While neither of the studies implicitly studied the payout ratio (possibly because such data was difficult to obtain), the studies did investigate the changes in the ratio of retained earnings to total assets, which does entail the implications of DPT on dividend payouts but does not allow to separate the effect of tax saving from the changes in dividend payouts potentially caused by the DPT itself.

Although results vary in magnitude, both studies indicate a decrease in external capital, including debt capital, and an increase in liquidity and in retained earnings. The biggest effect is observed in retained earnings and investment rates, which grew in total 15% points in comparison to the control group over the course of four subsequent reform years according to Masso et al (2010) research. The results are consistent with the expected effects of DPT, considering the average firm profile at the time. Firms with good growth opportunities yet restricted access to financing were able to direct more funds into investment projects.

Neither of the authors were able to investigate explicitly the dividend payout ratios. The observed positive effect of DTP on retained earnings may not be fully caused by the change in dividend payment patterns. The ratio of retained earnings to total assets is used more as a measure to demonstrate the increase of internal financing used in total capital structure. Nevertheless, in the presence of attractive investment opportunities and in absence of set dividend policies, as manifested in the study of Trumm (2005), which investigated the dividend payment patterns among Estonian firms in early 2000's, dividend payments were likely reduced.

A survey-based study conducted by Sander (2003) in early 2000's indicated that Estonian firms preferred to finance their operations through internal equity, followed by debt capital and external equity as the last option – supportive of the pecking order theory and similar to the financing preferences of firms from other major developed economies. The same study concluded that the key factors of trade-off theory such as taxes and bankruptcy costs turned out to be relatively unimportant in financing and investment decision in comparison to the results of the same survey conducted among US managers, possibly so due to the reduced tax advantage of debt under DPT.

Regardless of which theoretical framework is shaping the financing structure of the firm, DPT provides preference to internal funding, which is also manifested in the studies of Masso et al. (2010) and Hazak (2007), indicating a decrease in the use of external capital and debt capital. Furthermore, Masso et al. (2011) provide evidence that DPT improved firm survivability during the 2007-2008 financial crisis through increased liquidity and reduced indebtedness.

2.2. Country-level factors in cross-country studies

As this paper is a cross-country study aiming to isolate the effects of taxation system from other country-level effects, we look at existing research using similar methods or data and give a brief overview of the main country-level variables that have been shown to be a significant factor in corporate decisions relating to capital structure, dividend policies and investments. While traditional analysis of the determinants of company behaviour has focused mostly on firm-level effects like financial metrics, information asymmetry or agency considerations, contemporary research (Köksal et al., 2013; Antoniou et al., 2008; Booth et al., 2001; Demirgüç-Kunt and Maksimovic, 1999) finds that country-level and macroeconomic factors are also significant. De Jong et al. (2008) also noted that at least for capital structure decisions the reach of country-specific effects is in fact two-fold by affecting company behavior both directly as well as indirectly through influencing firm-specific determinants, i.e. that variables like state-level economic development can reinforce firm-level behavior determinants like profitability. Overview of the country level variables used in the cross-country studies is relevant for the regression specification as they help us to select an appropriate group of country-level control variables.

The effect of a country's taxation system has received ample attention, especially in terms of its effect on aggregate company leverage (Temimi et al., 2016; Fan et al., 2012; Heider and Ljungqvist 2012). Most recent research has confirmed that consistent with theory, firms tend to increase leverage when they are able to exploit positive tax gains such as debt-related tax shields and non-debt tax shields. Overesch and Wamser (2010) also found that in their sample in Eastern Europe, cutting tax rates attracted foreign subsidiaries and capital but did not result in significant loss of tax revenue: an indication that tax policy can be used as a tool to attract capital.

Robust institutional and governance structures such as of rule of law, corruption, institutional efficiency and reach of the judicial system, and the extent of creditor rights and shareholder rights have been shown to affect corporate behavior. Even though countries often have idiosyncratic institutional effects, research shows that in aggregate higher institutional and governance quality correlates positively with the corporate use of debt due to the availability of credit and reduced information asymmetry (Belkhir et al. 2016). As a caveat, both Belkhir et al. (2016) and Fan et al. (2012) also found that countries with high levels of corruption specifically were also more likely to use debt than equity because expropriation of wealth is relatively easier from equity holders than debt holders. Brockman and Unlu (2009) also found a strong link between creditor rights and dividend policies. They conclude that creditor rights establish "the balance of power between debt and equity claimants. Creditors demand and managers consent to a more restrictive payout policy as a substitute for weak creditor rights in an effort to minimize the firm's agency costs of debt". Similarly, Antoniu et al. (2008) noted that a country's legal and financial traditions were important capital structure determinants in both market-oriented and bank-oriented economies.

The maturity and activity of the local financial market is also an integral country-level control in cross-country studies. This is often captured by different economic ratios such as stock market capitalization to GDP or domestic credit to private sector as % GDP for debt markets (Köksal et al. 2013). Some researchers utilize more straightforward metrics like M&A activity (Antoniu et al. 2008) or the Lerner index which measures competition in the banking industry (Temimi et al., 2016). Antoniu et al. (2008) especially emphasize that capital market controls are important because they represent the funds available to

the corporate sector. This applies especially to cross-country studies, where domestic capital availability will always be somewhat idiosyncratic.

The broader macroeconomic measures such as inflation and GDP and GDP growth are often found to be used as controls for leverage models. However, for investment or dividend payments the evidence of macroeconomic factors is more tenuous – Djankov et al. (2010) note that for investment no reliable effects were found. Evidence of the effect of taxation on investment is more conclusive – e.g. Djankov et al. (2010) and Schwellnus and Arnold (2008) have shown a negative impact of tax rates on investment through a raised cost of capital. On a broader level, Cummins et al. (1994) conversely showed that most economies in their sample were responsive to tax reform easing the tax burden.

Recent cross-country research in dividends has often concentrated on behavioral aspects. Breuer et al. (2014) and found risk aversion correlated with higher dividends; conversely, Fidrmuc and Jacob (2010) found that cultures of high individualism and low uncertainty avoidance pay higher dividends. Brockman and Unlu (2009) found an institutional link by establishing that countries with high creditor right protection also pay higher dividends because agency costs of debt are smaller. We make a special note, however, that these studies concentrate on public companies. Researchers like Brav et al. (2005) note that payout ratios are usually lower for private companies and respond to investment opportunity faster.

Table 3. Summary of selected cross-country research papers

Authors	**Purpose**	**Result**
Taxes and leverage		
Fan, Titman and Twite (2012)	Cross-country study (39 countries) of the effects of institutional environment on firm's capital structure.	Countries' legal and tax systems, corruption levels and preferences of capital suppliers provide statistically significant explanations to cross-country differences in leverage and debt maturities. Weaker legal systems and higher corruption levels are associated with more leverage and shorter maturities. Higher tax gains from leverage (tax rates) are associated with higher usage of leverage.
Abate et al (2014)	Cross-country study (EU countries) investigating the country effects on leverage	There are firm, industry and country level effects on leverage. Key firm level influencers are profitability (-), liquidity (-), availability of non-debt tax shields (-), size (-). On country and macroeconomic level, they find evidence of following effects; level the creditor protection rights (+), shareholder protection (-), level of development of the financial system (+), inflation (-), economic growth and capital formation (+).

Authors	Purpose	Result
Heider and Ljungqvist (2014)	Estimating the tax sensitivity of leverage from state tax change (US-based study)	Tax effects on leverage are asymmetric: tax increases lead to a permanent increase in leverage while decreases do not. Tax sensitivity is greater among profitable and investment-grade firms which respectively have a greater marginal tax benefit and lower marginal cost of issuing debt.
Temimi et al. (2016)	Cross-country study (1317 companies across the Middle East and Asia) estimating effects of the tax status of countries on leverage	Taxation had direct and indirect effects on leverage: effects of tangibility and GDP growth were improved while effects of profitability and liquidity were weakened. Growth opportunities and leverage or size and leverage were not responsive to taxation.
Belkhir et al (2016)	Cross-country study of 444 firms in the MENA region, investigating firm and country level determinants of leverage	Size, asset tangibility, profitability, taxes, and growth were associated with leverage, consistent with trade-off and pecking order theories. Strong financial systems, rule of law, and regulatory effectiveness were main determinants of higher leverage. Corruption was also correlated with greater leverage.
Antoniou et al. (2008)	Cross-country study (UK, US, Japan, France, Germany) on leverage determinants in market or bank-oriented economies.	Leverage was positively affected by tangibility and size, but negatively with an increase in firm profitability, growth opportunities, and share price performance in both types of economies. The degree and effectiveness of these determinants were dependent on the country's institutional strength, market conditions and taxation system.
Taxes and investment		
Arnold and Schwellnus (2008)	Effects of taxation on productivity and investment at firm level.	Corporate taxes have a substantial negative effect on investment and productivity. All firms except those that are both small and young see their productivity growth reduced by high corporate taxes.
Cummins et al (1996)	Cross-country study in 14 OECD countries to analyze the effect of tax reform on fixed investment	Using the Q model of investment, tax reforms were used to investigate changes in marginal incentives to invest: fixed investment was responsive to the change of tax scheme in 12 out of 14 countries.
Djankov et al. (2010)	Cross-country study of 85 countries on the impact of effective tax rates on aggregate investment and entrepreneurial activity.	Effective corporate tax rate had a robust negative impact on aggregate investment, FDI, and entrepreneurial activity. Rates were also correlated with investment in manufacturing, but not services.
Dividend policies		
Breuer et al (2014)	Cross-country study of the relevance of behavioral patterns on dividend policy	Loss aversion and ambiguity aversion were positively correlated with dividend payouts, while more patient investors preferred lower dividend ratios. Some evidence of coexistence of behavioral and cultural variables as determinants of dividend policy.

Authors	Purpose	Result
Brockman and Unlu (2009)	Cross-country study from 52 countries on the importance of principal-agent relations.	Creditor rights influenced dividend policies by "establishing the balance of power between debt and equity claimants. Creditors demand and managers consent to a more restrictive payout policy as a substitute for weak creditor rights in an effort to minimize the firm's agency costs of debt."
Fidrmuc and Jacob (2010)	Cross-country study in 41 countries, cultural agency determinants of dividend policy	High individualism, low power distance and low uncertainty avoidance were significantly correlated with higher dividend payouts.
Shao et al. (2010)	Cross-country study from 21 countries on the importance of national culture on dividends	Dividend policy is affected by two dimensions: the severity of agency and asymmetric information problems within a firm, and by management's and investors' subjective perceptions of them, which hinges on cultural background.

3. Methodology and study design

The aim of this study is to explore the long run effects of the DPT on firms. Earlier studies (Praxis CASS, 2010; Hazak, 2007) that focused on the time periods close to the tax reform years have shown that DPT had been linked to a reduction in leverage and an increase in internal funding. They also noted that tax reform led firms to retain more cash in liquid funds as well as invest more. We aim to investigate whether systematic differences can be observed today, ca. 20 years after the introduction of this tax system. Given this focus of the study, we could not construct the methodology around the tax system change event and employ difference-in-difference methods, which would generally be preferred in this type of study. As another option, this study was set up in a cross-country framework. A major implication of this is the inability to introduce firm-level fixed effects into the model to control for cross-sectional heterogeneity. Firm-level fixed effects cannot be introduced simultaneously into a model with other fixed effects such as industry dummies and country-level variables. These economy-wide variables could not be left out of the study either, as then we could not control for important macro-level determinants of cross-country variation in independent variables. Moreover, our key variable for analysis, the tax system dummy, is also a country-level variable which does not vary across firms nor

time within one country. We hope to capture some of the firm level heterogeneity through industry dummies which are determined on a detailed level.

An additional layer of obstacles is added by the fact that there is only a single country, Estonia, which has employed this tax system consistently over a longer period of time. The tax system effect is therefore difficult to isolate from other country-level effects. We address this through a control group design, as well as by introducing well-researched significant country-level determinants into the regression to minimize the unexplained variation caused by unobserved country-level variability. Firms from six other countries in addition to Estonia are selected for the study. On the one hand, Estonia shares similar traits with other former Soviet Union countries while on the other, it's fast and exceptional speed of development over the last 25 years has brought it closer to the richer Nordic countries with which it also has closer cultural ties. For these reasons, the control group consists of countries from both economic types. The final group includes in addition to Estonia (EE), Finland (FI), Latvia (LV), Lithuania (LT), Poland (PL), Slovakia (SK) and Czech Republic (CZ).

The study will focus exclusively on private firms. Although it is easier to extract data for public firms, only a fraction of firms are publicly listed. In the case of Estonia, the sample would be miniscule, which would not allow us to reach reliable results on the effects of DPT. Secondly, in the context of DPT itself, results on private firms are much more interesting since they convey the effects on a more substantive part of the economy.

Overview of regression models

The key focus areas of the study will be capital structure, liquidity, investment patterns and dividend payments. These areas represent most interesting aspects to study in the context of DPT and allow us to obtain a more holistic overview of the implications of DPT than a single metric would. The table below (Table 4) summarizes all the models constructed in the study. In total, we analyze 7 key regressions, each of which provides answers to different study questions. All models are designed to provide answers on how the behavior of firms operating under DPT behave differently from firms operating under GPT (classical corporate taxation system). Firms from Estonia are classified under DPT and firms from all other countries are classified under GPT.

Table 4. Overview of the regression models

Study area	Dependent variable	Definition	Regression models
Capital structure	LIABCAP	Total liabilities divided by total capital	1. **External financing model** How DPT effects capital structure, external financing vs internal? Do firms operating under DPT use less external financing?
	DEBTCAP	Debt divided by total capital	2. **Leverage model** How does DPT effect capital structure, usage of leverage. Do firms operating under DPT use less leverage?
Liquidity	CASHCAP	Cash divided by total capital	3. **Liquidity model** How does DPT effect levels of liquidity? Do firms operating under DPT hold more liquid funds?
	CASH_DELTA	Yearly change in cash holdings divided by beginning of the year total assets.	4. **Cash-cashflow sensitivity model** Does DPT effect the extent to which cash holdings are financed with internally generated funds (includes interaction term)?
Investments	INVRATE	Investments divided by beginning of the year total assets	5. **Investment model** How does DPT effect investment activity? Do firms operating under DPT invest more?
			6. **Investment-cashflow sensitivity model** Does DPT effect the extent to which investments are financed with internally generated funds (includes interaction term)?
Dividend payments	RETEDELTACAP	Yearly difference in other shareholder funds (retained earnings and other reserves) less net income, divided by beginning of the year total capital.	7. **Dividend model** How does DPT effect dividend payments? Do firms operating under DPT pay less dividends?

Five of the seven models represent regressions in which we try to assess if DPT is associated with higher levels of leverage or liquidity for instance. In addition, we also employ two sensitivity models, investment-cashflow and cash-cashflow models, which aim is not to demonstrate the existence of financial constraints *per se* but rather the extent to which cash flow sensitivity is impacted by DPT. The specification of these models is explained to further detail further on.

Generic econometric model

We deploy standard OLS estimation techniques with robust standard errors and firm-level cross-country panel data from 2010-2016. We estimate several regressions, but the generic regression model remains relatively unanimous for all models. The generic formulation of the model is estimated as:

$$Y_{it} = \alpha + \sum_{k=1}^{K} \beta_k X_{it,k} + \sum_{c=1}^{C} \beta_c Z_{it,c} + \beta_{ind} Industry_i + \beta_{tax} TaxSystem_i + \varepsilon_{it}$$

where *Y* signifies dependent variable, which will change in every model (see Table 4). The key dependent variables across the four study domains are shown in Table 4. *Y* is time and firm variant in every model. *t* indicates time, *t* = 2010,…., 2016. *X* signifies a vector of firm-level independent variables such as age, size, liquidity, asset intensity, profitability, sales growth, which represent the key control variables used in literature for these types of models. The definition of the variables is given in Section 4. The selection of firm-level predictors varies slightly across models, as for instance we cannot introduce liquidity as independent variable into a model that is estimating liquidity. In order to address endogeneity, some variables are lagged.

Z represents a vector of country-level predictors such as real GDP growth, CIT rate, domestic credit to private sector as % of GDP, which proxies for financial sector development and deepening, Rule of Law Index as proxy for institutional efficiency, and the Ease of Doing Business Index that proxies general administrative burden associated with running a business in a given country. The selection of these variables as well as definitions will be discussed more in detail in Section 4.

Tax System refers to the dummy variable which takes value 1 if firms operate under DPT and 0 if firms operate under classical GPT. This dummy variable will be the key variable for interpretation of results. In the sensitivity models (addressed below), models will include in addition to the *TaxSystem* dummy, an interaction term between the cash flow proxy and dummy variable.

Industry refers to 2-digit level industry dummy determined on NAICS industry classification. Error term ε is assumed to have constant variance. As we are unable to include firm-level fixed effects to the model, α is time and firm invariant. The models

have been checked for multicollinearity, there is no significant correlation between the variables (Table 5).

Table 5. Correlations between independent variables used in regressions

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 DEBTCAP	1.00												
2 CASHCAP	-0.21	1.00											
3 RETEDELTACAP	0.13	-0.21	1.00										
4 AGE	-0.05	-0.03	-0.02	1.00									
5 TA	0.00	-0.12	0.04	0.13	1.00								
6 SALESGROWTH	0.02	0.03	0.03	-0.10	-0.02	1.00							
7 FIXACAP	0.28	-0.34	0.13	0.07	0.12	-0.03	1.00						
8 ROC	-0.17	0.22	-0.32	-0.03	0.00	0.15	-0.13	1.00					
9 TAXSYSTEM	0.05	0.03	0.01	-0.03	-0.05	0.03	0.07	0.03	1.00				
10 CIT_RATE	-0.07	0.09	0.00	0.10	0.02	-0.02	-0.01	0.02	0.23	1.00			
11 GDP_GROWTH	0.05	-0.04	0.02	-0.07	-0.01	0.13	0.02	0.03	0.20	-0.22	1.00		
12 DCPGDP	0.16	0.07	-0.03	0.10	-0.07	0.02	0.03	0.03	0.31	0.40	-0.10	1.00	
13 LAW	0.09	0.10	-0.04	0.15	-0.04	-0.01	-0.01	0.04	0.18	0.48	-0.19	0.76	1.00
14 EASEOFBUS	0.04	0.05	-0.01	0.02	-0.08	0.00	0.01	0.00	0.13	0.35	-0.19	0.36	0.30

Different transformations and winsorising (elimination of the highest 1% and lowest 1% of observations in the total sample) have been used on the variables selected into the regressions to improve the distribution of the error term. In all models, standard errors have been adjusted for heteroscedasticity by using White Period adjustment.

Elaboration on investment-cashflow and cash-cashflow models

We investigate liquidity and investment further by using investment-cashflow and cash-cashflow sensitivity models adapted from Almeida et al. (2004) and D'Espallier et al. (2008) that are based on the financial constraints approach pioneered by Fazzari et al. (1988). The principle behind the models is that sensitivity of investment and cash holdings to cash flow should be correlated with financing frictions. While a considerable debate exists in the literature whether this assumption always holds, D'Espallier et al. (2008) conclude that researchers tend to recognize that investments are largely driven by internal cash flows but that it is unclear to what extent this reflects the inability to access external funding due to financing constraints. For this paper, the debate surrounding the theoretical underpinnings is important to recognize, but somewhat tangential for the results: we do not set out to prove financial constraints per se, but rather the extent to which cash flow sensitivity is impacted for firms operating under DPT.

The central independent variable is the profitability proxy for internal cash flows, operating profit to total assets (ROC). Other research uses similar proxies – D'Espallier et al. (2008) use cash flow to total assets and Almeida et al. (2004) use earnings before extraordinary items and depreciation to total assets. In line with current literature, we use sales growth as the main proxy for investment opportunity. To maintain consistency with our other models, age and size controls were also included. We note that for the investment-cashflow and cash-cashflow sensitivity models, these are simply an additional control for investment opportunity. Almeida et al. (2004) add that for the sensitivity of cash holdings, a size variable can also control for economies of scale in cash management.

Overview of analysis

Our data analysis starts with the overview of the collected data and its descriptive statistics (Section 4), which we address separately for firm-level and country-level data. For illustrative purposes, in Section 5 we provide an overview of the development of key firm metrics in Estonia during 1996-2016 based on a different dataset, than that used for the study. This data is sourced from Statistics Estonia. As the empirical part of the study focuses on the 2010-2016 period, we are not able to observe the progression of metrics around the tax reform year. The data from Statistics Estonia, on an aggregated industry basis presented in Section 5, provides a convenient overview of the firm development before and after the tax reform up until 2016, which in our view is helpful insight in the context of this study.

The study finishes with the analysis of the regression results, which form the core of the study. Next, we give a more detailed overview of the data used in this study, steps of sampling and explain the rationale for variable selection in detail.

4. Data

4.1. Firm-level data

We have extracted firm-level panel data from Orbis database by Bureau Van Dijk for the period of 2010-2016 (2016 is the latest available year). Orbis has one of the best information coverage for private firms globally. We are looking only at data starting from 2010 partly because Orbis holds data only for last 10 years and partly because we wanted to eliminate the effects of the financial crisis years. Furthermore, to eliminate micro firms, all firms that did not have more than 10 employees or more than 500 thousand euros of revenues for at least one of the selected year during 2010-2016 were eliminated. The elimination of micro firms is important also from corporate taxation perspective: in several countries the CIT rates and the extent of dividend tax exemption is different for micro firms. In addition, all firms with less than 3 years of financial data and with legal form other than public or private limited companies were eliminated. By using NACE Rev 2 classification, firms from following sectors were excluded:

- Mining and Quarrying
- Electricity, Gas, Steam and Air Conditioning Supply
- Water Supply; Sewerage, Waste Management and Remediation Activities
- Financial and Insurance Activities
- Public Administration and Defence; Compulsory Social Security
- Education
- Human Health and Social Work Activities
- Activities of Households as Employers; Undifferentiated Goods and Services Producing Activities of Households for Own Use

These sectors were excluded due to potential substantial governmental influence, which might vary greatly from one country to another. After applying all these filters, search result ended with 4983 firms for Estonia. This sample should cover all sizeable Estonian firms which operated during 2010-2016 and exclude micro-firms which behaviour is more erratic, and which are often set up with the aim of optimizing personal taxes and avoid official employment contracts (see Section 5). The final size of the Estonian sample served as a guideline for building the sample size for other countries' samples. For rest

of the countries a random sample of 5000 firms based on the same criteria as described above was extracted. All extracted financial data was denominated in euros. As the study is focusing on private firms, all listed firms were also eliminated. In order to assure that every entity is represented once in the data, all firms with consolidated accounts were also eliminated. Definitions of the key variables are shown in Table 6. All variables were cleaned from incorrect or likely erroneous data.

Table 6. Firm level variable definitions

Variable	Definition	Criteria
Dependent variables		
LIABCAP	Total liabilities divided by total capital as at end of financial year. Total capital is defined as the sum of book values of liabilities and equity, being equal to the book value of assets.	$0 \leq$ LIABCAP < 1
DEBTCAP	Total short and long-term interest-bearing liabilities divided by total capital.	$0 \leq$ DEBTCAP < 1
CASHCAP	Total cash and cash equivalents divided by total capital.	$0 \leq$ CASHCAP < 1
CASH_DELTA	Yearly change in cash holdings standardized with total assets.	N/A
INVRATE	Investments divided by beginning of the year total assets. Investment is calculated as the aggregate change in tangible, intangible and other long-term assets (fixed assets) plus yearly amortization and depreciation.	$0 \leq$ INVRATE < 1
RETEDELTACAP	Yearly change in the total other shareholder funds less net income, divided by beginning of the year total assets. Other shareholder funds, consisting mainly of retained earnings but also minority interest and other reserves, have been used as a proxy for retained earnings due to the lack of the availability of less segregated data.	$-1 \leq$ RETEDELTACAP < 1
Independent variables (what it proxies)		
AGE (Age)	Difference between the year of observation and year of incorporation.	$2 \leq$ AGE < 300
TA (Size)	Natural logarithm of total assets.	$0 <$ TA
SALESGROWTH (Investment opportunities)	Difference in the yearly total revenues.	N/A
DEBTCAP (Leverage)	Total short and long-term interest-bearing liabilities divided by total capital.	$0 \leq$ DEBTCAP < 1
CASHCAP (Liquidity)	Total cash and cash equivalents divided by total capital.	$0 \leq$ CASHCAP < 1
FIXACAP (Asset intensity)	All year end fixed assets (tangible, intangible and other long-term assets) dividend by yearend total capital.	$0 \leq$ FIXACAP < 1
ROC (Profitability/internal cash flows)	EBIT divided by total capital.	N/A

Additional measures for descriptive statistics		
NO_EMPLOYEES	Reported number of employees.	NO_EMPLOYEES >0
NO_SHAREHOLDERS	Reported number of shareholders.	NO_SHAREHOLDERS >0
EBITDA%	EBITDA divided by revenues.	N/A
EBIT%	EBIT divided by revenues.	N/A
EBT%	EBT divided by revenues.	N/A
NI%	Net income divided by revenues.	N/A
ROEBT	Profit/loss before tax divided by total equity.	N/A

In addition to the criteria applied above, certain variables (LIABCAP, DEBTCAP, CASHCAP, RETEDELTACAP, INVRATE, SALESGROWTH, FIXACAP, ROC) were further winsorized by eliminating highest 1% and lowest 1% of observations in the total sample. The final cross-country panel includes a total of 222.000 firm-year observations, approx. 25.000-30.000 observations per country per variable.

4.1.1. Descriptive statistics of firm-level data

Table 7 provides an overview of the descriptive statistics of the firm level panel data used in this study with cross-country statistics on the left and median values of each metric across countries on the right. We have also included a number of other variables at the bottom of the table which are not incorporated in the regressions, but that we found interesting to observe. Next, we will provide an overview of variables that we considered insightful and relevant.

Table 7. Descriptive statistics of firm-level variables

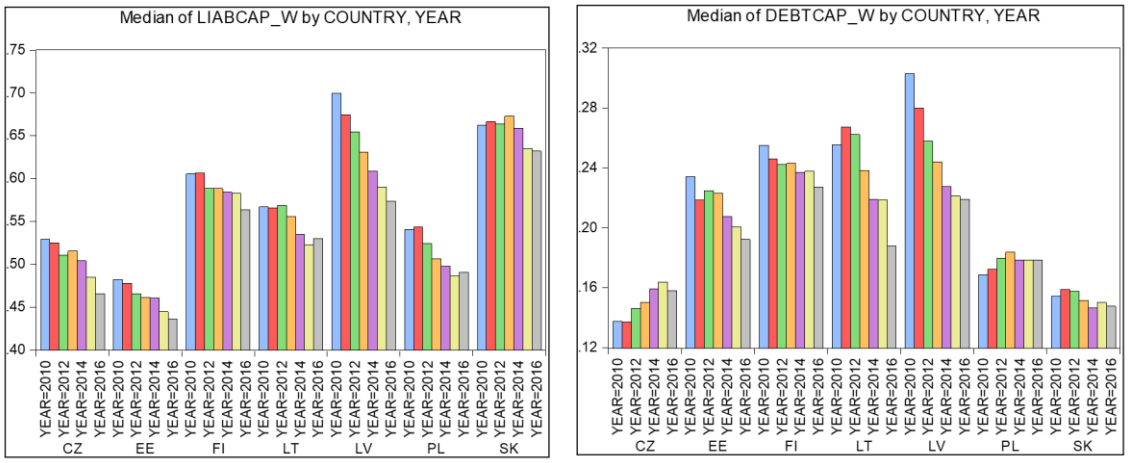
Variables used in regressions							Country median values						
	Mean	Median	Max	Min	Std. Dev.	No. Obs.	CZ	EE	FI	LT	LV	PL	SK
AGE	15.1	14.0	253.0	3.0	10.7	200802	14.0	14.0	17.0	13.0	13.0	16.0	12.0
TA	4166	1091	104212	14	9731	187100	1100	841	1086	1212	606	3250	972
LIABCAP	0.54	0.56	0.99	0.02	0.26	166819	0.51	0.46	0.59	0.55	0.63	0.51	0.66
DEBTCAP	0.24	0.20	0.87	0.00	0.20	98381	0.15	0.22	0.24	0.24	0.26	0.18	0.15
CASHCAP	0.14	0.07	0.84	0.00	0.17	182802	0.10	0.08	0.11	0.06	0.06	0.05	0.07
CASHDELTA	0.02	0.00	0.93	-0.39	0.13	150877	0.0019	0.0024	0.0006	0.0021	0.0006	0.0006	0.0006
RETEDELTACAP	-0.03	0.00	0.35	-0.54	0.09	151450	-0.004	0.000	-0.013	-0.001	0.000	-0.009	0.000
INVRATE	0.60	0.19	16.20	0.00	1.38	82513	0.21	0.20	0.19	0.21	NA	0.18	0.18
SALESGROWTH	0.12	0.04	5.97	-0.94	0.54	156826	0.02	0.066	0.03	0.074	0.05	0.02	0.03
FIXACAP	0.35	0.31	0.97	0.00	0.27	209454	0.26	0.36	0.28	0.27	0.33	0.33	0.30
ROC	0.064	0.056	0.676	-1.050	0.177	186869	0.054	0.065	0.073	0.063	0.046	0.056	0.042
Aditional variables for overview							Country median values						
	Mean	Median	Max	Min	Std. Dev.	No. Obs.	CZ	EE	FI	LT	LV	PL	SK
NO_EMPLOYEES	61.2	20.0	15000.0	1.0	208.6	166848	23.0	17.0	17.0	25.0	19.0	50.0	15.0
NO_SHAREHOLDERS	2	1	294	1	4	189385	1	1	2	1	1	2	2
RETECAP	0.31	0.30	0.94	-0.71	0.32	179887	0.33	0.46	0.32	0.31	0.18	0.32	0.19
EBITDA	0.08	0.06	0.55	-0.61	0.11	125157	0.06	0.07	0.07	0.07	0.05	0.06	0.06
EBIT	0.03	0.03	0.46	-1.32	0.14	184785	0.03	0.04	0.04	0.03	0.02	0.03	0.02
EBT	0.02	0.02	0.50	-1.39	0.14	184818	0.02	0.03	0.03	0.03	0.02	0.02	0.02
NI	0.02	0.02	0.46	-1.38	0.14	184773	0.02	0.03	0.02	0.02	0.02	0.02	0.01
ROEBT	0.2	0.2	5.0	-6.2	0.7	187505	0.12	0.14	0.21	0.16	0.20	0.12	0.14

Note: EE – Estonia, CZ – Czech Republic, FI - Finland, LT – Lithuania, LV – Latvia, PL – Poland, SK – Slovakia.

Firms from former Soviet Union countries are on average slightly younger, median age varies from 12 years in Slovakia to 17 years in Finland. Firm size in terms of number of employees varies from 15 employees in Slovakia to 50 employees in Poland. Firm size in terms of the size of the asset base seems to correlate with the size of the country's economy.

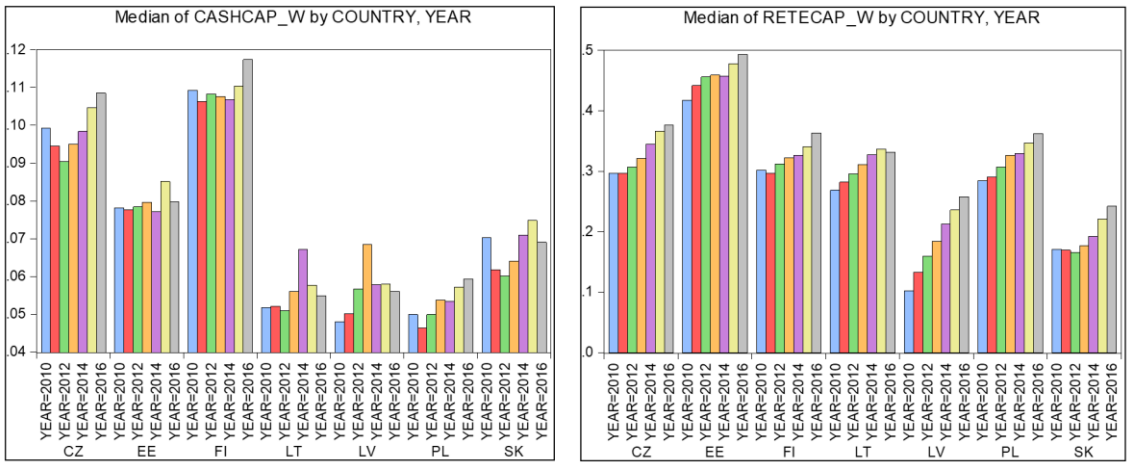
Estonia clearly has the lowest liabilities to capital ratio at 46%. The entire sample group medians range between from 46% to 66%. The ratio has been steadily decreasing across all countries over the 7-year period (Figure 3). The cross-country median debt ratio is around 20%, varying from 15% to 24% across countries. In Estonia, Finland, Lithuania, Latvia and Slovakia the debt ratio has been rather monotonously decreasing, but interestingly the trend is opposite in the Czech Republic and Poland.

Figure 3. Liabilities and debt to capital by country



During the observation period, firms had in aggregate a median of 7% of cash to total assets, with lowest rates in Poland (5%) and highest in Finland (11%). Cash levels have been slightly increasing across the 7-year time period across most countries (Figure 4). Estonian firms clearly stand out for the highest ratio of retained earnings to total capital at 46%, while the group median is 30%. This is due to the mechanical effect of DPT on retained earnings.

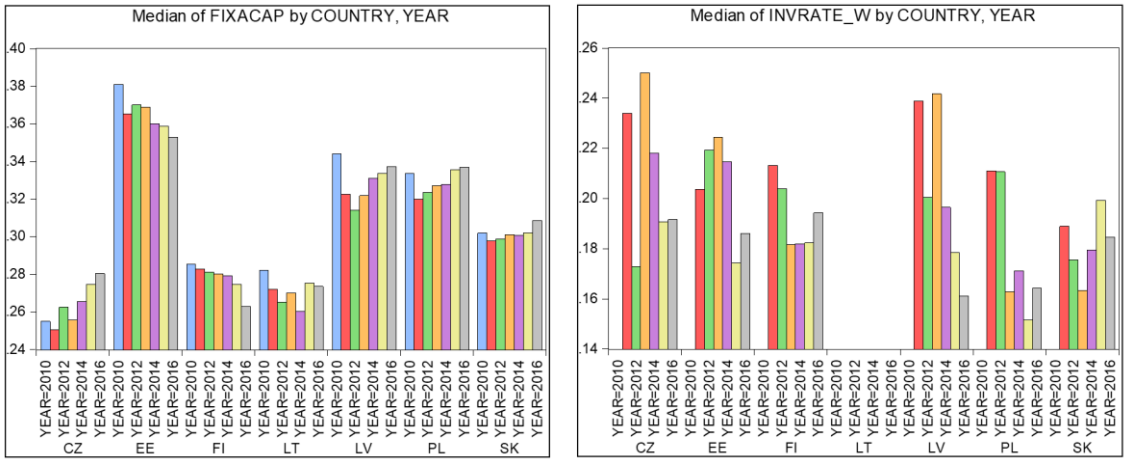
Figure 4. Cash and retained earnings to capital by country



Investment rates across the group are ranging from 18% to 22% with the median at 20%. There is a lot of variability within countries from one year to another – this is consistent with empirical observations of large year over year variation of investment activity (Figure 5). Reading by median, the level of fixed assets to total assets is 31%, while Estonia is an outlier at 36%. The distinctly high ratio of fixed assets could be explained

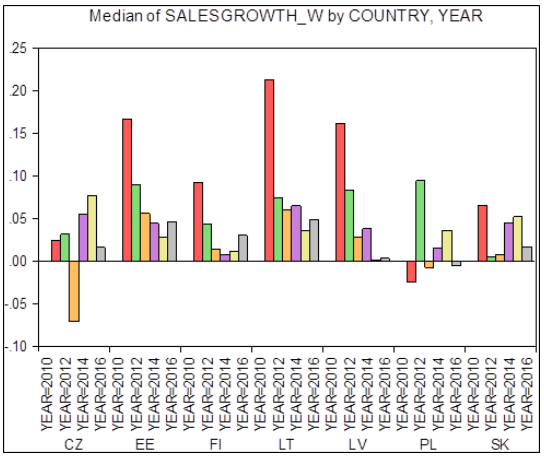
by the differences in the depreciation rates used for tax and financial reporting, as the investment rates are not visibly higher for Estonia.

Figure 5. Fixed assets to capital and investment rate by country



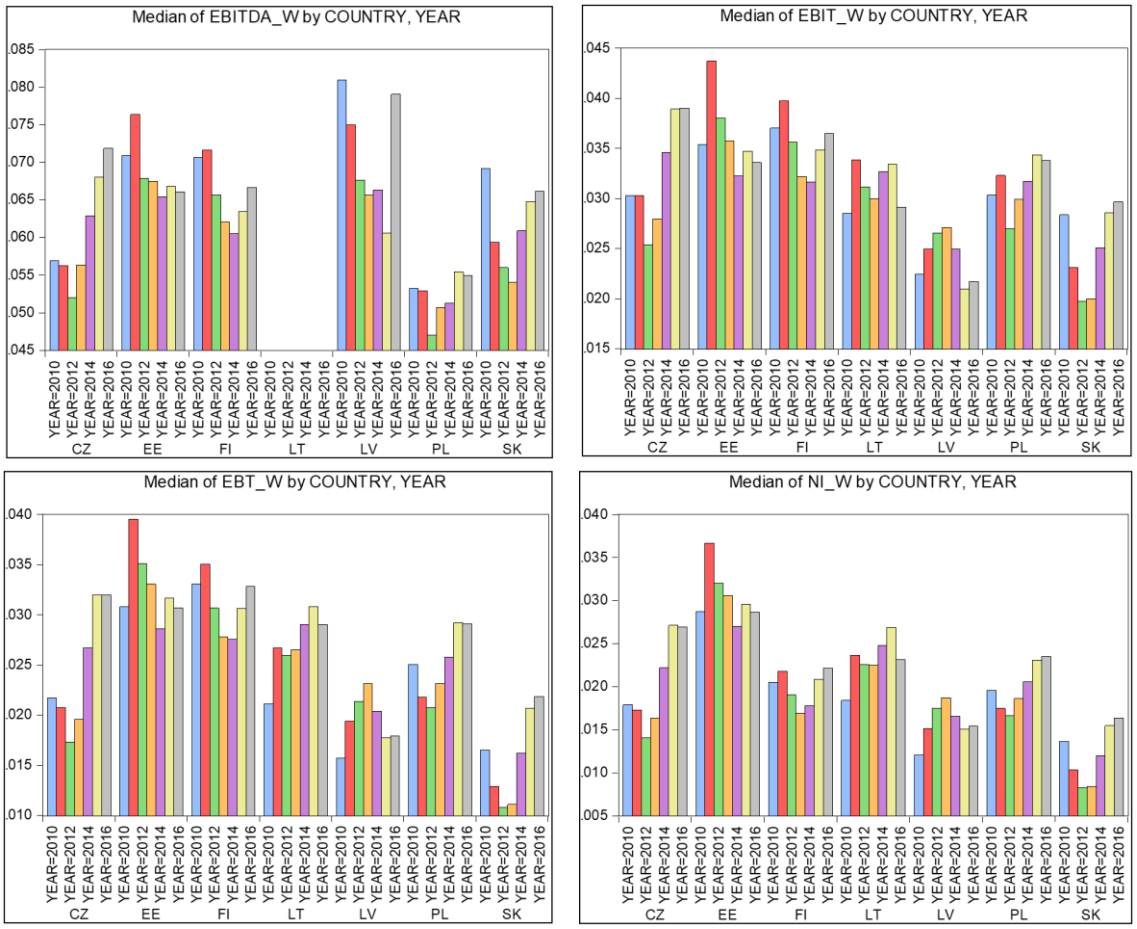
Sales growth (Figure 6) will be used as a proxy for investment opportunities. Sales growth varies from 2% to 7% across the sample countries, Lithuania and Estonia show highest rates, Poland and the Czech Republic the lowest**.**

Figure 6. Sales growth by country



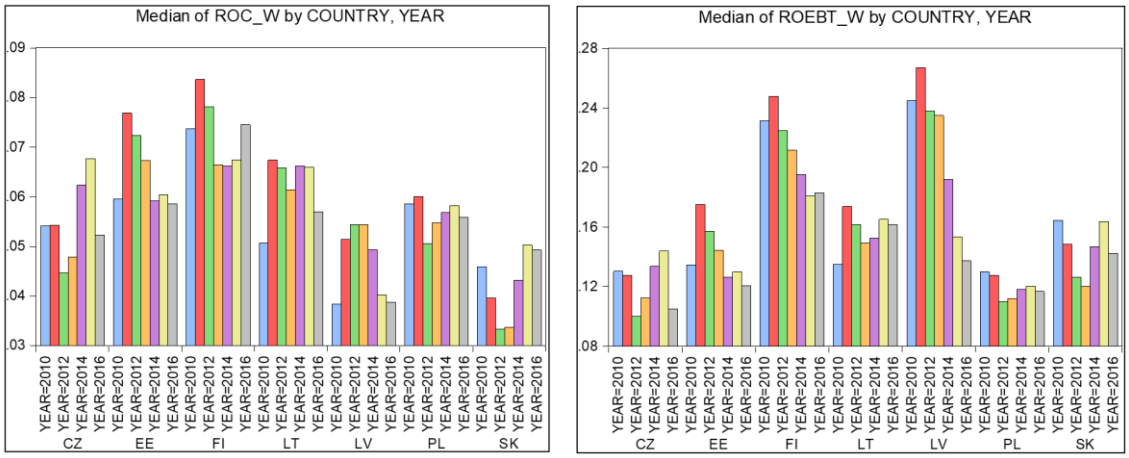
We observe a median EBITDA of 6% (ranging from 5.2% to 7.2%) and EBIT of 3% (ranging from 2.5% to 3.6%). Estonia has one of the highest EBT% and NI% with 3.3% and 3% respectively (Figure 7).

Figure 7. Profitability metrics by country



Median ROC is 5.6%, ranging from 4.2% to 7.3%. Given that Estonian firms pay income tax only when profits are distributed, return on equity before taxation (ROEBT) should be observed for fair comparison with other countries. While the rates for ROEBT vary greatly (from 11.9% to 21.1%), Estonian firms show returns on the lower end of the spectrum (14%) (Table 7, Figure 8).

Figure 8. Return on capital metrics by country



In conclusion, Estonian firms seem to have a lower ratio of liabilities (46% vs 56%) to capital and a clearly higher ratio of retained earnings to capital (46% vs 30%). However, we do not observe clearly higher rates of liquidity nor investment activity, although Estonian firms do show strong sales growth. While Estonian firms seem to have one of the highest EBITDA and EBIT margins, albeit by a small margin, this is not passed on to the return on equity due to higher ratios of equity capitalization. These observations are to some extent consistent with the theoretical background of DPT and previous research. In order to substantiate these results further, we carry out regression analysis on the key dependent variables by incorporating important firm, industry and country level control variables in Section 6.

4.1.2. Tests of equality of cross-country medians

We use the Mann-Whitney U-test to compare the medians of select variables between Estonian firms and median of the cross-country sample. The results of the test suggest that for all variables, except for investment rate, median values for Estonia firms are significantly different from the control group medians. This result is somewhat expected given the large dataset and the positioning of the medians of Estonian firms among the cross-country sample.

Table 8. Test of equality of medians

	EE	Cross-country	W-Value	Prob.	Level of significance
LIABCAP	0.46	0.59	55.73	0.00	***
DEBTCAP	0.21	0.20	8.75	0.00	***
RETECAP	0.46	0.28	74.50	0.00	***
CASHCAP	0.08	0.08	4.20	0.00	***
INVRATE	0.20	0.20	0.24	0.81	X
SALESGROWTH	0.07	0.03	22.78	0.00	***
FIXACAP	0.36	0.30	26.58	0.00	***
ROC	0.06	0.06	8.46	0.00	***

Notes: * p<0,05 ** p<0,01 *** p< 0,0001 X= no statistically significant difference

4.2. Country-level data

Based on the corporate finance theory and relevant literature discussed in Section 2 we have included several country-level variables into the models as our study is built up in a cross-country setting. Table 9 provides an overview of the independent variables and their definitions.

Table 9. Country-level variable definitions

Variable	Definition	Source
Tax system	Refers to the basis of CIT. If the CIT basis is annual accounting profits, the value is 0, if the basis is distributable profits, the value is 1 (collides with Estonia country effect).	N/A
CIT rate	Implicit corporate income tax rate. Applicable to private resident companies.	Eurostat PwC Worldwide Tax Summaries
Real GDP growth	Yearly difference in the real gross domestic product expressed in percentages.	Eurostat
Financial sector	Domestic credit to private sector as % of GDP. Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. The higher the measure the more means private sector has for development.	World Bank
Rule of Law Index	Rule of Law is a survey-based metric composed by the World Bank and captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5. Used in this study as a general proxy for institutional efficiency.	World Bank
Ease of Doing Business Index (Distance to Frontier)	Aggregate metric that includes different parameters which define the ease of doing business in a country. Distance to frontier score benchmarks economies with respect to regulatory best practice, showing the absolute distance to the best performance on each Doing Business indicator. When compared across years, the distance to frontier score shows how much the regulatory environment for local entrepreneurs in an economy has changed over time in absolute terms. The higher the value the better the business climate.	World Bank

While tax codes tend to be exhaustive with many nuances, we have focused only on the critical metrics in the context of this study: basis of CIT, CIT rates and extent of dividend

exemption from taxation. In all countries included in the sample, CIT is paid based on the annual net profits, except for Estonia, in case of which the CIT is effectively postponed until distribution of profits with no limit on the time of postponement. Tax system dummy represents the DPT system and takes value 1 for firms operating under DPT (applies only to Estonian firms). CIT rate is time-varying and reflects the implicit corporate income tax rate in a given country. Previous taxation related research has used either implicit or effective tax rates, we have opted for implicit rates. Since all countries selected into the sample have full dividend exemption on profit distribution no separate variable is needed to capture this effect[5]. In some countries, such as Poland and Lithuania, CIT rates vary based on firm size[6], but these rules would not be applicable to the designed sample.

Domestic credit to private sector as % of GDP is used as a proxy for the access to external financing and financial deepening, also used in many other studies (Abate et al, 2014; Overesch and Wamser, 2010 to name a few) to control for the access to financing. It is also regarded as a general measure of economic development and prosperity. Several studies (Fan, Titman, Twite, 2012; Belkhir et al, 2016; Antoniou et al, 2008) have identified that institutional efficiency and governmental policies have an impact on firm financing decisions. We used the Worldwide Governance Indicators project, which consists six composite indicators of broad dimensions of governance (such as control of corruption, regulatory quality, government effectiveness etc), run by World Bank as a starting point. While each of these indicators reflects on a specific area and all of them would be valuable in the models, we had to adopt only one since there was a very high correlation between all of them. The selected indicator, Rule of Law, is therefore a proxy for an overall level of and quality of governance, including corruption. Higher metric value reflects a greater level of institutional efficiency.

5 In certain countries specific rules must be filled, but these are not considered to have major effect on results. Poland: Recipient must hold minimum of 10% shares in the payer firms for at least 2 years before and after the distribution. Lithuania: Dividends are tax exempt from CIT if a parent company holds at least 10% of the shares of the subsidiary for at least 12 months. Czech Republic: Recipient must hold minimum of 10% shares in the payer firms for an uninterrupted period of 12 months. Source: PwC Worldwide Tax Summeries

6 Lithuania: Micro companies with up to 10 employees and 300 000 euros of income may be entitled to reduce rates of 5%. Poland: A reduced rate of 15% may be applicable for small and young firms. Source: PwC Worldwide Tax Summeries

We have used the Ease of Doing Business indicator, expressed as the distance to frontier, as a proxy for the general administrative burden of a given country. It is a composite measure covering different areas relevant to business development, such as getting a credit, paying taxes, getting permits and trading internationally. We were unable to extract specific sub-metrics due to the frequent methodology changes, therefore we use to total composite measure. A higher metric should reflect a more inductive environment for business development and higher levels of investment.

We also considered other country-level variables but had to disregard them either due to high correlation with the earlier described metrics or lack of time-variance. For instance, many studies (Brockman and Unlu, 2009; Abate et al, 2014 for instance) include measures such as extent of shareholder and creditor rights into capital structure models, but we could not include them due to the nature of the data and the design of this study. These metrics have in fact been incorporated already into the Rule of Law or Ease of Doing Business indices.

Other factors which have been shown to have an impact on corporate decisions such as the behavioral and cultural background of managers and investors (Breuer et al, 2014; Fidrmuc and Jacob, 2010) has not been explicitly addressed, but the sample design should address this to a certain extent through geographical and cultural proximity. We believe the critical determinants of cross-country differences have been captured by these 5 metrics. Based on the literature review, it was also identified that cross-country studies rarely have more than 4-5 country level metrics, some even less.

4.2.1. Descriptive statistics of country-level data

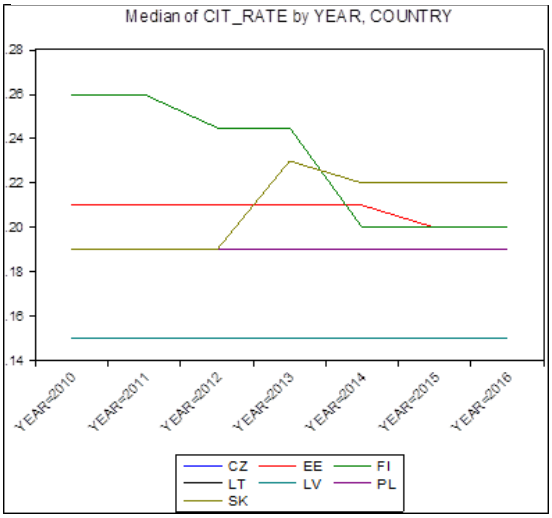
Descriptive statistics of country-level variables, used as independent variables, are shown in Table 10 below.

Table 10. Descriptive statistics of country level variables

	Tax System dummy **TAXSYSTEM**	Corporate Income Tax **CIT_RATE**	Real GDP growth **RGDP_GROWTH**	Financial sector **DCPGDP**	Rule of Law **LAW**	Ease of Doing Business **EASEOFBUS**
Mean	0.16	0.19	0.03	0.62	1.05	0.76
Median	0.00	0.19	0.03	0.53	0.94	0.76
Maximum	1.00	0.26	0.12	0.95	2.10	0.82
Minimum	0.00	0.15	-0.05	0.41	0.48	0.63
Observations	220038	220038	220038	220038	220038	220038

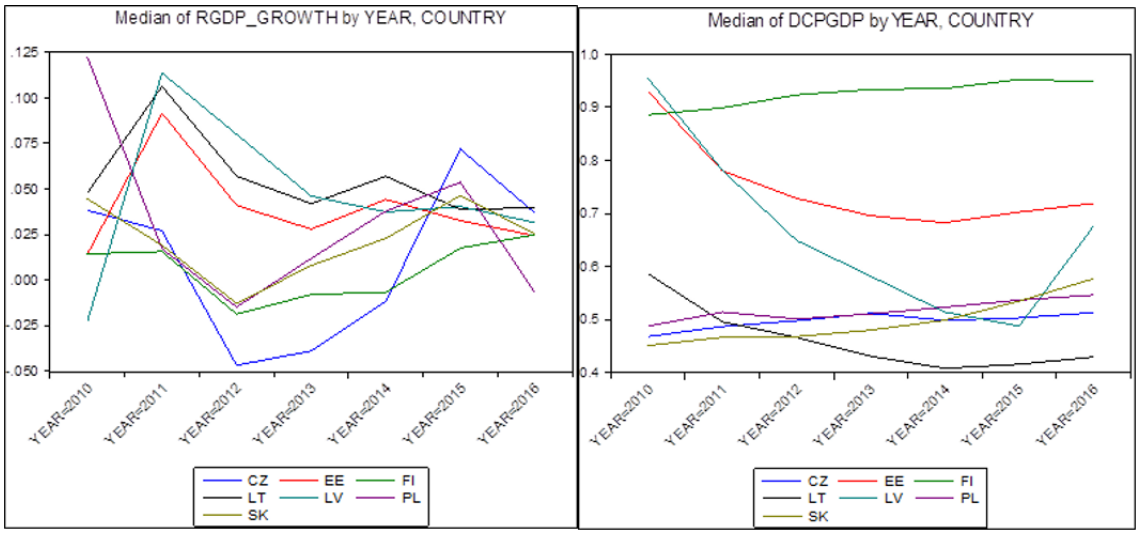
The CIT rates range from 15% to 26% during the observable period (Figure 9). There is not much within-country variation across years with the exception of Finland, where the CIT rate has been reduced from 26% to 20% in 2016 and Slovakia where CIT has been increased by 4% points.

Figure 9. CIT rates across countries



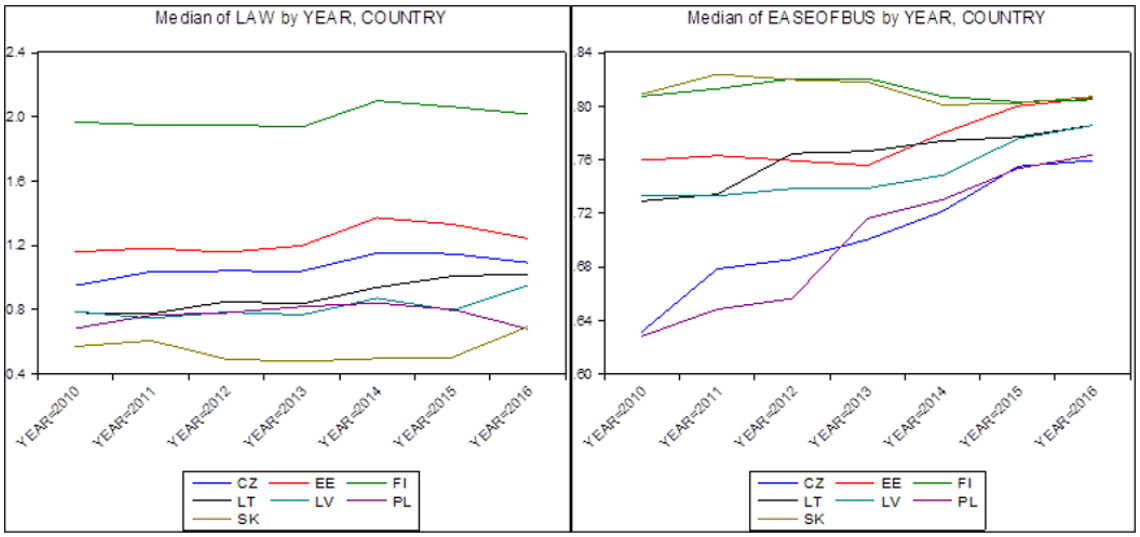
The changes in GDP and domestic credit to private sector as % of GDP has been indicated in Figure 10. While trends are similar across countries, different levels of GDP growth and financial deepening can be observed between countries.

Figure 10. GDP growth and domestic credit to private sector as % of GDP



While Rule of Law indicator provides little variation over time, a clear trend is observable in the Ease of Doing Business metric: the gap between the countries is closing in towards the end of the observable period (Figure 11), indicating countries' clear focus on improving the business climate and attracting investment.

Figure 11. Rule of Law and Ease of Doing Business indices across countries

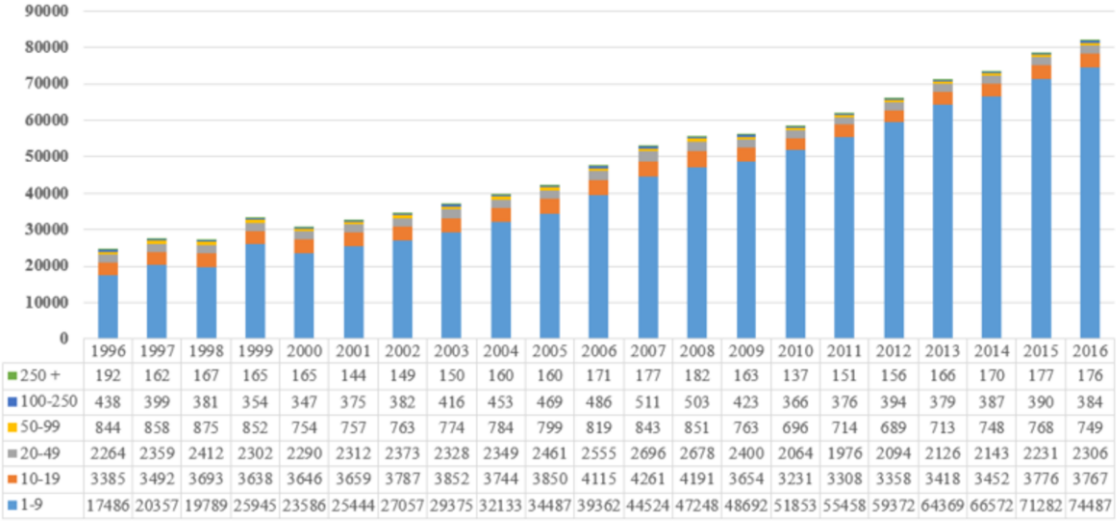


5. Development of key firm indicators under DPT in Estonia

In this section, we provide an overview of the development of key firm metrics in Estonia during 1996-2016 based on a different dataset than the data used for the regressions, specifically less granular data that allows us to illustrate developments in the economy. In the empirical part of the study, we do not concentrate on the progression of metrics around the tax reform year 2000. The data from Statistics Estonia on an aggregated industry basis provides a convenient overview of the development before and after the tax reform up until 2016. We believe this data gives valuable additional background on the firm development in DPT setting. Aggregated data represents the sum of all Estonian firm level year-end data/amounts across all industries, except financial institutions, over the course of last 20 years.

Perhaps one of the most astonishing findings is the fact the number of micro firms (less than 10 employees) has nearly quadrupled over the 20 years while the number of firms from all other size categories has remained relatively constant or even declined during the same period (see Figure 12). The growth of total revenue proportion of these micro firms has been disproportional (from 20% to 30%) to the growth in firm count which suggests the appearance of many mini-firms (1-2 persons) with negligible revenues (see Figure 13). It is very hard to comment if tax reform has anything to do with this.

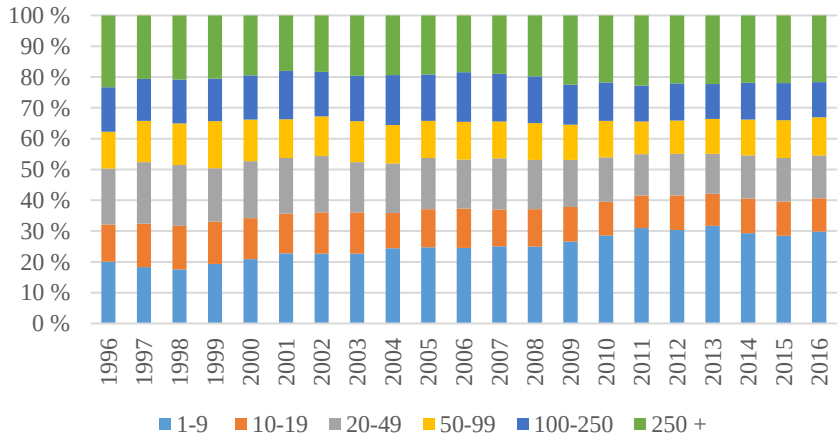
Figure 12. Number of firms by number of employees



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
250 +	192	162	167	165	165	144	149	150	160	160	171	177	182	163	137	151	156	166	170	177	176
100-250	438	399	381	354	347	375	382	416	453	469	486	511	503	423	366	376	394	379	387	390	384
50-99	844	858	875	852	754	757	763	774	784	799	819	843	851	763	696	714	689	713	748	768	749
20-49	2264	2359	2412	2302	2290	2312	2373	2328	2349	2461	2555	2696	2678	2400	2064	1976	2094	2126	2143	2231	2306
10-19	3385	3492	3693	3638	3646	3659	3787	3852	3744	3850	4115	4261	4191	3654	3231	3308	3358	3418	3452	3776	3767
1-9	17486	20357	19789	25945	23586	25444	27057	29375	32133	34487	39362	44524	47248	48692	51853	55458	59372	64369	66572	71282	74487

Source: Statistics Estonia

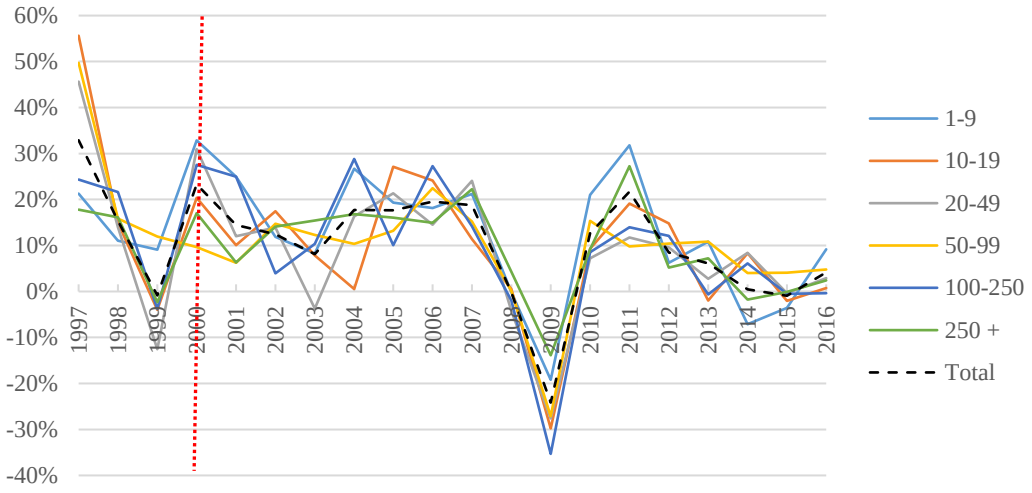
Figure 13. Proportion of total firm revenues based on firm size



Source: Statistics Estonia

Sales growth is correlated with economic cycles: steep drops can be observed during the Russian crisis in 1999 and financial crisis years (see Figure 14). Sluggish sales growth across size brackets observable during recent years may indicate significantly reduced growth opportunities.

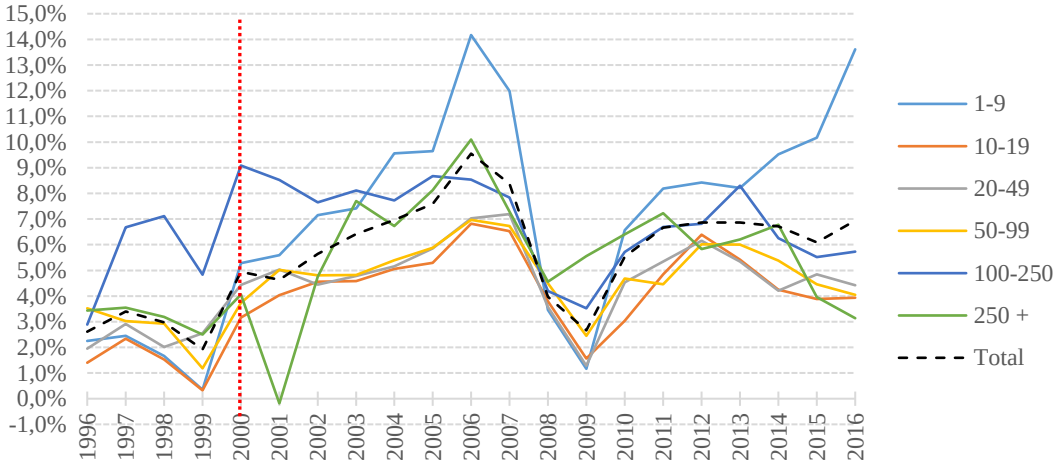
Figure 14. Sales growth based on firm size



Source: Statistics Estonia

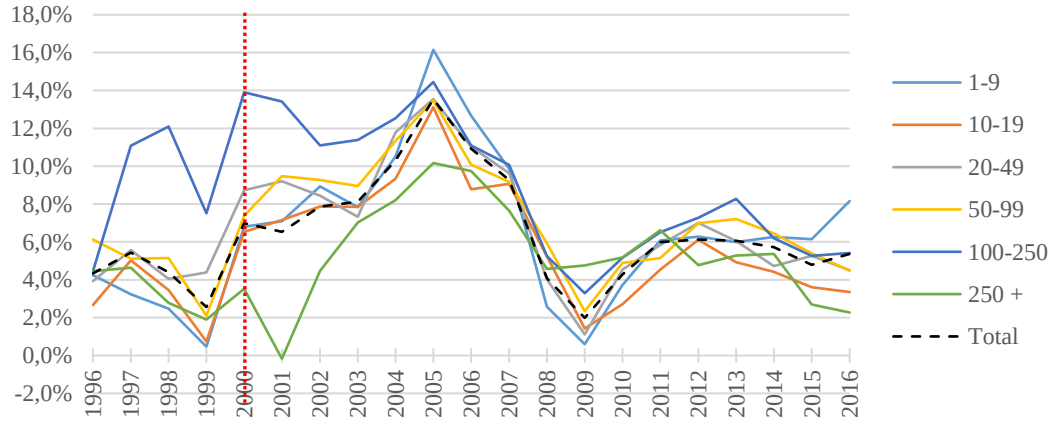
There are significant upward ticks in levels of profitability and return on capital (EBIT% and EBIT/total assets) in post-reform years, yet the causality is hard to be claimed, as Estonia was severely hit by the Russian crisis during 1998-1999 and the upward trend was already apparent before the crisis (see Figure 15 and Figure 16). Study of Praxis and CASS (2010) suggests that the effect of reporting improvement (less profit hiding) induced by the tax reform should not be underestimated also. The upward trend observed in 2000's was broken once again during financial crises and from thereafter there has been a slight downward trend. The profitability of the micro firms has grown significantly suggesting again some fundamentally different drivers of profitability or business logic.

Figure 15. Operating profit margin based on firm size



Source: Statistics Estonia

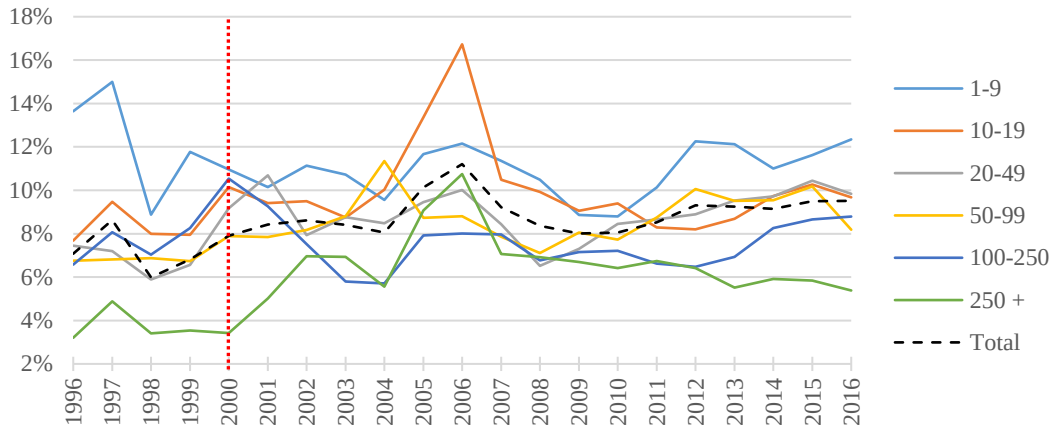
Figure 16. Return on total assets (EBIT/total assets) based on firm size



Source: Statistics Estonia

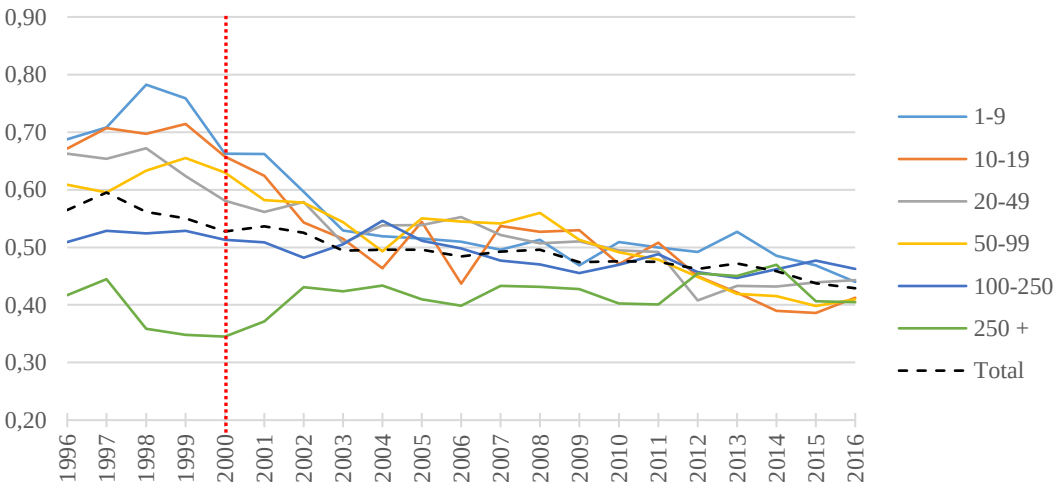
We can observe a slight upward trend of liquidity over the last 20 years with a clear difference in levels of cash holdings across various sizes of firms, i.e. bigger firms hold less cash (Figure 17). The share of liabilities to total assets (Figure 18) has steadily declined from around 53% in 1996 to around 43% in 2016 and the gap in the ratio between firms of different sizes is significantly reduced. The downward trend collides with the introduction of the reform in 2000 and is further enforced due to the mechanical effect DPT has on retained earnings which is reflected on the liabilities ratio (Section 1).

Figure 17. Liquidity (cash/total assets) based on firm size



Source: Statistics Estonia

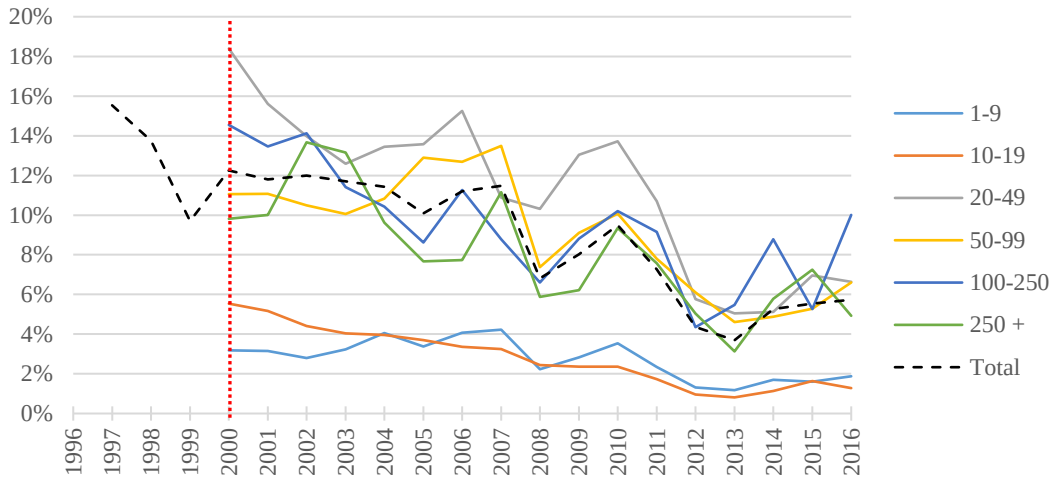
Figure 18. Total liabilities/total assets based on firm size



Source: Statistics Estonia

The cyclical and erratic nature of investments is illustrated by the steep downwards sloping trend across all size brackets (Figure 19). Investment rate has fallen from around 16% to around 5.7% in 2016, suggesting significantly reduced investment need and/or opportunities, consistent with the decline in sales growth observed earlier. Levels of investment differ substantially from the firm-level data set. This might be due to the sampling criteria. Again, micro firms stand out for significantly lower investment rates during the entire period.

Figure 19. Investment rate (CAPEX/fixed assets(t-1)) based on firm size



Source: Statistics Estonia

These observations are consistent with a maturing economy and firms in general. Economic shocks make it difficult to visually observe the tax reform effects. Based on the graphic visuals, reduction of liabilities in total capital fits very well with the key effect of DPT. Other effects are harder to observe, potentially due to their smaller magnitude. In some metrics clear differences emerge from the firm-level data collected from Orbis, such as the level of investment rates, which is much higher for Estonian firms in the firm-level data set (20%). These differences are most likely due to the sampling criteria used for the firm-level data.

One possible explanatory factors for the emergence of micro firms, which show significantly higher rates of profitability, cash holdings and low investment rates is the widespread practice in case of which employees fulfill the employment contract through their personal firms rather than employment contracts as in such way they can optimize on taxes. For these reasons, we also excluded firms smaller than 10 employees from the dataset.

6. Results and analysis

In this section, we provide an overview of the estimated regression models based on the firm-level panel data sampled from 7 countries. All models are estimated in two groups: extended group, which consists of all 7 countries and restricted group where Poland, the Czech Republic and Slovakia have been eliminated. This grouping is generated based on the results of selection of country-specific models, which were run as an initial diagnostic tool for assessing the comparability across countries. Somewhat lower explanatory power was observed for Poland, Czech Republic and Slovakia across some models, especially for the debt to total capital model. These results suggest that some important explanatory variables, particularly important in the context of those countries, may be omitted. Regression results for the restricted group are therefore statistically stronger and more likely to reflect the true nature of the relationship between independent and dependent variables.

6.1. Capital structure

The impact of DPT on capital structure will be investigated with the help of two models. First, we will regress selected commonly used firm, industry and country controls with the tax system dummy on liabilities to total capital ratio followed by the estimation of a debt to total capital regression with the same set of regressors.

The relationship between the DPT system and total liabilities to total capital (LIABCAP) is strongly significantly negative (see Table 11). DPT is associated with approx. 11.4% reduction in level of liabilities in both models. Owing to the mechanical positive effect on retained earnings caused by the DPT in all instances when profits are not fully distributed, reduction in the level of liabilities in total capital, which to large extent reflects the positive effects from equity to liabilities, is consistent with the expectations of the effects of DPT. The magnitude of the negative effect of DPT on liabilities ratio is also comparable to the results of Masso et al (2010) study, which found approx. 10% reduction in liabilities to total assets ratio after the reform.

Table 11. External capital model

Dependent variable	**LIABCAP**			**LIABCAP**		
Countries included	EE, LV, LT, FI			CZ, EE, LV, LT, SK, PL, FI		
Independent variables	**Coef.**	**t-stat**	**Prob.**	**Coef.**	**t-stat**	**Prob.**
Constant	0.9762	24.92	0.0000	0.4936	21.88	0.0000
Age	-0.0041	-18.20	0.0000	-0.0033	-17.60	0.0000
Size	-0.0202	-13.88	0.0000	-0.0162	-15.83	0.0000
Liquidity	-0.4302	-40.97	0.0000	-0.4484	-55.97	0.0000
Sales growth	0.0634	24.08	0.0000	0.0699	35.48	0.0000
Asset intensity	-0.0792	-10.08	0.0000	-0.1062	-17.89	0.0000
Profitability	-0.3832	-40.29	0.0000	-0.3790	-50.92	0.0000
Tax system (DPT=1, else 0)	**-0.1142**	**-27.78**	**0.0000**	**-0.1136**	**-30.53**	**0.0000**
CIT rate	0.1630	3.32	0.0009	0.2186	4.59	0.0000
Real GDP growth	-0.3646	-7.51	0.0000	-0.1489	-7.06	0.0000
Financial sector	0.2256	12.97	0.0000	0.2714	19.81	0.0000
Rule of law	-0.0435	-5.58	0.0000	-0.0836	-16.78	0.0000
Ease of doing business	-0.2818	-5.62	0.0000	0.3038	11.84	0.0000
Industry dummy	Yes			Yes		
Year dummies	No			No		
Model statistics:						
Adj. R square	0.215			0.203		
No of observations	66683			122511		

Notes: Standard errors adjusted for heteroscedasticity. Industry dummies (17) are determined on 2-digit NAICS codes. Liquidity has been lagged by one period to address endogeneity problems. Sales growth is proxy for investment opportunities.

Regression results on total debt to total liabilities (DEBTCAP) show a smaller effect of DPT (Table 12). DPT is associated with 5% reduction in leverage for the restricted group model and 1% point reduction in leverage for the extended group model. These results are by and large comparable to the magnitude of the effects of the tax reform found by Masso et al (2010) and Hazak (2007) studies, which showed a negative impact of 10% and 5% respectively on liabilities and 7% and 3.3% negative impact on leverage respectively.

Table 12. Leverage model

Dependent variable	**DEBTCAP**			**DEBTCAP**		
Countries included	EE, LV, LT, FI			CZ, EE, LV, LT, SK, PL, FI		
Independent variables	**Coef.**	**t-stat**	**Prob.**	**Coef.**	**t-stat**	**Prob.**
Constant	0.3955	8.69	0.0000	0.2392	11.51	0.0000
Age	-0.0022	-10.31	0.0000	-0.0015	-11.35	0.0000
Size	-0.0033	-2.23	0.0258	-0.0048	-4.78	0.0000
Liquidity	-0.2743	-23.15	0.0000	-0.2374	-27.08	0.0000
Sales growth	0.0193	7.60	0.0000	0.0127	6.79	0.0000
Asset intensity	0.2338	28.52	0.0000	0.1819	31.12	0.0000
Profitability	-0.2350	-26.54	0.0000	-0.1905	-27.44	0.0000
Tax system (DPT=1, else 0)	**-0.0505**	**-12.30**	**0.0000**	**-0.0108**	**-3.10**	**0.0020**
CIT rate	0.2554	4.34	0.0000	-0.7666	-15.62	0.0000
Real GDP growth	0.0476	0.88	0.3769	0.2481	10.66	0.0000
Financial sector	0.0683	3.86	0.0001	0.1626	12.59	0.0000
Rule of law	-0.0127	-1.57	0.1156	0.0258	5.68	0.0000
Ease of doing business	-0.2481	-4.27	0.0000	0.0226	0.96	0.3375
Industry dummy	Yes			Yes		
Year dummies	No			No		
Model statistics:						
Adj. R square	0.192			0.163		
No of firm-year observations	43525			75283		

Notes: Standard errors adjusted for heteroscedasticity. Industry dummies (17) are determined on 2-digit NAICS codes. Liquidity has been lagged by one period to address endogeneity problems. Sales growth is proxy for investment opportunities.

As argued in Sections 1 and 2, DPT favors the use of internal capital under pecking order theory and trade-off theory – these results are robust to the expectations. Firms preferring debt financing due to the tax advantage of debt are expected to use less debt under DPT than under GPT. Equity preferring firms would aim to minimize debt financing under both tax systems, but DPT may reduce the share of external financing used in total capital through tax savings on the amount of undistributed profit under conditions when all profits are not distributed.

6.2. Liquidity

In this section, we are interested in two aspects. First, the regression (Table 13) on levels of cash holdings (CASHCAP) helps to identify if DPT is associated with higher or lower levels of cash holdings. The second regression (Table 14), where we regress the cash flow proxy (profitability) and the tax system dummy interaction term on the change in yearly cash holdings (CASHDELTA), aims to identify sources of the change in cash levels.

The results of the first model (Table 13) suggests that DPT is associated with 1% higher liquidity based on the extended group model and with 1.5% higher liquidity on the restricted group model. Given a median cash ratio of 7% and an average ratio of 14% based on our panel, these results may be regarded as economically significant.

Table 13. Liquidity model

Dependent variable	**CASHCAP**			**CASHCAP**		
Countries included	EE, LV, LT, FI			CZ, EE, LV, LT, SK, PL, FI		
Independent variables	**Coef.**	**t-stat**	**Prob.**	**Coef.**	**t-stat**	**Prob.**
Constant	0.2202	8.00	0.0000	0.1966	16.98	0.0000
Age	0.0001	0.51	0.6101	0.0000	-0.01	0.9953
Size	-0.0108	-14.75	0.0000	-0.0114	-22.46	0.0000
Leverage	-0.0777	-20.88	0.0000	-0.0807	-26.96	0.0000
Asset intensity	-0.1410	-32.43	0.0000	-0.1244	-41.50	0.0000
Profitability	0.1593	28.78	0.0000	0.1578	34.55	0.0000
Tax system (DPT=1, else 0)	**0.0149**	**6.34**	**0.0000**	**0.0105**	**5.10**	**0.0000**
CIT rate	-0.1302	-3.47	0.0005	-0.0460	-1.75	0.0793
Real GDP growth	-0.0961	-3.45	0.0006	0.0167	1.19	0.2330
Financial sector	0.0275	3.36	0.0008	-0.0042	-0.59	0.5538
Rule of law	0.0087	1.95	0.0510	0.0205	7.99	0.0000
Ease of doing business	0.0276	0.78	0.4365	0.0349	2.74	0.0062
Industry dummy	Yes			Yes		
Year dummies	No			No		
Model statistics:						
Adj. R square	0.247			0.226		
No of observations	43933			76399		

Notes: Standard errors adjusted for heteroscedasticity. Industry dummies (17) are determined on 2-digit NAICS codes. Leverage has been lagged by one period to address endogeneity. Expected signs for predictor variables are shown in brackets.

To test to what extent changes in cash holdings are financed from internal cash flows, we use a modified version of the Almeida et al. (2004) cash-cashflow sensitivity model (Table 14). Our central additions to their model are the cross-country approach and the interaction term between profitability and the DPT dummy. Additionally, the model is purposefully specified with different predictor variables than the first cash flow model in order to better reflect the sensitivity of cash holdings to cash flow. To do this, we specifically replace leverage and asset intensity with proxies for sales growth and profitability, which reflect investment opportunity and internal cash flow, respectively.

The results show that the interaction term is strongly significant in both models, suggesting that DPT is associated with a greater level of internal cash flow financing of cash holdings. We may illustrate the effects with currency: in comparison to firms operating under GPT, for every euro unit increase in internal cash flow, firms operating

under DPT channel 5.0 cents more into their cash holdings based on the restricted group model and 5.8 cents more based on the extended group model.

Relating the interaction term to its constituents, we note that the retention rate from internal cash flows without the tax system dummy is 12.6% in the restricted sample and 11.8% in the extended sample. We point out further that these results are highly parallel to D'Espallier et al. (2008) who found retention rates between 9% and 15% depending on company size. We take this as an additional signal of the reliability of our regression results.

The adjusted R-squared is low in both models, which is expected for this type of model – we concentrate on the robustness of the interaction term. As a robustness check, the regression was run for the restricted country set with additional controls for cash flow sensitivity, namely beginning of year cash holding ratio and beginning of year leverage (Appendix 1). The results did not vary significantly from the initial results.

Table 14. Cash-cashflow sensitivity model

Dependent variable	**DELTA_CASH**			**DELTA_CASH**		
Countries included	EE, LV, LT, FI			CZ, EE, LV, LT, SK, PL, FI		
Independent variables	**Coef.**	**t-stat**	**Prob.**	**Coef.**	**t-stat**	**Prob.**
Constant	0.1041	4.31	0.0000	0.0470	9.12	0.0000
Age	-0.0001	-1.56	0.1193	0.0000	-0.58	0.5605
Size	-0.0069	-20.50	0.0000	-0.0068	-29.55	0.0000
Sales growth	0.0356	21.79	0.0000	0.0366	29.83	0.0000
Profitability	0.1265	30.01	0.0000	0.1180	39.80	0.0000
Tax system (DPT=1, else 0)	0.0042	3.38	0.0007	-0.0022	-2.44	0.0148
Profitability * Tax system	**0.0495**	**5.67**	**0.0000**	**0.0576**	**7.03**	**0.0000**
CIT rate	-0.0823	-2.82	0.0048	0.0782	5.30	0.0000
Real GDP growth	-0.0052	-0.21	0.8354	0.0259	2.12	0.0340
Financial sector	-0.0164	-3.08	0.0021	-0.0210	-5.23	0.0000
Rule of law	0.0148	4.86	0.0000	0.0037	2.76	0.0057
Ease of doing business	-0.0621	-2.00	0.0450	-0.0048	-0.71	0.4751
Industry dummy	Yes			Yes		
Year dummies	No			No		
Model statistics:						
Adj. R square	0.077			0.068		
No of observations	75123			139111		

Notes: Standard errors adjusted for heteroscedasticity. Industry dummies (17) are determined on 2-digit NAICS codes. Size is lagged by one period.

Robustness of the results from both models allows us to conclude that DPT is as anticipated associated with higher levels of liquidity and the savings of firms operating under DPT are financed to a greater extent with internal cash flows in comparison to the firms operating under GPT. These results are consistent with the expected implications of DPT. Firms are ceteris paribus able to accumulate more liquid funds under DPT compared to GPT, especially so in the absence of attractive investment opportunities and set dividend policies. These results however do not allow us to substantiate exactly the rationale for the accumulation of cash. It would be reasonable to assume, based on pecking order theory, that firms accumulate funds in anticipation of attractive investment opportunities. Yet, it may also be related to the investor level taxation and preferences: from an investor point of view, it might be tax optimal to retain profits in the firm and reinvest them low-return assets inside the firm rather than accumulate returns on investor level where the capital gains are taxed.

6.3. Investments

As with liquidity, investment activity was investigated with two sets of models. The first model addresses whether DPT has lead companies to invest differently compared to the control group, while the second model is used to investigate whether companies operating with DPT finance their investment activity differently. For the main investment regression (Table 15), key firm level predictors are sales growth (proxy for investment opportunities) and profitability (proxy for internal cash flow). Age and size were included for consistency with the rest of the models in the paper, although we note that with investment these are simply an additional control for investment opportunity – in line with current literature, we use sales growth as the main proxy for investment opportunity.

We emphasize that while our models take after the traditional investment-cashflow sensitivity models (Fazzari et al., 1988) which have been criticized for poor prediction of investment activity (Gomes, 2001), our models are designed to capture the effects of DPT rather than demonstrate effects of financial constraints on investments. While a common assumption in the literature has been that cashflows as a proxy for financial constraints can predict investment, recent literature (Chen and Chen, 2012) explicitly criticizes this assumption. In our first set of models, the internal cash flow proxy (profitability) is

insignificant, which reflects that we cannot deduce substantial investment effects from cash flow.

The effect of DPT is statistically strongly positive for in both restricted and extended groups, but we consider the positive effect of 1.5% and 0.5% respectively economically rather negligible given the median investment rate of 19% and average of 60% for the total panel. To substantiate the results further, we run a robustness check on the restricted sample using beginning of year leverage and cash holdings and find that the tax system variable is largely unaffected (Appendix 2).

In our expectations, we set tentatively positive outlook on the effect of DPT on investment, due to the apparent easing of financial constraints and tax exemption of reinvested profits. The observed effect of DPT is smaller than expected, the economic significance is questionable. While investment models are difficult to specify, the results deviate substantially from earlier research, which indicated an increase of 15% on investments (Masso et al, 2010). This is an interesting observation, given reinforcement of investment is the key argument for this type of tax system. The results may also indicate that the effect of DPT on investment may decay over time.

Table 15. Investment model

Dependent variable	**INVRATE**			**INVRATE**		
Countries included	EE, LV, LT, FI			CZ, EE, LV, LT, SK, PL, FI		
Independent variables	**Coef.**	**t-stat**	**Prob.**	**Coef.**	**t-stat**	**Prob.**
Constant	0.3568	7.20	0.0000	0.1930	17.27	0.0000
Age	-0.0007	-8.87	0.0000	-0.0007	-10.52	0.0000
Size	-0.0157	-19.63	0.0000	-0.0136	-29.64	0.0000
Sales growth	0.0622	16.77	0.0000	0.0462	23.31	0.0000
Profitability	0.0047	0.74	0.4566	0.0075	1.86	0.0630
Tax system (DPT=1, else 0)	**0.0151**	**3.07**	**0.0021**	**0.0053**	**2.83**	**0.0047**
CIT rate	0.0241	0.62	0.5362	0.0491	1.49	0.1352
Real GDP growth	-0.1697	-3.48	0.0005	0.0013	0.08	0.9401
Financial sector	0.0094	0.40	0.6886	0.0371	3.44	0.0006
Rule of law	0.0087	1.09	0.2755	-0.0152	-4.70	0.0000
Ease of doing business	-0.2161	-3.39	0.0007	-0.0157	-1.06	0.2877
Industry dummy	Yes			Yes		
Year dummies	No			No		
Model statistics:						
Adj. R square	0.130			0.100		
No of observations	32340			77223		

Notes: Standard errors adjusted for heteroscedasticity. Industry dummies (17) are determined on 2-digit NAICS codes. Size is lagged by one period. To eliminate outliers, a restriction of <1 is placed on investment rate.

The second set of models with interaction terms (Table 16) were used to analyze specifically whether DPT influences the ways in which firms finance their investment activity. The interaction term is added but other variables are kept the same for consistency between other models.

The results are statistically strongly positive for the interaction terms which indicates that DPT may lead companies to use their operating profits to fund their investment activity more than the control groups. The output shows that under DPT, companies clearly use more internal cash flow on each unit of increased investment in comparison to the control groups; namely, 7.3% in the extended group model and 8.8% restricted group model.

This evidence lines up with our expectations of lower levels of external financing used by firms operating with DPT. The two sets of investment models show that distributed profit taxation helps companies take advantage of their increased liquidity for investment, even if the aggregate level of investment is only marginally higher in terms of economic importance.

Table 16. Investment-cashflow sensitivity model

Dependent variable	**INVRATE**			**INVRATE**		
Countries included	EE, LV, LT, FI			CZ, EE, LV, LT, SK, PL, FI		
Independent variables	**Coef.**	**t-stat**	**Prob.**	**Coef.**	**t-stat**	**Prob.**
Constant	0.3557	7.19	0.0000	0.1927	17.25	0.0000
Age	-0.0007	-8.95	0.0000	-0.0007	-10.48	0.0000
Size	-0.0156	-19.61	0.0000	-0.0135	-29.57	0.0000
Sales growth	0.0611	16.54	0.0000	0.0459	23.21	0.0000
Profitability	-0.0310	-4.13	0.0000	-0.0069	-1.63	0.1028
Tax system (DPT=1, else 0)	0.0070	1.41	0.1593	-0.0006	-0.32	0.7503
Profitability * Tax system	**0.0879**	**6.99**	**0.0000**	**0.0729**	**6.58**	**0.0000**
CIT rate	0.0259	0.67	0.5053	0.0497	1.51	0.1306
Real GDP growth	-0.1654	-3.39	0.0007	0.0017	0.10	0.9206
Financial sector	0.0026	0.11	0.9117	0.0345	3.20	0.0014
Rule of law	0.0096	1.21	0.2267	-0.0143	-4.40	0.0000
Ease of doing business	-0.2057	-3.24	0.0012	-0.0136	-0.92	0.3557
Industry dummy	Yes			Yes		
Year dummies	No			No		
Model statistics:						
Adj. R square	0.132			0.101		
No of observations	32340			77223		

Notes: Standard errors adjusted for heteroscedasticity. Industry dummies (17) are determined on 2-digit NAICS codes. Size is lagged by one period. To eliminate outliers, a restriction of <1 is placed on investment rate.

6.4. Dividend payments

Previous research (Masso et al., 2010; Hazak, 2007) has investigated the way in which DPT affects the levels of retained earnings to total assets as a way to argue for the positive effect on internal financing associated with DPT as well as argue for the reduction in dividend payments (Hazak, 2007). We do not see this particularly insightful nor correct way to deduct effect on dividend payments: when profits are not fully distributed, which normally is the case, DPT will always cause a mechanical increasing effect in retained earnings compared to the GPT due to the tax saving (see Section 1). The increase of internal financing is also reflected over to the liabilities to total assets ratio, which we have already addressed in Section 6.1. Nevertheless, as a point of comparison to the earlier studies, we estimated also the retained earnings regression (see Appendix 3), which suggest firms operating under DPT have 19% point higher retained earnings to total assets ratio, aligned with expectations. This ratio is not entirely comparable to earlier studies as our retained earnings proxy includes also other reserves, yet it does not lie far from the results of Masso et al (2010) that showed 15% point increase.

By eliminating the effect of net income from retained earnings we will be able to investigate indirectly the effect of DPT on dividend payments, which we find a more insightful set-up. The data on retained earnings proxy unfortunately includes also other reserves, and therefore the change in the levels of that account (RETEDELTACAP), whilst having already eliminated the effect of net income[7], may relate to other items which enter retained earnings through comprehensive income or to any changes in other reserves. However, these changes are likely related to dividend distributions to a large extent. This is also confirmed by the frequency distribution of RETEDELTACAP, in which majority of the observations positioned below 0, i.e. they were negative, suggesting that majority of changes in the retained earnings and other reserve account had been due to dividend distributions. If the value of RETEDELTACAP is 0, this means there have been no distributions in that years. This set-up is the closest way to investigate the effects of DPT on dividend payout patterns in the absence of specific dividend payout related

[7] $\text{RETEDELTACAP} = ((\text{retained earnings}_t + \text{other reserves}_t) - (\text{retained earnings}_{t-1} + \text{other reserves}_{t-1}) - Net\ Income_t)/Total\ assets_{t-1}$

data, which is challenging to extract for private firms. This is also possibly the reason why dividend payments have not been explicitly addressed in any of the earlier research using econometrical modeling.

We regress tax system dummy along with a number of control variables on the changes in retained earnings and other reserve account standardized by total assets (see Table 17). Results of the restricted group model suggest an economically small but statistically significant positive effect of the tax system dummy on the dependent variable RETEDELTACAP. The positively signed tax system dummy suggests less dividend payments. The results of the extended group model suggest economically and statistically somewhat less significant yet also positive impact of tax system dummy on RETEDELTACAP.

Table 17. Dividend payout regression model

Dependent variable	**RETEDELTACAP**			**RETEDELTACAP**		
Countries included	EE, LV, LT, FI			CZ, EE, LV, LT, SK, PL, FI		
Independent variables	**Coef.**	**t-stat**	**Prob.**	**Coef.**	**t-stat**	**Prob.**
Constant	0.0472	2.99	0.0028	-0.0049	-0.94	0.3465
Age	-0.0002	-4.92	0.0000	-0.0002	-7.85	0.0000
Size	-0.0011	-3.53	0.0004	-0.0018	-8.11	0.0000
Liquidity	-0.0849	-23.64	0.0000	-0.0815	-31.33	0.0000
Sales growth	0.0192	23.09	0.0000	0.0203	31.35	0.0000
Asset intensity	0.0131	7.33	0.0000	0.0133	10.64	0.0000
Profitability	-0.1545	-37.53	0.0000	-0.1619	-48.41	0.0000
Tax system (DPT=1, else 0)	**0.0070**	**6.64**	**0.0000**	**0.0015**	**1.70**	**0.0882**
CIT rate	0.0212	1.13	0.2567	0.1743	13.04	0.0000
Real GDP growth	0.0972	5.74	0.0000	0.0741	9.08	0.0000
Financial sector	-0.0099	-2.14	0.0327	-0.0216	-5.97	0.0000
Rule of law	0.0157	6.54	0.0000	0.0044	3.52	0.0004
Ease of doing business	-0.1018	-4.98	0.0000	-0.0344	-5.26	0.0000
Industry dummy	Yes			Yes		
Year dummies	No			No		
Model statistics:						
Adj. R square	0.169			0.154		
No of observations	72323			131333		

Notes: Standard errors adjusted for heteroscedasticity. Industry dummies (17) are determined on 2-digit NAICS codes. Size, liquidity and asset intensity have been lagged by one period. Sales growth is used as a proxy for investment opportunities.

As the proxy for dividend payouts is not perfect it does not allow us to make strong conclusions on the effect of DPT on dividend payments but does suggest that DPT may affect dividend payments negatively and firms retain more profits.

As an additional path of analysis, we have looked into the dividend payout ratios for Estonian firms. Based on the differences in the pre- and post-tax profits we were able to calculate the average dividend payout ratio for firms operating under DPT (i.e. it applies only to Estonian firms) as taxation occurs only with profit distribution. We are not able to calculate dividend payout ratios for firms from other countries which use GPT.

Table 18. Effective tax rates across sample countries

COUNTRY	Mean	Median
CZ	0.22	0.19
EE	0.09	0.00
FI	0.20	0.21
LT	0.15	0.15
LV	0.21	0.15
PL	0.19	0.20
SK	0.34	0.22
All	**0.20**	**0.18**

Notes: Effective tax rate calculated as the difference between after tax profit and pre-tax profit over pre-tax profit. Calculated for each firm-year observation.

Data shows (Table 18) that median Estonian firm paid 0% of income tax and at average Estonian firm paid 8.9% of income tax. This suggests that major part of Estonian private firms do not pay any dividends at all and a small share of firms contribute the majority of the dividend payments. The average income tax rate of 8.9% would otherwise suggest a 42% - 44.5% payout ratio (8.9% divided by 20% or 21% applicable statutory CIT in force in Estonia) during the observation period 2010-2016. This ratio would also include all other capital expatriation transactions subject to CIT, hence the true dividend payout ratio is somewhat lower than 44.5%. This ratio is at par with the countries with lowest public company payout ratios based on the Sakinc (2017) study, which suggest average public firm payout ratio of 58%. Some research suggests that private firms tend to distribute less profit than public firms (Brav et al, 2005). Based on this data a claim can't be made that DPT significantly reduces dividend payments, but it does allow the exclusion positive effect assumptions of DPT on profit distributions.

Our evidence suggests that dividend payments of firms operating under DPT may be negatively affected: firms may pay less dividends than firms which operate under classical GPT. Additional research is required to substantiate these results further, yet our analysis serves as preliminary guidance of the effects of DPT on dividend payment patterns, which to large extent has not been addressed in the literature.

7. Conclusion and limitations

Our aim was to investigate the effects of a unique approach to corporate taxation, distributed profit taxation, on firms' capital structure, investment activity, liquidity and dividend payments. The effects of DPT can only be observed over an extended period of time for Estonia, but given its attractiveness, other countries such as Latvia and Georgia have also introduced it in recent years. The topic is relevant considering limited prior research on the effects of such a taxation system as well as increasing competition among countries to attract capital and to design tax attractive business environments. The results therefore contribute to a body of research both on DPT and more broadly to alternative systems of corporate taxation.

The study has a broad scope in order to provide robustness to the results on the implications of DPT, considering the study's methodological challenges brought on by the uniqueness of the tax system as well as the study's focus on a more recent time period than what is used in previous research. The paper was designed as a cross-country study leveraging a rich dataset containing more than 220.000 firm-year observations on private firms, sampled from Estonia and six control countries. The study builds on a set of regression models based on earlier research, estimated with OLS and including key firm, industry and country level control variables.

Our results by and large coincide with the results of earlier literature on DPT, but provide new evidence on its effects. We observe a significant reduction in external financing, including debt financing, among firms operating under DPT. We also observe somewhat higher levels of cash holdings under DPT and find evidence that cash savings are financed to a greater extent through internal cash flows under DPT in comparison to the control group. These results are consistent with our expectations for the DPT system, which in comparison to classical GPT increases internal cash flows in all instances when profits are not fully distributed. While increased liquidity and access to financing may increase firm competitiveness and improve firm survivability, additional liquidity may not necessarily lead to investments, but rather to paying off loans or accumulating excessive liquid funds that will generate low returns. These potentially negative consequences of DPT could give basis for interesting future research.

Furthermore, our results suggest that firms under DPT do not necessarily invest more and that the superior investment rates exhibited in the Masso et al. (2010) research based on data from the 2000's may have decayed over time. This is an interesting finding as it is one of the key propositions used for implementing this type of a taxation system. However, our findings show that companies operating under DPT do take advantage of their increased liquidity by financing investment projects to a greater extent with internal funds.

Our analysis of dividend payments is limited due to the unavailability of explicit dividend payout data. The indirect model used to proxy the effects of DPT on payouts suggests that dividend payments may be negatively affected by the tax code. Additional research is required to substantiate these results, yet our analysis serves as preliminary guidance of the effects of DPT on dividend payment patterns, which have not so far been explicitly addressed in the literature by means of empirical study.

Finally, we believe that the consistency of the regression results observed across the four inter-related domains provides robust and interesting evidence on the implications arising from DPT and its effects in the long term. A number of methodological improvements, which we were not able to incorporate due to the scope of the study, could substantiate the results even further. Given the setup of the study, we were not able to control for firm-level heterogeneity directly through firm-level fixed effects. While tested, we were not able to fully validate and therefore incorporate the results of the "between-within method" (Sjölander et al., 2013), which aims to simulate the fixed effects and could provide a solution to the problem. Matching methods and different or extended set of country-level variables could also help to improve the robustness of the results.

References

Amihud, Y., Lev, B. and Travlos, N.G., 1990. Corporate control and the choice of investment financing: The case of corporate acquisitions. The Journal of Finance, 45(2), pp.603-616.

Anderson, R.W., 2002. Capital structure, firm liquidity and growth (No. 27). Working paper research.

Baker, M. and Wurgler, J., 2002. Market timing and capital structure. The Journal of Finance, 57(1), pp.1-32.

Barclay, M.J., Smith, C.W. and Watts, R.L., 1995. The determinants of corporate leverage and dividend policies. Journal of applied corporate finance, 7(4), pp.4-19.

Bayless, M. and Chaplinsky, S., 1996. Is there a window of opportunity for seasoned equity issuance?, The Journal of Finance, 51(1), pp.253-278.

Bond, S. and Xing, J., 2015. Corporate taxation and capital accumulation: Evidence from sectoral panel data for 14 OECD countries. Journal of Public Economics, 130, pp.15-31.

Brainard, W.C. and Tobin, J., 1968. Pitfalls in financial model building. The American Economic Review, 58(2), pp.99-122.

Chaplinsky, S. and Niehaus, G., 1993. Do inside ownership and leverage share common determinants?, Quarterly Journal of Business and Economics, pp.51-65.

Cummins, J.G., Hassett, K.A. and Hubbard, R.G., 1996. Tax reforms and investment: A cross-country comparison. Journal of Public Economics, 62(1-2), pp.237-273.

DeAngelo, H. and Masulis, R.W., 1980. Optimal capital structure under corporate and personal taxation. Journal of financial economics, 8(1), pp.3-29.

Demirgüç-Kunt, A. and Maksimovic, V., 1996. Stock market development and financing choices of firms. The World Bank Economic Review, 10(2), pp.341-369.

D'Espallier, B., Vandemaele, S. and Peeters, L., 2008. Investment-cash flow sensitivities or cash-cash flow sensitivities? An evaluative framework for measures of financial constraints. Journal of Business Finance & Accounting, 35(7-8), pp.943-968.

Devereux, M.P., Griffith, R. and Klemm, A., 2002. Corporate income tax reforms and international tax competition. Economic policy, 17(35), pp.449-495

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R. and Shleifer, A., 2010. The effect of corporate taxes on investment and entrepreneurship. American Economic Journal: Macroeconomics, 2(3), pp.31-64.

European Commission. Taxation Trends in Europe. 2009 Edition.

Fan, J.P., Titman, S. and Twite, G., 2012. An international comparison of capital structure and debt maturity choices. Journal of Financial and quantitative Analysis, 47(1), pp.23-56.

Frank, M.Z. and Goyal, V.K., 2009. Capital structure decisions: which factors are reliably important?. Financial management, 38(1), pp.1-37.

Graham, J.R., 2003. Taxes and corporate finance: A review. The Review of Financial Studies, 16(4), pp.1075-1129.

Hall, R.E. and Jorgenson, D.W., 1969. Tax policy and investment behavior: Reply and further results. The American Economic Review, 59(3), pp.388-401.

Harris, M. and Raviv, A., 1991. The theory of capital structure. the Journal of Finance, 46(1), pp.297-355.

Hazak, A., 2007. Dividend decision under distributed profit taxation: investor's perspective. International Research Journal of Finance and Economics, 9, pp.201-219.

Hazak, A., 2008. Profit vs. distributed profit-based taxation and companies' capital structure. International Journal of Entrepreneurship and Innovation Management, 8(5), pp.524-541

Hazak, A., 2009. Companies' Financial Decisions Under the Distributed Profit Taxation Regime of Estonia. Emerging Markets Finance and Trade, 45(4), pp.4-12.

Heider, F. and Ljungqvist, A., 2015. As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes. Journal of Financial Economics, 118(3), pp.684-712.

Hovakimian, A., 2006. Are observed capital structures determined by equity market timing?. Journal of Financial and Quantitative analysis, 41(1), pp.221-243.

Jalilvand, A. and Harris, R.S., 1984. Corporate behavior in adjusting to capital structure and dividend targets: An econometric study. The journal of Finance, 39(1), pp.127-145.

Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. The American economic review, 76(2), pp.323-329.

Jürgenson, A., Kaarna, R., Kralik, S.,Sein, Kärt. 2010. Ettevõtjate hinnangud kehtiva ettevõtte tulumaksusüsteemi mõjudele Eestis. Ettevõtete ja jaotamata kasumi mittemaksustamise mõju investeeringutele ja majandusarengule.

Jürgenson, A., Kuusk, K. 2010. Ülevaade poliitikakujundajate ootustest ja tänastest hinnangutest maksureformile. Ettevõtete ja jaotamata kasumi mittemaksustamise mõju investeeringutele ja majandusarengule.

Kaarna, R. Lasn, K. 2010. Maksutulude laekumise analüüs. Ettevõtete ja jaotamata kasumi mittemaksustamise mõju investeeringutele ja majandusarengule.

Keynes, J.M., 1936. The General Theory of Employment, Interest and Money. Harcourt Brace, London.

Kim, S.J., 1998. Growth effect of taxes in an endogenous growth model: to what extent do taxes affect economic growth?. Journal of Economic Dynamics and Control, 23(1), pp.125-158.

King, M.A., 1974. Taxation and the cost of capital. The Review of Economic Studies, 41(1), pp.21-35.

King, R.G. and Rebelo, S., 1990. Public policy and economic growth: developing neoclassical implications. Journal of Political Economy, 98(5, Part 2), pp.S126-S150.

Korajczyk, R.A., Lucas, D.J. and McDonald, R.L., 1991. The effect of information releases on the pricing and timing of equity issues. The Review of Financial Studies, 4(4), pp.685-708.

Kraus, A. and Litzenberger, R.H., 1973. A state-preference model of optimal financial leverage. The journal of finance, 28(4), pp.911-922.

Kuldkepp, A., 2005. Tax Policy of Estonia in the framework of the EU Integration (Doctoral dissertation, Erasmus School of Law (ESL))

Lucas Jr, R.E., 1990. Supply-side economics: An analytical review. Oxford economic papers, 42(2), pp.293-316.

Maheshwari, Y. and Rao, K.V., 2017. Determinants of Corporate Cash Holdings. Global Business Review, 18(2), pp.416-427.

Manne, H.G., 1965. Mergers and the market for corporate control. Journal of Political economy, 73(2), pp.110-120.

Masso, J., Meriküll, J. 2010. Teoreetiline simulatsioon: ettevõtete tulumaksureformi mõju majanduse makro-aegridadele. Ettevõtete ja jaotamata kasumi mittemaksustamise mõju investeeringutele ja majandusarengule.

Masso, J., Meriküll, J. and Vahter, P., 2010. Ettevõtete jaotamata kasumi mittemaksustamise mõju investeeringutele ja majandusarengule: Äriregistri andmete analüüs (pp. 60-102). Tartu Ülikool, mimeo.

Masso, J., Meriküll, J. and Vahter, P., 2011. Gross profit taxation versus distributed profit taxation and firm performance: effects of Estonia's corporate income tax reform.

Modigliani, F. and Miller, M.H., 1958. The cost of capital, corporation finance and the theory of investment. The American economic review, 48(3), pp.261-297.

Modigliani, F. and Miller, M.H., 1963. Corporate income taxes and the cost of capital: a correction. The American economic review, 53(3), pp.433-443.

Myers, S.C. and Majluf, N.S., 1984. Corporate financing and investment decisions when firms have information that investors do not have. Journal of financial economics, 13(2), pp.187-221.

Overesch, M. and Wamser, G., 2010. The effects of company taxation in EU accession countries on German FDI. Economics of Transition, 18(3), pp.429-457.

Poliitikauuringute Keskus Praxis, Sotsiaalteaduslike rakendusuuringute keskus RAKE. 2010. Ettevõtete ja jaotamata kasumi mittemaksustamise mõju investeeringutele ja majandusarengule. Lõppraport. Tartu-Tallinn.

Prasad, S., Green, C.J. and Murinde, V., 2001. Company financing, capital structure and ownership: a survey and implications for developing countries.

Rajan, R.G. and Zingales, L., 1995. What do we know about capital structure? Some evidence from international data. The Journal of Finance, 50(5), pp.1421-1460.

Sakinc, M.E., 2017. Share Repurchases in Europe–A Value Extraction Analysis. The Academic-Industry Research Network Working Paper (16/2017 May), pp.1-27.

Sander, P., 2003. Capital Structure Choice in Estonian Companies: a Survey. Management of Organizations: Systematic Research, (27).

Shyam-Sunder, L. and Myers, S.C., 1999. Testing static tradeoff against pecking order models of capital structure. Journal of financial economics, 51(2), pp.219-244.

Sjölander, A., Lichtenstein, P., Larsson, H. and Pawitan, Y., 2013. Between–within models for survival analysis. Statistics in medicine, 32(18), pp.3067-3076.

Stokey, N.L. and Rebelo, S., 1995. Growth effects of flat-rate taxes. Journal of Political Economy, 103(3), pp.519-550.

Temimi, A., Zeitun, R. and Mimouni, K., 2016. How does the tax status of a country impact capital structure? Evidence from the GCC region. Journal of Multinational Financial Management, 37, pp.71-89.

Titman, S. and Wessels, R., 1988. The determinants of capital structure choice. The Journal of finance, 43(1), pp.1-19

Tobin, J., 1969. A general equilibrium approach to monetary theory. Journal of money, credit and banking, 1(1), pp.15-29.

Trumm, K., 2005. Dividendipoliitika Eesti ettevõtetes ja seda mõjutavad tegurid (Doctoral dissertation).

Vogt, S.C., 1994. The role of internal financial sources in firm financing and investment decisions. Review of Financial Economics, 4(1), pp.1-24.

Wald, J.K., 1999. How firm characteristics affect capital structure: an international comparison. Journal of Financial Research, 22(2), pp.161-187.

Appendix 1. Robustness Check for Cash-Cashflow Sensitivity Model

Dependent Variable: CASHDELTA_W
Method: Panel Least Squares
Date: 05/25/18 Time: 01:44
Sample: 2010 2016 IF COUNTRY<>"SE" AND COUNTRY<>"PL" AND COUNTRY<>"CZ" AND COUNTRY<>"SK"
Periods included: 6
Cross-sections included: 10853
Total panel (unbalanced) observations: 43685
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.112131	0.024895	4.504237	0.0000
AGE_W	-7.39E-05	5.15E-05	-1.436442	0.1509
LOG(TA_W2(-1))	-0.007880	0.000420	-18.76930	0.0000
SALESGROWTH_W	0.030351	0.002015	15.06419	0.0000
CASHCAP_W(-1)	**-0.157509**	**0.007966**	**-19.77348**	**0.0000**
DEBTCAP_W2(-1)	**-0.024800**	**0.002168**	**-11.44192**	**0.0000**
ROC_W	0.123718	0.005337	23.18050	0.0000
IS_EE	0.001326	0.001357	0.976674	0.3287
IS_EE*ROC_W	**0.057744**	**0.010613**	**5.440675**	**0.0000**
CIT_RATE	-0.099485	0.032112	-3.098101	0.0019
RGDP_GROWTH	0.008292	0.026901	0.308238	0.7579
DCPGDP	-0.010824	0.006163	-1.756219	0.0791
LAW	0.017598	0.003484	5.051065	0.0000
EASEOFBUS	-0.040035	0.031997	-1.251225	0.2109
NAICSSHORT="31"	-0.002043	0.003162	-0.645939	0.5183
NAICSSHORT="32"	-0.002158	0.003164	-0.681948	0.4953
NAICSSHORT="33"	-0.001787	0.003180	-0.561880	0.5742
NAICSSHORT="42"	-0.002843	0.003066	-0.927187	0.3538
NAICSSHORT="44"	0.000177	0.003179	0.055659	0.9556
NAICSSHORT="45"	-0.002370	0.003825	-0.619600	0.5355
NAICSSHORT="48"	0.000841	0.003042	0.276564	0.7821
NAICSSHORT="49"	0.006951	0.005966	1.165102	0.2440
NAICSSHORT="51"	0.015677	0.006252	2.507475	0.0122
NAICSSHORT="53"	0.010585	0.003615	2.927727	0.0034
NAICSSHORT="54"	0.018659	0.004066	4.588930	0.0000
NAICSSHORT="55"	-0.009539	0.009973	-0.956505	0.3388
NAICSSHORT="56"	0.017763	0.004450	3.991430	0.0001
NAICSSHORT="71"	0.009208	0.005626	1.636833	0.1017
NAICSSHORT="72"	0.014536	0.003913	3.714710	0.0002

R-squared	0.102238	Mean dependent var	0.013889
Adjusted R-squared	0.101662	S.D. dependent var	0.103722
S.E. of regression	0.098308	Akaike info criterion	-1.800756
Sum squared resid	421.9131	Schwarz criterion	-1.794991
Log likelihood	39362.01	Hannan-Quinn criter.	-1.798939
F-statistic	177.5568	Durbin-Watson stat	1.948757
Prob(F-statistic)	0.000000		

Appendix 2. Robustness Checks for Investment Models

Dependent Variable: INVRATE_TA_W
Method: Panel Least Squares
Date: 05/23/18 Time: 18:15
Sample: 2010 2016 IF COUNTRY<>"SE" AND COUNTRY<>"CZ" AND
COUNTRY<>"PL" AND COUNTRY<>"SK" AND INVRATE_TA_W<1
Periods included: 6
Cross-sections included: 5256
Total panel (unbalanced) observations: 18604
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.300885	0.063336	4.750588	0.0000
AGE_W	-0.000880	0.000117	-7.526501	0.0000
LOG(TA_W2(-1))	-0.016675	0.001122	-14.85552	0.0000
SALESGROWTH_W	0.074093	0.005164	14.34836	0.0000
CASHCAP(-1)	**0.016102**	**0.011284**	**1.426982**	**0.1536**
DEBTCAP(-1)	**0.010024**	**0.006707**	**1.494469**	**0.1351**
ROC_W	0.017583	0.009370	1.876447	0.0606
IS_EE	**0.014752**	**0.006447**	**2.288236**	**0.0221**
CIT_RATE	-0.068383	0.055397	-1.234418	0.2171
RGDP_GROWTH	-0.157312	0.064989	-2.420586	0.0155
DCPGDP	0.016839	0.031437	0.535659	0.5922
LAW	0.004541	0.010653	0.426293	0.6699
EASEOFBUS	-0.109505	0.080579	-1.358986	0.1742
NAICSSHORT="31"	-0.005797	0.009722	-0.596307	0.5510
NAICSSHORT="32"	0.014865	0.009386	1.583724	0.1133
NAICSSHORT="33"	0.002700	0.009021	0.299307	0.7647
NAICSSHORT="42"	-0.028458	0.009064	-3.139667	0.0017
NAICSSHORT="44"	-0.027596	0.009254	-2.982036	0.0029
NAICSSHORT="45"	-0.044991	0.010643	-4.227315	0.0000
NAICSSHORT="48"	0.096643	0.009309	10.38175	0.0000
NAICSSHORT="49"	0.021196	0.023409	0.905455	0.3652
NAICSSHORT="51"	0.057385	0.020491	2.800457	0.0051
NAICSSHORT="53"	0.031242	0.011253	2.776186	0.0055
NAICSSHORT="54"	0.005079	0.009903	0.512834	0.6081
NAICSSHORT="55"	-0.029325	0.032030	-0.915541	0.3599
NAICSSHORT="56"	0.021157	0.010518	2.011491	0.0443
NAICSSHORT="71"	-0.003360	0.012493	-0.268941	0.7880
NAICSSHORT="72"	-0.001295	0.009948	-0.130196	0.8964

R-squared	0.146159	Mean dependent var	0.119928
Adjusted R-squared	0.144918	S.D. dependent var	0.157970
S.E. of regression	0.146076	Akaike info criterion	-1.007878
Sum squared resid	396.3775	Schwarz criterion	-0.996091
Log likelihood	9403.278	Hannan-Quinn criter.	-1.004008
F-statistic	117.7708	Durbin-Watson stat	1.564140
Prob(F-statistic)	0.000000		

Dependent Variable: INVRATE_TA_W
Method: Panel Least Squares
Date: 05/25/18 Time: 01:22
Sample: 2010 2016 IF COUNTRY<>"SE" AND COUNTRY<>"CZ" AND COUNTRY<>"PL" AND COUNTRY<>"SK" AND INVRATE_TA_W<1
Periods included: 6
Cross-sections included: 5256
Total panel (unbalanced) observations: 18604
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.298829	0.063207	4.727759	0.0000
AGE_W	-0.000886	0.000117	-7.589704	0.0000
LOG(TA_W2(-1))	-0.016655	0.001120	-14.86564	0.0000
SALESGROWTH_W	0.072570	0.005121	14.17047	0.0000
CASHCAP(-1)	**0.014604**	**0.011283**	**1.294299**	**0.1956**
DEBTCAP(-1)	**0.009914**	**0.006713**	**1.476803**	**0.1397**
ROC_W	-0.029273	0.011504	-2.544719	0.0109
IS_EE	0.005950	0.006552	0.908016	0.3639
ROC_W*IS_EE	**0.110803**	**0.018145**	**6.106663**	**0.0000**
CIT_RATE	-0.069101	0.055353	-1.248370	0.2119
RGDP_GROWTH	-0.154076	0.065002	-2.370324	0.0178
DCPGDP	0.009768	0.031442	0.310657	0.7561
LAW	0.005194	0.010671	0.486720	0.6265
EASEOFBUS	-0.094714	0.080475	-1.176941	0.2392
NAICSSHORT="31"	-0.006105	0.009672	-0.631164	0.5279
NAICSSHORT="32"	0.013570	0.009361	1.449684	0.1472
NAICSSHORT="33"	0.001190	0.008989	0.132334	0.8947
NAICSSHORT="42"	-0.029528	0.009038	-3.267249	0.0011
NAICSSHORT="44"	-0.028186	0.009231	-3.053290	0.0023
NAICSSHORT="45"	-0.046711	0.010580	-4.415124	0.0000
NAICSSHORT="48"	0.095953	0.009287	10.33189	0.0000
NAICSSHORT="49"	0.022699	0.023454	0.967810	0.3332
NAICSSHORT="51"	0.055595	0.020443	2.719512	0.0065
NAICSSHORT="53"	0.030749	0.011218	2.740963	0.0061
NAICSSHORT="54"	0.003502	0.009872	0.354771	0.7228
NAICSSHORT="55"	-0.030183	0.031389	-0.961574	0.3363
NAICSSHORT="56"	0.020615	0.010505	1.962410	0.0497
NAICSSHORT="71"	-0.005963	0.012579	-0.474014	0.6355
NAICSSHORT="72"	-0.001526	0.009944	-0.153508	0.8780

R-squared	0.148763	Mean dependent var	0.119928
Adjusted R-squared	0.147479	S.D. dependent var	0.157970
S.E. of regression	0.145857	Akaike info criterion	-1.010824
Sum squared resid	395.1690	Schwarz criterion	-0.998617
Log likelihood	9431.683	Hannan-Quinn criter.	-1.006816
F-statistic	115.9347	Durbin-Watson stat	1.565576
Prob(F-statistic)	0.000000		

Appendix 3. Retained Earnings Model

Dependent Variable: RETECAP_W
Method: Panel Least Squares
Date: 05/25/18 Time: 01:14
Sample: 2010 2016 IF COUNTRY<>"SE" AND COUNTRY<>"PL" AND COUNTRY<>"CZ" AND COUNTRY<>"SK"
Periods included: 7
Cross-sections included: 15983
Total panel (unbalanced) observations: 86640
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.052492	0.046705	1.123890	0.2611
AGE_W	0.004472	0.000256	17.48697	0.0000
LOG(TA_W2)	0.017820	0.001611	11.06453	0.0000
FIXACAP	-0.039493	0.008276	-4.771866	0.0000
ROC_W	0.716830	0.010082	71.10227	0.0000
IS_EE	**0.197009**	**0.004728**	**41.67124**	**0.0000**
CIT_RATE	-0.231345	0.054546	-4.241277	0.0000
RGDP_GROWTH	-0.143110	0.019662	-7.278625	0.0000
DCPGDP	-0.213539	0.011746	-18.17968	0.0000
LAW	0.106415	0.007204	14.77082	0.0000
EASEOFBUS	0.088782	0.058937	1.506382	0.1320
NAICSSHORT="31"	-0.026117	0.015237	-1.714132	0.0865
NAICSSHORT="32"	-0.007813	0.013974	-0.559095	0.5761
NAICSSHORT="33"	0.004051	0.013277	0.305152	0.7603
NAICSSHORT="42"	-0.006927	0.012950	-0.534879	0.5927
NAICSSHORT="44"	-0.006095	0.013761	-0.442912	0.6578
NAICSSHORT="45"	-0.019491	0.018152	-1.073747	0.2829
NAICSSHORT="48"	-0.023794	0.012963	-1.835466	0.0664
NAICSSHORT="49"	-0.078916	0.026250	-3.006379	0.0026
NAICSSHORT="51"	-0.020603	0.018320	-1.124656	0.2607
NAICSSHORT="53"	-0.011939	0.016401	-0.727899	0.4667
NAICSSHORT="54"	-0.001397	0.013319	-0.104857	0.9165
NAICSSHORT="55"	0.081459	0.080768	1.008549	0.3132
NAICSSHORT="56"	-0.016946	0.014834	-1.142375	0.2533
NAICSSHORT="71"	-0.121666	0.025026	-4.861665	0.0000
NAICSSHORT="72"	-0.078891	0.015924	-4.954282	0.0000

R-squared	0.243532	Mean dependent var	0.338435
Adjusted R-squared	0.243314	S.D. dependent var	0.321267
S.E. of regression	0.279463	Akaike info criterion	0.288406
Sum squared resid	6764.512	Schwarz criterion	0.291217
Log likelihood	-12467.73	Hannan-Quinn criter.	0.289265
F-statistic	1115.356	Durbin-Watson stat	0.214143
Prob(F-statistic)	0.000000		