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Capital Structure Decisions under Institutional Factors and Asymmetric Adjustments

Kapitalstrukturbeslutninger med Asymmetriske Justeringer og Institusjonelle Faktorer

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Problem Description

This thesis will investigate two topics within capital structure theory: asymmetric adjustments and institutional factors. The first paper will focus on the capital structure decisions of European firms incorporating asymmetric adjustments. The second paper is an empirical analysis of institutional factors and their influence on capital structure decisions for European firms.

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Preface

This master's thesis was carried out at the Department of Industrial Economics and Technology Management at the Norwegian University of Science and Technology (NTNU). This thesis represents the completion of the Masters of Science program for Industrial Economics and Technology Management with concentration in financial engineering. The last four years of our study at NTNU have given us the fundamental background to finish this challenging task.

Our master's thesis furthers our project thesis "A Robust Estimator for Leverage Adjustment in Western Europe", and the goal is to investigate two topics within capital structure theory: asymmetric adjustments and institutional factors. Through the process of researching and writing our thesis, we have learned much about capital structure theory, however we acknowledge that it is a complicated field within finance as a unifying model has yet to be discovered. We hope our research will contribute and benefit to ongoing researchers through their endeavor.

We would like to express gratitude to our supervisor at NTNU, Associate Professor Stein Frydenberg, whose guidance and feedbacks has been greatly appreciated. We also thank Leslie Wei for reviewing our paper.

June 10th 2011, Trondheim

Christopher Friedberg

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Capital Structure Decisions under Asymmetric Adjustment

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Abstract

The purpose of this paper is to compare the symmetric model of capital structure with the asymmetric model. Currently most research on the capital structure speed of adjustment assumes symmetric adjustment (e.g. Flannery and Rangan, 2006). This assumption is flawed because it fails to take into account adjustment costs such as external financing costs and financial constraints. Using a modified partial adjustment model we conclude that there is a significant heterogeneous leverage adjustment, which needs to be considered for capital structure research. Our results indicate that firms who are smaller, less profitable or have more investment adjust their leverage faster. We also include regressions with combinations of the adjustment costs for the segments of adjustment costs that give higher or lower speeds of adjustment. This sheds light on the capital structure puzzle, and shows that the speed of adjustment varies in different segments of our sample, which is consistent with previous research (e.g. Flannery and Hankins, 2007; Dang, Kim and Shin, 2009).

Keywords: Trade-off theory, Dynamic, Modified partial adjustment model, Adjustment costs, asymmetric

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1. Introduction

The ever evolving theories of capital structures have been the subject of debate for financial economists since the 1958 seminal work of Miller and Modigliani. Modern research favors the symmetric dynamic capital structure model when calculating the mean reversion of leverage adjustment. Papers concurrent with this methodology include Flannery and Rangan (2006), Leary and Roberts (2005) and Huang and Ritter (2009). Recently a group of researchers, Dang et al., 2009; Faulkender et al., 2010, are advocating a more heterogeneous (asymmetric) adjustment accounting for adjustment cost.

The field of heterogeneous leverage adjustment was first introduced by Fischer et al. (1989) who analyzed different scenarios in which leverage adjustment is not symmetric. They conclude that optimal debt ratios vary over a certain range, which depend on predictions relating to firm specific properties. We further develop their model by exploring how to extend static theories to a dynamic setting. There are three rationalizations to using an asymmetric capital structure model: first, the trade-off theory needs to consider capital market imperfections which create adjustment costs that affect the rebalancing of capital structure (Frank and Goyal, 2008b). Second, a firm's financial flexibility determines how it can handle uncertainties and variations in internal cash inflows or constraints (Flannery and Hankins, 2007); therefore under the assumption of imperfect capital markets, firms require financial flexibility (Byoun, 2011). Lastly, information asymmetry creates market frictions which cause external financing costs to fluctuate. It is expected that external financing costs could affect the leverage adjustment.

The purpose of this paper is to determine whether a significant discrepancy exists between the asymmetric and symmetric model. To do so, we measure the symmetric speeds of adjustment for firms in France, Germany, Great Britain, Italy and Spain. By using an assortment of different estimators such as ordinary least squares (OLS), generalized method of moments (GMM) and bootstrap based bias correction (BC) we are able to determine a robust result for the different speeds of adjustment. We also measure the speed of adjustment for different adjustment costs, such as external financing costs and financial constraints, by using the modified partial adjustment model proposed by Flannery and Hankins (2007). To observe any inconsistencies, we compare our symmetric results with our asymmetric results.

From our baseline estimates of the symmetric speeds of adjustment we find that it varies for different estimators. The OLS estimator reports a speed of adjustment at 16.5 percent, indicating a downward bias. The two most robust estimators; system-GMM and BC report speeds of adjustment at 36 percent and 20 percent respectively.

Using a modified partial adjustment model we find the heterogeneous speeds of adjustment for our two groups of adjustment costs. Dividing our sample of the external financing costs (age and size) and financial constraints (profitability, investment and cash flow) into high and low regimes, we find significantly different speeds of adjustments. To better understand the effect of adjustment costs we further divide our sample into combinations of different proxies. One important result we observe is how firms with higher investments, lower profitability and lower cash flow produce a significantly larger leverage adjustment compared to the average firm in our sample. Lastly, we follow the same procedure for the analysis of adjustment costs, but we also include restrictions for over/underleveraged firms. We find that over- and underleveraged firms with varying degrees of financial constraints have a larger speed of adjustment compared to our initial estimates. Interestingly, we do not find a significant difference between overleveraged and underleveraged firms.

Our paper contributes to capital structure research in three ways. First, we further earlier research (Dang et al., 2009) on heterogeneous leverage adjustment in Great Britain by expanding our dataset to Western European firms. Our data set contains firms from the five largest economies in Western Europe (GDP, 2007): Great Britain, France, Germany, Spain and Italy. This is important since it will give insight to firm behavior in the European economy. Second, we expand upon Flannery and Hankins (2007) by applying the alternative BC estimator to an asymmetric capital structure model. This is the first time the BC estimator has been used in an asymmetric capital structure model. Lastly, we perform regressions with combination values of the different adjustment costs. Combining the different adjustment costs allows us to have more insight to how each of them affects the leverage adjustment.

Our results indicate that the modified partial adjustment method may induce some distortions. For the system GMM, we see that the baseline estimates are considerably different than our original speeds of adjustment. We also notice that some results are not consistent with our predictions for the different adjustment costs. The large difference in the speeds of adjustment suggests that adjustment costs need to be included in dynamic capital structure models.

The paper is organized as follows. Section 2 presents literature review. Section 3 presents the economic models. Section 4 describes the data and different explanatory variables. Section 5 presents the econometric methods and the different estimators. Section 6 present the empirical result and section 7 concludes.

2. Literature Review

We recognize that there have been many influential papers centered on the topic of capital structure, however due to practicality we will only refer to the papers that have influenced us the most. One paper that lay the foundation for our empirical research is Flannery and Rangan (2006). Their paper introduces the general partial adjustment model of firm leverage and examines how fast a firm with a target leverage will adjust. Using the dynamic partial adjustment model with OLS, fixed effects, Fama-Macbeth, instrumental variables and GMM estimators, they find that a typical firm closes about 34 percent of the gap between current leverage and target leverage every year. Their model does not permit occasional deviations from the optimal target leverage, which is an important issue in dynamic capital structure theory. According to Stewart C. Myers (1984: 578), 'Large adjustment costs could possibly explain the observed wide variation in actual debt ratios, since firms would be forced into long excursions away from their optimal ratios.' Furthermore, Fischer et al. (1989) investigate the impact of adjustment costs on capital structure decisions. They develop a model of dynamic capital structure choice that takes into account recapitalization costs. The purpose of their study is to find predictions about capital structure decisions which are not based on static leverage ratios. They conclude that smaller, riskier, lower-tax and lower-bankruptcy-cost firms will have leverage ratios that fluctuate more. Their result is dependent on the assumed form of transaction costs, and lacks a general model for dynamic capital structure decisions.

Expanding upon Fischer et al. (1989), Leary and Roberts (2005) conducted an empirical study of a firms dynamic rebalancing in capital structure, taking into account adjustment costs. They believe firms infrequently consider capital structure decisions and maintain a financial policy consistent with dynamic rebalancing. This theory signifies an attempt to pursue a leverage target. Their study proves that firms rebalance their capital structure by issuing and retiring debt and, to a lesser extent, repurchase equity. Their research mainly tests whether firm rebalance and does not distinguish between the pecking order and trade-off behavior.

To test the hypotheses of the trade-off and pecking order theory while taking into account adjustment costs, Flannery and Hankins (2007) introduce a modified partial adjustment model. They believe leverage decisions are influenced by the costs and benefits of reaching the leverage target. Their research assumes that a company has two rebalancing points; retire debt and issue equity when overleveraged or repurchase shares and issue debt when underleveraged. Since market frictions exist, the two rebalancing points require either financial flexibility or external financing. With the modified partial adjustment model they find that the proxies for financial constraints are significant and that the benefits of adjustment are important determinants. In their evaluation of financial flexibility they use cash inflows measured by profitability and asset sales. The impact of the variables they proxy for financial flexibility and financial constraints are subjective and have been interpreted differently by other researchers (e.g. Frank and Goyal, 2009; Byoun, 2011)

Byoun (2011) examines different interpretations of financial flexibility, and formulated three financial flexibility hypotheses, which state assumptions about firms in different life-cycle stages. The first hypothesis postulates that small developing firms with low cash flow, no dividends and no credit rating are in the most need of financial flexibility. To compensate, these firms issue more equity and maintain lower leverage ratios. The second hypothesis states that growing firms with mediocre cash flows should have higher leverage ratios. The last hypothesis states that large mature firms with high earned capital rely on internally generated funds and use only safe debt in order to preserve financial flexibility. Byoun (2011) concludes that there is a significant relationship between leverage and financial flexibility, which influences a firms capital structure decisions.

One variable often used in empirical capital structure research is profit, Flannery and Hankins (2007) use it as a proxy for financial flexibility. Empirical research have shown profit as negatively related to leverage (e.g. Fama and French, 2002; Flannery and Rangan, 2006). Many researches interpret this phenomenon as the "Achilles heel" of the trade-off theory, since it predicts that there should be a positive relationship between leverage and profitability. Frank and Goyal (2009) disprove this relationship in their paper, stating that it is more complicated than just a linear relationship. In their paper, they prove that highly profitable firms will have more debt, repurchase equity, and experience an increase in the market and book value of equity. Firms with lower profitability will reduce debt and issue equity. They conclude that the relationship between profit and leverage are consistent with the trade-off theory.

Another proxy often used for financial flexibility is free cash flow. Faulklender et al. (2010) analyze the impact of free cash flow on capital structure decisions, and found that companies with large operating cash flows have more aggressive changes in their capital structure. They believe firms are more likely to make leverage adjustments when adjustment costs are shared with transactions associated to the firms operating cash flows. They also find that financial constraints affect the speed of adjustment. Firms that pay dividends or have credit rating adjust faster when they are underleveraged and slower when they are overleveraged. They conclude that constrained firms adjust more slowly when they are underleveraged and more quickly when they are overleveraged.

3. Economic Model

There is an underlying ambiguity in capital structure which results from the subjective opinions of different researchers. Will a firm choose debt or equity and how will this choice impact its overall value? Miller and Modigliani address these issues in their 1958 paper, stating that the value of a levered firm is the same as the value of an unlevered firm. They later corrected their own work in 1963 by considering the option of debt and concluding that for taxable firms, the value of the firm increases with the use of debt. Modern research on the subject often refer to Miller and Modigliani's innovative work, and despite uncertainties, two main theories have appeared: The Pecking Order Theory and The Trade-Off Theory.

The pecking order theory was first introduced by Donaldson (1961) in his study of the financial practices of large corporations. According to his research, company executives prefer to use internally generated funds to finance investments. Later Myers and Majluf (1984) contributed to Donaldson's proposal, showing that it is generally better to issue safe securities rather than risky ones. They believe that firms sometimes forego good investments if risky securities are the only form of external financing available. In general we may summarize the financial hierarchy of the pecking order of financing with two points:

1. Firms prefer internal financing.
2. If firms require external financing, they start with issuing debt, then hybrid securities (e.g. convertible bonds) and as a last resort equity.

The second major theory of capital structure is the static trade-off theory. This theory considers the trade-off between the benefits and costs of debt. For instance, while borrowing money may allow companies to become eligible for interest tax shields, they also become susceptible to bankruptcy and financial distress. Some examples of financial distress are bankruptcy costs, auditor fees, legal fees and management fees. The purpose of the static trade-off theory is to find the optimal debt ratio that balances the costs and benefits of debt for each firm. According to Myers (1984) there are two main predictions from the trade-off model:

1. Risky firms use less debt. The term risk can be defined as a volatile value of the firm's earnings or assets, Bradley, Jarrel and Kim (1984).
2. Firms with tangible assets will borrow more than firms holding specialized intangible assets or growth opportunities.

Previous research (e.g. Frank and Goyal, 2008b) of the trade-off theory have shown that an increase in the costs of financial distress or non-debt tax shields will reduce the optimal debt level. Conversely, an increase in the personal tax rate on equity increases the optimal debt level.

While intuitively the static trade-off theory seems realistic, the problem is whether it explains capital structure decisions (Myers, 1984). One limitation of the static trade-off theory is that it fails to take into account transaction costs in response to fluctuations in asset value (Fisher, Heinkel & Zechner, 1989). In a dynamic model, the proper financing decision for the next period depends on whether the firm needs to raise funds or is expected to pay out funds (Frank and Goyal, 2008). Therefore, firms are expected to adjust their leverage toward the long-run target leverage only when the benefits of doing so outweigh the costs of adjustment. Evidence of a higher speed of adjustment is consistent with the trade-off theory. Likewise if the time to close the gap between the observed and the target leverage is too large, then leverage target can be viewed as a less significant factor in corporate financing decisions (Hovakimian and Li, 2010).

To recognize the role of time, it is necessary to consider adjustment costs and expectations. According to Fisher et al. (1989) firms facing adjustment costs take different adjustment paths, leading to a different speed of adjustments for each segment of the firm. Byoun (2007) shows that capital structure adjustments occur in response to available surpluses. He illustrates that firms with below-target debt will have slower adjustments and vice versa. One explanation is that adjustment costs for reducing debt is lower than those of increasing debt. Another possibility is that financial conditions of the firm affect the costs of adjustment e.g. companies with financial deficit will have higher adjustment cost.

Several studies assume symmetric speeds of adjustment (e.g. Flannery and Rangan, 2006; Dang, Kim and Shin, 2010) but do not consider costly adjustment. Byoun (2011) argues capital market frictions do exist and the speed of adjustment varies for different regimes. Myers (1984) states that if adjustment costs are large, companies may take extended excursions away from their leverage targets. If this is true, researchers need to give more attention to adjustment costs. According to Flannery and Hankins (2007) if there are large discrepancies in adjustment costs among firms, this requires financial flexibility or external financing. A summary of the different proxies we choose for adjustment costs can be found in table 1.

Through our empirical study regarding the impact of financial flexibility and financial constraints, we have three hypotheses:

1st Hypothesis *Due to financial flexibility and financial constraints, speeds of adjustment vary for different segments of the population.*

2nd Hypothesis A *slower speed of adjustment is expected when there is a higher adjustment cost and vice versa.*

3rd Hypothesis *Overleveraged firms adjust quicker than underleveraged firms.*

Financial flexibility is a vital aspect of handling uncertainties and variations in both the internal and external financial environments. Byoun (2011) defines financial flexibility as "a firm's capacity to mobilize its financial resources in order to take preventive and exploitive actions in response to uncertain future contingencies in a timely manner to maximize the firm value". In the survey by Graham and Harvey (2001), they conclude that the most important item affecting corporate debt decisions is management's desire for financial flexibility. Financially flexible firms often avoid financial distress and negative shocks, and are able to fund investment at low costs (Gamba and Triantis, 2006). According to Flannery and Hankins (2007) a firm's internal financial flexibility is composed of cash inflows and constraints. This paper uses three proxies for financial constraints: profitability, investments and free cash flow. Although profitability can also be used as a determinant for capital structure, we include it as an adjustment cost to account for its complexity (Frank and Goyal, 2009). An increase in profitability enlarges the value of the debt tax shields, but it also affects the value of equity. Frank and Goyal (2009) conclude that highly profitable firms issue debt and repurchase equity, while low profit firms reduce debt and issue equity.

External financing costs affect capital structure decisions when leverage rebalancing requires security to be issued. According to Myers (1977), information asymmetry creates market frictions that influence the availability of issuing securities. Byoun (2007) advocates that adverse selections of costs combined with informational asymmetry, influence a firm's capital structure adjustment decisions, and therefore must be a part of a unified theory of capital structure. This paper has two proxies for information asymmetry: firm age and size. Firm age is used as a proxy since younger firms are more likely to engage in asset substitution (Flannery and Hankins, 2007). Size is used as proxy since our hypothesis states that larger firms have lower information asymmetry, and therefore lower costs of financing.

Table 1. Proxies and labels for adjustment costs

	Adjustment costs	Proxy	Label
Financial Flexibility	Profitability	EBIT over total assets	PROF
	Investments	Capital expenditures-depreciation over operating revenue	INV
	Free cash flow	Cash flow over total assets	CASH
External Financing Costs	Age	Date of incorporation	AGE
	Size	Natural log of sales	SIZE

4. Data and Explanatory Variables

Determinants of Capital Structure

Before introducing the econometric methods used in our research it is important to clarify the explanatory variables. The variables we used in our model are based upon earlier research from Titman and Wessels (1988), Frank and Goyal (2008b) and DeAngelo and Masulis(1980). A summary of the different capital structure determinants and their proxies, labels and predictions can be found in table 2.

Leverage

One of the main purposes of this paper is to analyze various adjustments of leverage; thus the proxy for leverage is very important. Researchers have yet to agree upon using the market or book value of leverage. The main issue is whether leverage predictions of the trade-off theory and pecking order theory describe market leverage or book leverage. Researchers such as Hovakimian (2003) and Flannery and Rangan (2006) chose to use market-value debt ratios, since it represents the market valuation of the firm. Conversely Frank and Goyal (2009) preferred to use book value since volatile financial markets may cause the market value to become unreliable. Another distinction between the two proxies is because a large part of the market value is accounted for by assets not yet in place, while book value represents assets already in place (Myers, 1977). According to Fama and French (2002), most predictions for capital structure theory apply directly to book leverage, and some to market leverage. Several studies (e.g. Fama and French, 2002) report both book and market leverage, because of the uncertainty of predictions or as a test for robustness of the model. We use the book value of leverage as a proxy in our regressions.

Profit

Donaldson (1961) suggested that capital structure decisions for firms are dominated by a preference for internal financing. Therefore, the pecking order theory predicts a negative correlation between profitability and leverage while the trade-off theory predicts a positive sign on profit, since the firm issues more debt to create a tax shield on their earnings. Previous studies (e.g. Titman and Wessels, 1988; Fischer et al. 1989) show that profit has a negative correlation with leverage. This is considered by many to be the "Achilles heel" of the trade-off theory.

Frank and Goyal (2008a) disagree with this claim and emphasize the relationship between profitability and leverage has been misunderstood. This will be explained in further detail in the adjustment cost section. We include profit as capital structure determinant, and use earnings before interest and taxes (EBIT) over total assets as a proxy.

Size

Larger companies have two distinct differences from their smaller counterparts: less asymmetric information and a larger debt ratio. According to the trade-off theory, having less asymmetric information, makes it easier for creditors to calculate the risk of default. Titman and Wessels (1988) argue that there is a positive correlation between size and leverage. A possible explanation being that larger firms are more diversified and have a smaller probability of bankruptcy. Meanwhile, the pecking order theory predicts a negative relationship between leverage and size, because of less asymmetric information, and easier access to capital markets.

According to Warner (1977) bankruptcy costs tend to contribute to a larger part of the firm value for small firms in comparison to large firms. Frank and Goyal (2009) found the natural logarithm of sales to be a significant proxy for size in their research. We use the natural logarithm of sales as a proxy for size, which was also used by Titman and Wessels (1988).

Tangibility

According to Myers and Majluf (1984) firms prefer issuing secure debt rather than securities. Their model incorporates the costs of issuing securities, since firm managers have better information than outside shareholders. To avoid these costs, it can be assumed that firms will issue debt with security in tangible assets. In accordance to this assumption the trade-off theory predicts more leverage in companies that have more tangible assets (Titman and Wessels, 1988). The pecking order theory predicts tangibility to have a negative effect on leverage, since tangible assets lower asymmetric information. In our regressions we include fixed assets as a proxy for tangibility in a firm.

Growth opportunities

Earlier research (e.g. Fama and French, 2002; Flannery and Rangan, 2006) on capital structure use the growth determinant in their regression, although there are different opinions on the relationship between growth and leverage. According to Titman and Wessels (1988), growth opportunities add internal value to capital assets. As they cannot be collateralized, the trade-off theory predicts a negative sign while the pecking order theory, predicts a positive impact on leverage.

There are several accepted proxies for growth, including change in assets. Frank and Goyal (2009) find this proxy to be a significant explanatory variable and positively correlated with debt. Another proxy for growth, the market-to-book ratio, has been found to correspond with lower leverage. Fama and French (2002) use research and development (R&D) expenditures to assets as a proxy for growth, because of its purpose of generating future investments. They found R&D to be negatively related to leverage. The firms in our sample fail to report market-to-book ratio and R&D; therefore we use change in assets as our proxy.

Non-debt tax shield

According to DeAngelo and Masulis (1980), depreciation and tax deductions can replace the tax benefits of debt financing. We hypothesize firms with large non-debt tax shields will have less debt compared to similar firms with lower tax shields. According to the trade-off theory, firms with higher non-debt tax shields will have lower leverage, since the amount of revenue to be secured from taxes will be lower. Currently the pecking order theory does not have concrete predictions regarding non-debt tax shields. We model non-debt tax shield as depreciation over total assets as suggested by Titman and Wessels (1988).

Industry

Industry variables have been found to be strong significant factors of leverage (e.g. Bradley et al., 1984; Faulkender et al., 2010). Possible variables include the unobservable factors such as business risk, technology, and regulations shared by companies in the same industry. These variables are important because managers use other firms in the industry as a target for the appropriate amount of leverage for their firm. The trade-off theory predicts a positive relationship between industry mean leverage and firm leverage. The pecking order theory has no specific predictions regarding industry effects. We calculate the industry mean leverages using the standard industrial classification code (SIC).

Table 2. Proxies, labels and predictions for determinants

Determinant	Proxy	Label	Trade-off theory prediction	Pecking order theory prediction
Profitability	EBIT over total assets	PROF	+	-
Size	Natural log of sales	SIZE	+	-
Tangibility	Fixed assets over total assets	TANG	+	-
Growth	Natural log of total assets over last year's total assets	GROWTH	-	+
Non-debt tax shield	Depreciation over total assets	NDT	-	NA
Industry effects	Industry mean leverage	INDMEAN	+	NA

Note: The determinants and their respective proxies along with the predictions given by the trade-off theory and pecking order theory.

Data

The financial and accounting data for this paper were collected from the Amadeus database, which contains financial information for European companies. We analyze a panel of listed companies from France, Great Britain, Germany, Italy and Spain. We chose to study these countries because they are ranked the top 5 EU countries according to nominal GDP (GDP, 2007), and will provide a good benchmark for the rest of Europe. The financial data is collected from the period 2002-2009 and contains the information for 1,851 companies. Please refer to Table 3 for an overview of the dispersion among the countries.

Table 3. Number of companies for each country

Country	Companies	Average leverage
France	438	0.555
Germany	445	0.441
Great Britain	687	0.495
Italy	173	0.537
Spain	108	0.556

For consistency among our data we restrict it in two areas. First, experience from a previous paper (Friedberg and Johannessen, 2010) has confirmed that smaller firms generally have less financial data reported; thus we will only include firms with 100 or more employees. Second, in order to use the BC estimator and the dynamic GMM estimators, which require lagged instruments, we remove firms with four or more consecutive year's observations missing.

Descriptive statistics

Table 4. Correlations between different variables

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
TOTDEBT	[1]	1.000									
PROF	[2]	-0.115	1.000								
SIZE	[3]	0.188	0.211	1.000							
TANG	[4]	-0.012	0.023	0.150	1.000						
GROWTH	[5]	-0.040	0.233	-0.043	-0.053	1.000					
NDT	[6]	0.040	**-0.448**	-0.052	0.127	-0.235	1.000				
INDMEAN	[7]	0.234	-0.028	0.057	-0.165	0.007	-0.075	1.000			
INV	[8]	-0.019	0.016	0.224	0.171	-0.065	-0.044	-0.083	1.000		
CASH	[9]	-0.183	**0.728**	0.161	0.088	0.168	0.008	-0.048	0.075	1.000	
AGE	[10]	-0.019	0.016	0.224	0.171	-0.065	-0.044	-0.083	-0.015	0.005	1.000

Note: Correlation among the variables used in the method described by Flannery and Hankins (2007). Most of the variables are uncorrelated, except non-debt tax shield and profitability, and cash flow and profitability. Non-debt tax shield and profitability are used simultaneously, and may produce less robust results due to correlation. The cash flow variable is only used to divide the sample into low and high cash flow firms and not for any actual regressions therefore the correlation with profitability can be disregarded.

Table 5. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	13296	0.505	0.211	.002	1.795
PROF	13456	0.048	0.142	-2.867	0.936
SIZE	13414	12.36	2.063	3.324	19.63
TANG	13453	0.236	0.212	0	0.991
GROWTH	11514	0.078	0.320	-2.441	5.199
NDT	13181	0.050	0.061	-0.093	2.679
INDMEAN	14562	0.509	0.050	0.318	0.608
INV	11284	-0.001	4.146	-309.5	220.45
CASH	13167	0.067	0.128	-2.672	1.376
AGE	14574	40.93	37.812	1.0	210.0

Note: Descriptive statistics for the variables used in stage 1 of the Flannery Hankins method. Non-debt tax shield is negative for 12 firm years. This is a result of the rare cases where depreciation is negative, and only reported for 11 firms.

5. Econometric Methods

For this paper we use the two-step partial adjustment model to calculate the speed of adjustment under asymmetry. The partial adjustment model assumes that the dynamics of corporate debt are closely associated with a specific fraction of its deviation from the target ratio (Hovakimian and Li, 2010). This section will introduce the two step partial adjustment model and several methods used for estimating the models.

The Partial Adjustment Model of Leverage

Step 1

We first define the book value of debt to value as

$$TOTDEBT_{i,t} = \frac{D_{i,t}}{V_{i,t}} \quad (1)$$

Where

$$D_{i,t} = long - term\ debt_{i,t} + \ short - term\ debt_{i,t}$$

$$V_{i,t} = Total\ Assets_{i,t}$$

According to Flannery and Rangan (2006) we can define the firms target debt ratio as a function of the observed characteristics (X) of the firm.

$$TOTDEBT^{*}{}_{i,t} = \ \beta X_{i,t-1} \quad (2)$$

Thus, the partial adjustment model of leverage is defined as

$$TOTDEBT_{i,t} - TOTDEBT_{i,t-1} = \lambda\left(TOTDEBT^{*}{}_{i,t} - TOTDEBT_{i,t-1}\right) + \delta_{i,t} \quad (3)$$

Where λ represents the average speed of adjustment for the firm. Substituting in for the target debt ratio and rearranging, our model becomes

$$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)\left(TOTDEBT_{i,t-1}\right) + \delta_{i,t} \quad (4)$$

Flannery and Rangan (2006) state that fixed firm effects produce sharper estimates of the target.

Step 2

The purpose of this step is to consider adjustment costs. The previous section introduced the five different adjustment speed factors (Ω). For our analysis we perform regressions conditional on a single adjustment cost as well as combinations.

$$\Omega = \text{investments (INV), profitability(PROF), free cash flow(CASH), size and age}$$

We modify equation (4) to allow the speed of adjustment to vary with Ω and replace λ with λ_{new}, which includes the base adjustment speed calculated in step one and adjustment speed factors λ_j. We have the following expression for the new speed of adjustment

$$\lambda_{new} = \lambda_0 + \lambda_j \Omega_j \quad (5)$$

By inserting (5) into (3) we get the modified partial adjustment model

$$TOTDEBT_{i,t} - TOTDEBT_{i,t-1} = (\lambda_0 + \lambda_j\Omega_j)\left(TOTDEBT^{*}{}_{i,t} - TOTDEBT_{i,t-1}\right) + \delta_{i,t} \quad (6)$$

In order to isolate the leverage target we rearrange our original expression for the speed of adjustment (eq. 4)

$$\beta X_{i,t-1} = \frac{1}{\lambda}(TOTDEBT_{i,t} + (1-\lambda)\left(TOTDEBT_{i,t-1}\right)) + \delta_{i,t} \quad (7)$$

We now calculate the predicted target using the predicted values ($\widehat{BDR_{\iota,t}}$ and $\hat{\lambda}$)

From step one

$$TOTDEBT^{*}{}_{i,t} = \frac{1}{\lambda}(\widehat{TOTDEBT_{\iota,t}} + \left(1-\hat{\lambda}\right)\left(TOTDEBT_{i,t-1}\right)) + \delta_{i,t} \quad (8)$$

With the target leverage calculated in equation (8) we calculate the deviation between the target and current leverage as well as the change in leverage

$$Deviation_{i,t-1} = TOTDEBT^{*}{}_{i,t} - TOTDEBT_{i,t} \quad (9)$$

$$Change_{i,t} = TOTDEBT_{i,t} - TOTDEBT_{i,t-1} \tag{10}$$

Substituting (9) and (10) into equation (6) gives the following expression

$$Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j) Deviation_{i,t-1} + \delta_{i,t} \tag{11}$$

Using equation 11 we calculate the speeds of adjustment of different segments in three steps

1) Determine the baseline speed of adjustment using equation 4.
2) Perform regressions to find the λ_0 speed of adjustment using the following equation: $Change_{i,t} = \lambda_0 Deviation_{i,t-1} + \delta_{i,t}$
3) Determine the speeds of adjustment for the different adjustment costs using sample splitting: $Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j) Deviation_{i,t-1} + \delta_{i,t}$

Estimators for the Partial Adjustment Model

The regressions in step 1 of the modified partial adjustment model require dynamic panel data estimation. In capital structure research there are two estimation techniques most commonly used: Ordinary Least Squares (OLS) and Generalized Method of Moments (GMM). In addition we also use an alternative estimator; the Biased Corrected iterative bootstrap (BC). We will now give a brief introduction of each of these three estimators.

The OLS estimator is often used by econometricians due to its simplicity and general acceptance. However, it is well known that the results are biased since the lagged dependent variable ($TOTDEBT_{i,t-1}$) is correlated with the transformed errors ($\delta_{i,t}$) (Frydenberg, 2003). The OLS estimator tends to overestimate λ, resulting in a faster speed of adjustment (Mathisen and Skrebergene, 2009).

Generalized Method of Moments (GMM) refers to a class of estimators constructed through a method known as moment matching. Moment matching is a process in which the sample moments are matched with their respective population moments (see appendices). There are two versions of the GMM; the difference-GMM and the System GMM. Arellano and Bond (1991) developed the difference-GMM estimator, which maximizes an objective function with moment restrictions, including no correlation between the lagged dependent and residual. The System GMM was developed by Arellano-Bover (1995) and Blundell-Bond (1998). The system GMM improves upon the difference-GMM with the added assumption that the first difference of the instruments is uncorrelated with the fixed effects. Compared to the difference-GMM estimator, the system GMM performs better in regressions with persistent variables such as firm leverage, therefore we will be using the system GMM in our research. The system GMM also allows for more instruments, which builds a system of the original equation and the transformed one. One important assumption with the GMM-estimates is no serial correlation in the differenced residuals. The Hansen J-test (see appendices) and the Arellano-Bond test for autocorrelations, AR(1) and AR(2), are often applied to test this assumption. The AR(1) test has a null hypothesis of no autocorrelation in the differenced residuals, and is often rejected since the differenced residuals are defined as

$$\Delta e_{i,t} = e_{i,t} - e_{i,t-1} \; and \; \Delta e_{i,t-1} = e_{i,t-1} - e_{i,t-2} \tag{12}$$

We see from equation 12 that $\Delta e_{i,t}$ and $\Delta e_{i,t-1}$ both include $e_{i,t-1}$, as a result we will reject the AR(1) test. The test for AR(2) detects autocorrelation in levels. Another important assumption of the GMM-estimator is that the instruments are exogenous. We also report the Sargan-test[1], which checks the validity of instrumental variables. The null hypothesis for the Sargan test, states that the instruments are uncorrelated with the residuals, hence the preference for a high p-value. It is also important to run a difference-in-Sargan test, which checks the validity of a subset of instruments.

The more traditional estimators, such as FE and OLS, have a tendency to produce biased results. Econometric methods have evolved to correct these biases with methods such as long differencing estimator (Huang and Ritter, 2009), bias-corrected least square dummy variable (Flannery and Hankins, 2007) and the iterative bootstrap based bias corrected estimator (Dang, Kim and Shin, 2010). For this paper we chose to use the bootstrap based bias correction (BC), since previous studies (e.g. Dang, Kim and Shin, 2010; Friedberg and Johannessen, 2010) have shown that it is a robust estimator for leverage adjustment. The BC estimator was first introduced by Everaert and Pozzi (2007), who used it in their empirical analysis of leverage adjustment. The principle behind this bias correction is to reduce the bias in the estimator by bootstrap simulations. The purpose of the bootstrap simulation method is to resample the original data, directly or through a fitted model, and create a replicate dataset (Davison and Hinklev, 1997). The main idea of bias correction is illustrated best by defining the bias function for the biased estimator $\widehat{\xi}$

$$E(\hat{\xi}) \neq \xi \tag{13}$$

We extract a sample from the population and create N biased estimates $\widehat{\xi}^*{}_1(\xi), \dots, \hat{\xi}^*{}_N(\xi)$, which are written as

$$E(\hat{\xi}) = \lim_{N\to\infty} \frac{I}{N} \sum_{n=1}^{N} \widehat{\xi}^*{}_n(\xi) \tag{14}$$

From (14) it is clear that $\overline{\xi}$ will be an unbiased estimator of ξ. If this condition holds (Shin, 2008)

$$\hat{\xi} = \lim_{N\to\infty} \frac{I}{N} \sum_{n=1}^{N} \widehat{\xi}^*{}_n(\bar{\xi}) \tag{15}$$

The BC estimator implements an iterative bootstrap algorithm to search over the parameter space until we find the unbiased estimators $\overline{\xi}$ that satisfies equation (15). The coefficients are considered to be unbiased estimates for the true population parameters. We use this method to correct for the bias of the FE estimator. Encouraged by Everaert and Pozzi (2007) the following is the algorithm used to calculate the bootstrap-based bias corrected estimator

(1) Estimate the fixed effect estimators $\hat{\xi}$ for the original sample and set $\hat{\xi} = \tilde{\xi}$.

(2) Estimate the vector of individual effects.

[1] The Econometric software Stata has a module called xtabond2 which conducts difference GMM and system GMM that gives you the Hansen J-test, AR(1), AR2) and the difference-in-Sargan, see Roodman (2006).

(3) Calculate the residuals $\widehat{\delta_{\iota,t}}$

$$\widehat{\delta_{\iota,t}} = TOTDEBT_{i,t} - \tilde{\rho}\, TOTDEBT_{i,t-1} - \tilde{\eta} X_{i,t-1} \quad (16)$$

Then rescale them according to (MacKinnon, 2002), which gives $\widetilde{\delta_{\iota,t}}$.

(4) Generate the first bootstrap sample. For each cross-section (i) draw with replacement a sample $\widetilde{\delta_{\iota,t}}^{n}$ of size T.

(5) Using the estimator and sample in step 1 calculate the new bootstrap sample $BDR_{i,t}{}^{n}$, where the starting value is the first sample value $BDR_{i,t}$.

$$TOTDEBT_{i,t}{}^{n} = \tilde{\eta} X_{i,t-1} + \tilde{\rho} TOTDEBT_{i,t-1}{}^{n} + \widetilde{\delta_{\iota,t}}^{n} \quad (17)$$

(6) Find the fixed effect estimator, $\widetilde{\xi_J}^{\,n} = (\tilde{\rho}_j{}^{n}, \tilde{\eta}_j{}^{n})$ for bootstrap sample n.

(7) Duplicate steps 4-6 N times, N is the number of bootstraps chosen, and calculate the empirical mean, $\bar{\xi}_0 = \frac{1}{N}\sum_{j=1}^{N} \widetilde{\xi_J}^{\,n}(\widetilde{\xi_J}(0))$. The difference between the empirical mean and the estimator $(\hat{\xi})$ in step one is $\hat{\xi} - \bar{\xi}_0 = \omega$, which is the convergence criteria. We stop when ω ≈ 0, which means $\bar{\xi}_0$ is an unbiased estimator of ξ. If the convergence criterion is not accomplished repeat steps 2-7 for an updated value $\tilde{\xi}^{b}(k+1) = \tilde{\xi}^{b} + \omega_k$ until equation (15)[2] is satisfied.

Notes: $\lambda\beta = \eta$, $(1-\lambda) = \rho$, T = number of years, the *vector of unknown parameters* $\xi = (\rho,\eta)'$, $\hat{\xi}^{*}{}_{n}(\bar{\xi})$ *is sampled estimators from a population with parameter* $\bar{\xi}$ *. An unbiased estimator of* $\bar{\xi}$ *needs to satisfy equation (15).*

According to Everaert and Pozzi (2007) the bias corrected estimators are more robust than the GMM estimators under most circumstances, e.g. panels with small to moderate time dimension.

6. Empirical Results

This section presents the empirical results. We calculate the baseline estimates (equation 4) from step one in the partial adjustment model of leverage and find the λ_0 speed of adjustment, which is the first part of step 2 in the Flannery and Hankins modified partial adjustment model. We then calculate the asymmetric speed of adjustment using equation 11, which is the second part of step two in the modified partial adjustment model. Lastly we determine the speeds of adjustment for combination values of the adjustment costs and overleveraged/underleveraged firms.

We report all three estimators for robustness. Most of the results obtained are similar for all methods, thereby indicating good explanatory power.

[2] The iterative bootstrap bias correction is done in Stata. Currently there is no procedure available, but with the help from Minjoo Kim at Leeds University Business School, we modified the module he had recently developed and used it for our research.

Table 6. Baseline estimate results (step 1) using the partial adjustment model
$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)(TOTDEBT_{i,t-1}) + \delta_{i,t}$

Proxies	OLS	GMM	BC
TOTDEBT-1	0.835***	0.641***	0.803***
	(0.000)	(0.000)	(0.000)
PROF-1	-0.054***	-0.065**	-0.100***
	(0.000)	(0.026)	(0.000)
SIZE-1	0.004***	0.019***	0.006***
	(0.000)	(0.000)	(0.000)
TANG-1	-0.007	-0.027	-0.016***
	(0.165)	(0.281)	(0.001)
GROWTH-1	0.007**	0.006	-0.001
	(0.047)	(0.180)	(0.775)
NDT-1	-0.030	-0.043	0.040
	(0.141)	(0.237)	(0.112)
INDMEAN-1	0.130***	0.294***	0.121***
	(0.000)	(0.000)	(0.000)
GERMANY	-0.004	-0.021***	-0.005
	(0.165)	(0.000)	(0.680)
SPAIN	0.010**	0.008	0.020*
	(0.023)	(0.404)	(0.081)
ITALY	0.011***	0.010	0.002
	(0.006)	(0.123)	(0.833)
FRANCE	0.005*	0.013**	0.008
	(0.057)	(0.015)	(0.458)
CONS	-0.036***	-0.198***	(omitted)
	(0.004)	(0.001)	
Nr. Of obs.	9273	9273	8538
AR(1)		-10.45	
P-value		0.00	
AR(2)		2.30	
P-value		0.021	
Sargan test		445.09	
P-value		0.00	
Diff-in Sargan - GMM		85.14	
P-value		0.00	
Diff in Sargan - IV		9.72	
P-value		0.084	

Note: Regression results from the first stage of the modified partial adjustment method of Flannery and Hankins(2007). * is significant at 10%, ** is significant at 5% and *** is significant at 1%. P-values are shown in brackets.

Baseline Estimates for the Partial Adjustment Model

OLS

According to table 6, the OLS estimator gives a speed of adjustment of 16.5 percent. Furthermore, profitability, size and average industry leverage are significant at the one percent significance level while growth is significant at the five percent significance level. There are mixed results regarding the country variables with France, Italy and Spain being significant and having positive coefficients while Germany is insignificant with a negative coefficient.

Our results for size and non-debt tax shield are consistent with the predictions of the trade-off theory, however our results for profitability, tangibility and growth are consistent with the predictions of the pecking order theory. While this may seem contradictory, this result is not unique and has been reported in previous literature (Flannery and Rangan, 2006). Note the large coefficient for the industry mean leverage, indicates that Frank and Goyal(2009) was correct in their prediction of industry effects as a first order factor for leverage.

GMM

The two-step system GMM for the baseline estimate in table 6 gives a large speed of adjustment of 35.9 percent, which is considerably larger than the OLS. This result is similar to Flannery and Rangan (2006) who predicted a mean reversion at 34 percent. Our previous paper, Friedberg and Johannessen (2010), predicted a mean reversion in Western Europe at 24 percent using the two-step system GMM. This ten percent discrepancy most likely results from the inclusion of British firms. Rerunning the experiment using only British firms resulted with a speed of adjustment of nearly 40 percent, thus confirming our prediction that British firms have a larger speed of adjustment than the other European countries and explaining the difference between our two speeds of adjustment.

The GMM estimation produces the same coefficients signs as the OLS estimator, but there is some variation in the significance of the variables. Specifically, profitability is only significant on a ten percent level compared to one percent with the OLS. Growth changes from significant to insignificant with the GMM estimator. The country dummy variables maintain the same signs, but Germany is now significant at a one percent significant level. We also observe the country dummy variables for Spain and Italy are insignificant, while France is significant on a five percent level.

BC

The BC gives a speed of adjustment of 19.7 percent for the baseline estimate, similar to the result of the OLS. Profitability, size, tangibility and average industry leverage are significant at a one percent significance level. Referring back to OLS and GMM, the average industry leverage had the highest coefficient, indicating that it is an important explanatory variable for firm leverage. Growth and non-debt tax shields are insignificant and of all the country variables, only Spain is significant on a ten percent significant level.

Robustness

Earlier research (e.g. Nickell, 1981) has shown that OLS and fixed effects estimators produce biased results in dynamic models. The bias in the OLS estimator results from the lagged leverage variable being correlated with the residuals. Previous research in capital structure (Flannery and Rangan, 2006; Fama and French, 2002) proves that this correlation tends to produce a downward bias in the speed of adjustment for the OLS estimator. Our results indicate this is also true for our OLS estimation, since it measures a speed of adjustment of only 16.5 percent.

Referring to table 6, the GMM regression diagnostic signifies to reject the AR(1) test for no autocorrelation to differenced residuals. In addition, the AR(2) test for autocorrelation in levels is rejected, which implies that there is autocorrelation and that our GMM results are not robust. Furthermore the Sargan-test is rejected which implies over identified instruments. The system GMM regression also reports the difference-in-Sargan test, which is rejected. Overall the diagnostic of the system GMM shows instruments are weak and most likely correlated with the residuals. Therefore the BC estimator is the most robust estimator for the partial adjustment model, which is concurrent with our previous papers (e.g. Friedberg and Marki Johannessen, 2010).

Table 7. $\lambda_0$estimates for the modified partial adjustment model

Table 7 presents the λ_0 speeds of adjustment, which is the first part in step 2. The speed of adjustments from step1 and the λ_0 obtained using the baseline version of equation 11 are shown below. This is the speed of adjustment obtained in stage 2 without the consideration of adjustment costs. Regression output for the λ_0 calculations can be found in the appendices (table A6).

$Change_{i,t} = \lambda_0 Deviation_{i,t-1} + \delta_{i,t}$

	Original SOA	λ_0
OLS	0.165	0.219
GMM	0.359	0.191
BC	0.197	0.222

The λ_0 speeds of adjustment are all similar in value. The regressions in step 1 gave large variances in the speed of adjustment, ranging from 16.5 percent for the OLS, to 34.4 percent for the GMM estimator. The baseline adjustment speeds of about 20 percent are expected and consistent with previous research (e.g. Friedberg and Johannessen, 2010; Dang, Kim and Shin, 2010).

Flannery and Hankins (2007) achieved similar results for λ_0 and their one-stage estimations compared to our OLS and BC estimations. This is an indication that the two-stage methodology does not introduce distortion in the results. Our differences for the GMM from the first stage, indicates that there may be some distortions introduced by this method in our research.

Step two of the Modified Partial Adjustment Model using Adjustment Costs

Following Flannery and Hankins (2007) and their modified partial adjustment model, we report the result from step two in our model.

External financing costs

From table 8, younger firms have speeds of adjustment of 26.8-28.9 percent, while older firms adjust with a more modest range of 11.2-15.1 percent. Our results indicate a significantly faster speed of adjustment for younger firms, which is inconsistent with our earlier prediction that younger firms suffer from information asymmetry leading to smaller and more frequent financing activity (Flannery and Hankins, 2007). As expected, firm's size has the same effect as age, since the two variables are often positively correlated (see table 4). Smaller firms have mean reversion from 25.9 percent to 27.3 percent, while larger firms adjust more slowly from

12.8 percent to 15.0 percent. Our result for the age and size coefficients conflicts with the results by Flannery and Hankins (2007) but are consistent with Dang, Kim and Shin (2009), who conclude that larger and older firms are less active on the capital market.

Table 8.

The observations below describe the results from stage two of the method described by Flannery and Hankins (2007), using equation 11. We report the speeds of adjustment for the adjustment costs by distinguishing between quartile one and four. For profitability, cash flow and investments, quartile 1 is the quartile of companies with the lowest values regarding these variables, while quartile 4 is the quartile of companies with the highest values. For size and age, quartile 1 indicates the 25% smallest or youngest firms, while quartile 4 is the 25% largest or oldest firms in the sample. The p-value is the significance test[3] for the difference between quartile 1 and 4. The speeds of adjustment $(\lambda_0 + \lambda_j \Omega_j)$are all significant on a one percent level. See table A7 in the appendices for detailed regression output. The values reported in the table for each adjustment cost are the sum of the λ_0 and the adjustment factor (λ_j), signifying the (total) speed of adjustment for the respective quartile.

$Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j) Deviation_{i,t-1} + \delta_{i,t}$

	Quartile	OLS	GMM	BC
PROF	1	0.253	0.235	0.26
	4	0.193	0.179	0.196
	P-value	(0.04)**	(0.05)**	(0.03)**
INV	1	0.177	0.155	0.186
	4	0.334	0.302	0.333
	P-value	(0.00)***	(0.00)***	(0.00)***
CASH	1	0.280	0.257	0.287
	4	0.230	0.203	0.235
	P-value	(0.11)	(0.08)*	(0.08)*
AGE	1	0.287	0.268	0.289
	4	0.144	0.112	0.151
	P-value	(0.00)***	(0.00)***	(0.00)***
SIZE	1	0.269	0.259	0.273
	4	0.150	0.128	0.145
	P-value	(0.00)***	(0.00)***	(0.00)***

* is significant at 10%, ** is significant at 5% and *** is significant at 1%.

[3] The significance test is reported using the suest function in STATA, which is a post estimation command that can test whether two separate regression coefficients are significantly different. For more details see STATA user manual.

Our results are not in line with the predictions of the trade-off theory; we conclude that larger and older firms have lower speeds of adjustment, while the trade-off theory expects the opposite. Furthermore, the trade-off theory states that larger firms should have lower asymmetric information costs, and therefore less adverse selection and possible moral hazard problems (Dang, Kim and Shin, 2009). This implies that as a firm increases in size, it will have more access to external financing.

Theoretically, a firm's age should have a similar effect as size, in terms of mitigating information asymmetry. In actuality it is slightly more complicated to interpret. Taking into account the life cycle of financial progress, older firms could be a proxy for a firm that has reached the maturity phase while younger firms could be a proxy for firms in the development or growth stage (Byoun, 2011). This explains the higher leverage adjustment for younger firms if we assume that these firms are in the growth stage. However, if the firm is in the development stage we would expect it to have a slower speed of adjustment. Our results are inconclusive, but the large differences in speeds of adjustment show that external financing costs needs to be taken into consideration in dynamic capital structure theory.

Financial constraints

In table 8, the regression results for the high and low quartiles of cash flow are strongly significant on a 5 percent level for the three estimators. There is a significant difference between quartile one and four for most results, except for the OLS regression using cash flow as an adjustment cost. The speeds of adjustment for the low cash flow firms have a range of 25.7 percent for the GMM estimator to 28.7 percent for the BC estimator. Estimations for firms with high cash flow range from 20.3 percent for the GMM estimator to 23.5 percent for the BC estimator. The small difference in speeds of adjustment indicates that the estimation results are robust.

The results from table 8 also indicate firms with large cash flows have slower adjustment speeds. This contradicts the results by Faulkender et.al (2010), who predicted a larger speed of adjustment when adjustment costs are shared between transaction costs related to the operating cash flow. Furthermore, Byoun (2011) argued that large cash flow implies a firm reaching the maturity stage. Firms in the maturity stage are characterized as large firms with substantial operating cash flows, moderate cash holdings, high dividend payouts and moderate leverage ratios. Therefore it would be reasonable to expect firms in the maturity stage to have moderate leverage adjustment.

The estimations for profitability in table 8 are significant at the five percent level. This signifies that less profitable firms adjust quicker compared to more profitable firms; these findings are consistent with the result from Dang, Kim and Shin (2009) but contradict the claims made by Flannery and Hankins (2007) and Frank and Goyal (2008a). The result ranges from 23.5 percent for the GMM estimator to 26.0 percent for the BC estimator. The regression result for high profit firms show that they adjust more slowly with a speed of adjustment ranging from 17.9 percent for the GMM estimator to 19.6 percent for the BC estimator. Therefore less profitable firms adjust quicker, while high profit firms adjust slower. This confirms the predictions of the pecking order theory that less profitable firms are more inclined to issue debt. More profitable firms are observed to adjust more slowly, contradicting the result of Frank and

Goyal (2008a). They predicted less profitable firms should repurchase debt and issue equity. The negative relationship between profitability and leverage is complicated and it is important to take into account the fact that high profit firms experience an increase in both book equity and market value of equity.

The regression results between the low and high segments of investments, from table 8, exhibit the largest differences among the different financial constraints. The results for firms with less investment indicate a smaller speed of adjustment, ranging from 15.5 percent for the GMM estimator to 18.6 percent for the BC estimator. For firms with more investments there is a considerable increase in mean reversion, ranging from 30.2 percent for the GMM estimator to 33.4 percent for the OLS estimator. All of the regression results are significant on a five percent level. Overall, our result for the investment proxy indicates that firms with more investment have a faster speed of adjustment. This contradicts the result of Flannery and Hankins (2007) and Dang, Kim and Shin (2009) whom predicted firms facing financial constraints, such as

Table 9 Combination Variables

Table 9 consists of regressions performed with combination variables of the adjustment costs. The procedure is the same as in table 8, but each adjustment speed is a combination of two or three adjustment costs. Please see the table A8 in the appendices for the detailed regression output. LARGECOSTS-1 consists of firms in which the following three criteria hold; low profit, low cash flow and high investments. LARGECOSTS-2 consists of firms where at least 2 of the three previous criteria hold. SMALLCOSTS consists of firms in which the following three criteria hold true; high profitability, high cash flow and low investments. SMALL&YOUNG-1 consists of small and young firms. SMALL&YOUNG-2 is similar to SMALL&YOUNG-1 with the added assumption that young firms are nine years or younger. OLD&LARGE-1 are old and large firms. OLD&LARGE-2 is similar to OLD&LARGE-1 with a more strict size variable with values above 15. The p-value is the significance level of the combination regression compared to the original estimate of speed of adjustment (table 6). The values reported in the table for each combination variable are the sum of λ_0 and the adjustment factor (λ_j), meaning it is the (total) speed of adjustment for this selection of firms in the sample.

$$Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j) Deviation_{i,t-1} + \delta_{i,t}$$

	Avg. LEV	GMM	P-value	OLS	P-value	BC	P-value	PROF	CASH	INV	AGE	SIZE	Nr. Of obs
LARGECOSTS-1	0.441	0.379	(0.00)***	0.370	(0.00)***	0.375	(0.00)***	Low	Low	High			785
LARGECOSTS-2	0.479	0.251	(0.00)***	0.232	(0.00)***	0.257	(0.00)***	Low	Low	High			3436
SMALLCOSTS-1	0.477	0.131	(0.00)***	0.122	(0.00)***	0.130	(0.00)***	High	High	Low			1987
SMALL&YOUNG-1	0.415	0.268	(0.00)***	0.260	(0.00)***	0.271	(0.00)***				Young	Small	3268
SMALL&YOUNG-2	0.313	0.385	(0.00)***	0.381	(0.00)***	0.371	(0.00)***				Young	Small	334
OLD&LARGE-1	0.526	0.137	(0.00)***	0.113	(0.00)***	0.142	(0.00)***				Old	Large	2926
OLD&LARGE-2	0.530	0.115	(0.00)***	0.108	(0.00)***	0.113	(0.00)***				Old	Large	484

* is significant at 10%, ** is significant at 5% and *** is significant at 1%.

Investments, adjust slower toward the target leverage. Conversely, the pecking order theory states that growing firms are characterized by more investment and the need for external financing. Such firms should issue the safe security first, such as debt, and resort to equity as a last option.

Combination Variables

Based on the result from the previous section (table 8) there is a significant difference in the speeds of adjustment for different adjustment costs. To understand the effects, we perform a regression with combination variables; which are different arrangements of adjustment cost variables.

The results for the combination variables from table 9 are consistent with the results from table 8. We observe that all of our combination estimates are significant on a five percent level. Firms with more investment, lower profitability and lower cash flow adjust their leverage more quickly and vice versa. Again, this could be caused by firms who lack internally generated funds, thereby requiring external financing for their investments. The pecking order theory predicts that these firms will choose secure debt or hybrids instead of equity financing, which also explains the higher leverage adjustment. Furthermore, smaller and younger firms adjust more quickly compared to older and larger firms. This confirms our result from the previous section that our initial predictions of firm age and size are wrong, since our two proxies, age and size, for informational asymmetry do not affect the speed of adjustment in the way we originally thought.

Overleveraged and Underleveraged

Profitability

In accordance with the analysis of profitability in the previous section we include another restriction in which we distinguish between overleveraged and underleveraged companies. From table 10, the speed of adjustment is significantly larger for less profitable companies. This is inconsistent with the trade-off theory, but consistent with earlier research which shows that profitability has a negative impact on the speed of adjustment (e.g. Flannery and Rangan, 2006). Overleveraged companies reduce less of the gap between actual leverage and target leverage compared to underleveraged firms although the difference is not significant. This result conflicts with our 3rd hypothesis. Looking at table 6, there is a significant difference between our estimates for over- and underleveraged firms and the original speed of adjustment implying faster speeds of adjustment for firms further away from their target debt ratio.

One aspect of profitability that may explain the discrepancy in adjustments is the nature of profitability and its effect on debt and equity. A firm with negative profitability for a year will lose its value for that year, unless the negative profitability stems from payment/repurchase of debt, in which case debt will retain its value and reduce the equity. This will lead the firm closer to the target leverage, meaning there is an automatic adjustment to target leverage for underleveraged firms with negative profitability. Flannery and Hankins (2007) also notice this dynamic relationship, stating that high profit underleveraged firms will move further from their target, and counter this relationship by a more rapid adjustment.

Table 10. Overleveraged and underleveraged

Table 10 presents the results from stage two of the method described by Flannery and Hankins (2007), using equation 11. The quartiles are the same as the ones used in table 8, with the additional restriction of only regressing on over- and underleveraged firms. Underleveraged (U) firms have a leverage debt ratio ten percent or more below their target leverage ($BDR^*_{i,t}$) which is found with equation 8 ($BDR^*_{i,t} = \frac{1}{\hat{\lambda}}(\widehat{BDR}_{i,t} + (1-\hat{\lambda})(BDR_{i,t-1})) + \delta_{i,t}$), and overleveraged (O) firms have a leverage debt ratio ten percent or more above their target leverage. The values reported in the table for each adjustment cost are the sum of λ_0 and the adjustment factor (λ_j), meaning that it is the (total) speed of adjustment for this selection of firms in the sample. P-value is the significance test for the difference between over- and underleveraged firms in the respective quartile. P_1 and P_2 are the significance of the underleveraged and overleveraged speed of adjustment result compared to the speed of adjustment for their respective quartiles (Table 8). Please see table A9 in the appendices for detailed regression output.

$Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j) Deviation_{i,t-1} + \delta_{i,t}$

		OLS					GMM					BC					Nr. Of obs	
	Quartile	U	P1	O	P2	P-value	U	P1	O	P2	P-value	U	P1	O	P2	P-value	U	O
	1	0.394	(0.00)***	0.359	(0.05)**	(0.63)	0.357	(0.00)***	0.270	(0.48)	(0.20)	0.430	(0.00)***	0.273	(0.82)	(0.06)*	569	574
PROF	4	0.385	(0.00)***	0.301	(0.01)**	(0.36)	0.385	(0.00)***	0.179	(0.99)	(0.00)***	0.369	(0.00)***	0.270	(0.07)*	(0.16)	428	568
	1	0.430	(0.00)***	0.473	(0.01)***	(0.61)	0.354	(0.00)***	0.365	(0.11)	(0.89)	0.466	(0.00)***	0.427	(0.01)**	(0.60)	802	393
CASH	4	0.429	(0.00)***	0.432	(0.00)***	(0.96)	0.416	(0.00)***	0.234	(0.48)	(0.01)**	0.423	(0.00)***	0.388	(0.01)***	(0.66)	442	551
	1	0.427	(0.00)***	0.413	(0.01)***	(0.86)	0.391	(0.00)***	0.377	(0.04)**	(0.87)	0.460	(0.00)***	0.368	(0.03)**	(0.19)	534	651
SIZE	4	0.217	(0.14)	0.360	(0.00)***	(0.06)*	0.183	(0.22)	0.255	(0.00)***	(0.29)	0.219	(0.11)	0.221	(0.27)	(0.98)	486	537
	1	0.422	(0.00)***	0.497	(0.00)***	(0.34)	0.376	(0.00)***	0.399	(0.03)**	(0.76)	0.431	(0.00)***	0.441	(0.00)***	(0.88)	569	574
AGE	4	0.245	(0.06)**	0.365	(0.00)***	(0.20)	0.166	(0.25)	0.205	(0.05)*	(0.62)	0.288	(0.01)***	0.332	(0.00)***	(0.60)	428	568
	1	0.318	(0.00)***	0.330	(0.05)**	(0.88)	0.275	(0.00)***	0.209	(0.24)	(0.35)	0.348	(0.00)***	0.247	(0.30)	(0.23)	485	600
INV	4	0.539	(0.00)***	0.448	(0.04)**	(0.24)	0.502	(0.00)***	0.337	(0.47)	(0.02)**	0.541	(0.00)***	0.421	(0.08)*	(0.10)*	475	530

* is significant at 10%, ** is significant at 5% and *** is significant at 1%.

Cash flow

While cash flow and profitability are positively correlated (table 4), there are still some differences among their respective effects on leverage. For instance, the speed of adjustments for both quartiles is larger for cash flow than profitability. The mean reversion for the different estimators is about 40 percent, indicating a fast adjustment towards target leverage. Additionally, the differences between over- and underleveraged firms have become less pronounced and our significance test (P-value) indicates no significant difference. From our second significance test, the estimates for over- and underleveraged firms are significantly different from our initial estimates for the speed of adjustment (table 6). Similar results regarding cash flow have been reported by Faulkender et al. (2010), and indicate that large and negative cash flows have a large impact on capital structure policy.

Size

According to table 10 there are two notable differences between the 1st and 4th quartiles for the variable size. The two quartiles have different magnitudes for speeds of adjustment, with smaller companies adjusting toward their target faster than larger companies. This is consistent with our results in table 8, where we analyze size, minus the restrictions for under- and overleveraged firms. Furthermore, the speeds of adjustment seem to be higher for underleveraged firms in quartile 1 while the opposite is true for quartile 4; this difference is not significant on a five percent level. We can conclude that there is a significant difference between the estimates and our original speed of adjustment (table 6). The higher speed of adjustment for large overleveraged firms is logical since the costs of an increased bankruptcy risk could be greater than the gain from less tax expenses which allows the firm to revert back to its target leverage quicker than our original speed of adjustment. The result may seem strange, but it confirms the mixed and inconclusive result of Dang, Kim and Shin (2009) in their size regressions.

Age

Similar with size, adjustments are faster for younger firms, with all adjustments speeds above 37 percent for quartile 1. This may be caused by the correlation between size and age. The negative correlation between age and leverage may be caused by the firms reaching the maturity phase. According to Byoun (2011) large mature firms are expected to have moderate leverage ratios. Our significance test shows no significant difference between over- and underleveraged firms.

Investments

Firms with larger investments have a larger speed of adjustment compared to firms with fewer investments, see table 10. For underleveraged firms with high investments, all adjustment rates are above 50 percent, showing that firms in this segment close more than half of the gap between actual leverage and target leverage in a year. Our estimates are significantly different from the initial speed of adjustment in table 6. A possible explanation for the high speed of adjustment for firms in quartile 4 is because these firms are often in the development stage of their life cycle. It can be expected that these firms have less debt, and invest by means of equity financing (Byoun, 2011). This explains how underleveraged firms with large investments have a large speed of adjustment. As for profitability, cash flow, investments and age, we do not find a significant difference between over- and underleveraged firms.

7. Conclusion

From the regressions in tables 8, 9 and 10, we conclude that adjustment costs have an effect on the speed of adjustment. Regressions with external financing costs indicate a significant difference in the speed of adjustment among firms that are young and old, and firms that are large and small. Likewise, regressions with financial constraints conclude a significant difference in the speed of adjustment for high and low regimes. This proves that our 1st hypothesis cannot be rejected, and that there is a significant difference in the speed of adjustment for different segments of our sample.

Our 2nd hypothesis predicts a slower speed of adjustment with higher adjustment costs. According to the results in tables 8 and 9, this hypothesis should be rejected. However profitability, cash flow and investments did not perform as initially expected. Most notably, investments cannot be used as a financial constraint, which results in a larger speed of adjustment for firms with more investments compared to firms with fewer investments. This result is confirmed by our combination value regressions, where firms with more investments, smaller cash flow and lower profitability adjust quicker than their counterparts.

From the regressions for over- and underleveraged firms (table 10) we include the restrictions for financial constraints and external financing costs. We do not find a significant difference for over- and underleveraged firms; indicating the rejection of our 3rd hypothesis. Nevertheless, comparing the speed of adjustment to our initial estimates produces a significant result. In the analysis of financial constraints and external financing costs, over- and underleveraged firms, regardless of the number of financial constraints, adjust faster than the initial estimates for the speed of adjustment (table 6). It is possible that underleveraged firms adjust faster by retiring equity and issuing debt. A possible explanation for the higher speed of adjustment for overleveraged firms is because increased bankruptcy costs is larger than the tax advantage of debt, therefore the firm will revert more quickly towards their target leverage.

Our paper contributes to ongoing research on capital structure in three ways. First, we further the research of Dang, Kim and Shin (2009) on heterogeneous leverage adjustment in Great Britain by expanding our dataset to France, Germany, Spain and Italy. This is important to give an outlook of capital structure decisions in Europe. Second, expanding upon our previous paper, Friedberg and Johannessen (2010), we apply the BC estimator to an asymmetric dynamic capital structure model. Lastly, we include combination values of the adjustments costs used by Flannery and Hankins (2007). Further research is still needed on developing a more robust method of capital structure research, since the modified partial adjustment model may induce some distortions in the calculations of the baseline estimates in tables 6 and 7. One alternative could be the more complicated dynamic threshold panel data model of leverage by Dang, Kim and Shin (2009), but as Makridakis and Hibbon (2000) pointed out: the best solution to a problem is not always a more sophisticated econometric model when we in fact do not know whether it can predict real life data.

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Appendices

Econometric Methods

Generalized Method of Moments

Following Blundell and Bond, 1998 we use an AR(1) model with unobserved individual-specific effects to illustrate how we can apply the GMM estimator

$$y_{i,t} = \alpha y_{i,t-1} + \eta_i + \nu_{it} \qquad \text{(X.1)}$$

For i = 1,..,N and t=2,…,T, where $\eta_i + \nu_{it} = u_{it}$ is the "fixed effects" decomposition of the error term where N is large and T is fixed. We find the error component structure

$$E(\eta_i) = 0, E(\nu_{it}) = 0, E(\nu_{it}\eta_i) = 0 \; for \; i = 1, \dots, N \; and \; t = 2, .., T$$
$$E(\nu_{it}\nu_{is}) = 0 \; for \; i = 1, .., N \; and \; t \neq s$$

The moment restrictions specified by Blundell and Bond (1998) can be expressed as

$$E\left(Z_i{}'\bar{u}_i\right) = 0 \qquad \text{(X.2)}$$

Where $\bar{u}_i$ is the $(T-2) vector \; (\Delta \nu_{i3}, \Delta \nu_{i4}, \dots, \Delta \nu_{iT})'$ and m = $0.5(T-1)(T-2) + (T-3)$ and Z_i is (T-2)*m matrix given by

$$Z_i = \begin{bmatrix} y_1 & y_2 & & & \cdots & & & \cdots & \\ & -y_3 & y_1 & y_2 & \cdots & & & \cdots & \\ \vdots & \vdots & \vdots & \vdots & \cdots & \vdots & & \cdots & \vdots \\ & & & & \cdots & -y_{T-1} & y_1 & \cdots & y_{T-2} \end{bmatrix} \qquad \text{(X.3)}$$

The Generalized Method of Moments estimator is based on these moment conditions minimizing the quadratic distance $(Z\bar{u}_i{}'A_N Z'\bar{u}_i)$ for some metric A_N where $Z'$is the m*N(T-2) matrix $(Z'_1, Z'_2, .., Z'_N)$ and $\bar{u}$ is the N(T-2) vector $(\bar{u}_1{}'\bar{u}_2{}', .., \bar{u}_N{}')'$. We obtain the GMM estimator for α as

$$\hat{\alpha} = (\bar{y}_{-1}{}'ZA_N Z'\bar{y}_{-1})'\bar{y}_{-1}ZA_N\bar{y} \qquad \text{(X.4)}$$

Where $\bar{y}_i$ is the (T-2) vector$(\Delta y_{i3}, \Delta y_{i4}, \dots, \Delta y_{iT})'$. A more thorough derivation can be found in Arellano and Bond (1991) and Blundell and Bond (1998).

Hansen J test for joint validity

It is computed as:

$$J = \frac{1}{NT} \times (Z`E)` \times S^{-1} \times Z`E \qquad \text{(X.5)}$$

Where S is the estimate of var($Z`E$). The J statistic is χ^2distributed with degrees of freedom equal to the degree of over identification (Roodman, 2006).

Descriptive statistics of quartiles

Table A1 to A5 shows descriptive statistics for the quartiles of the different adjustment costs. The quartiles for companies are based upon the average value of the adjustment factors for all reported years.

Table A1. Cash flow

	Quartile 1					Quartile 2				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3167	0.559	0.240	0.002	1.795	3263	0.532	0.192	0.006	1.734
PROF	3237	-0.029	0.167	-2.071	0.876	3281	0.041	0.082	-0.814	0.936
SIZE	3217	11.559	1.878	4.317	18.007	3270	12.558	1.977	4.094	18.836
TANG	3238	0.175	0.206	0.000	0.991	3281	0.225	0.212	0.000	0.962
GROWTH	2756	0.057	0.441	-2.441	5.199	2797	0.071	0.265	-1.513	2.979
NDT	3167	0.047	0.080	-0.093	1.416	3219	0.039	0.041	-0.037	0.893
INDMEAN	3563	0.515	0.047	0.318	0.608	3565	0.517	0.042	0.318	0.608
CASH	3158	-0.014	0.155	-2.061	0.628	3217	0.055	0.059	-0.622	0.631

	Quartile 3					Quartile 4				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3336	0.494	0.184	0.055	1.771	3263	0.440	0.194	0.010	1.727
PROF	3366	0.068	0.085	-2.803	0.895	3292	0.115	0.107	-1.718	0.708
SIZE	3363	12.901	2.056	5.403	18.624	3289	12.466	2.031	4.295	19.634
TANG	3362	0.265	0.208	0.000	0.968	3292	0.281	0.209	0.000	0.916
GROWTH	2894	0.082	0.245	-1.604	3.408	2827	0.098	0.267	-2.096	2.459
NDT	3301	0.047	0.056	-0.010	2.679	3228	0.062	0.053	-0.002	1.396
INDMEAN	3566	0.511	0.046	0.318	0.608	3564	0.496	0.058	0.318	0.608
CASH	3299	0.086	0.054	-0.493	0.460	3227	0.142	0.082	-0.346	1.376

Table A2. Profitability

	Quartile 1					Quartile 2				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3167	0.495	0.246	0.002	1.778	3308	0.547	0.192	0.006	1.493
PROF	3248	-0.048	0.173	-2.803	0.538	3341	0.038	0.070	-1.663	0.876
SIZE	3220	11.194	1.655	4.094	18.007	3329	12.659	2.107	4.602	18.836
TANG	3244	0.198	0.210	0.000	0.991	3337	0.236	0.211	0.000	0.962
GROWTH	2766	0.039	0.433	-2.096	5.199	2848	0.074	0.301	-2.441	3.408
NDT	3159	0.065	0.099	-0.093	2.679	3274	0.044	0.037	-0.048	0.402
INDMEAN	3577	0.509	0.048	0.318	0.608	3589	0.515	0.046	0.318	0.608

	Quartile 3					Quartile 4				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3329	0.524	0.184	0.058	1.771	3299	0.455	0.197	0.011	1.734
PROF	3339	0.072	0.049	-0.440	0.339	3324	0.138	0.078	-0.502	0.895
SIZE	3342	12.877	1.944	7.108	18.296	3321	12.756	1.996	4.949	19.634
TANG	3343	0.285	0.227	0.000	0.968	3324	0.226	0.192	0.000	0.951
GROWTH	2863	0.091	0.254	-1.163	3.299	2860	0.104	0.242	-1.860	2.170
NDT	3292	0.044	0.032	-0.082	0.399	3255	0.044	0.036	-0.037	1.017
INDMEAN	3581	0.512	0.047	0.318	0.608	3591	0.501	0.055	0.318	0.608

Table A3. Age

	Quartile 1					Quartile 2				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3101	0.474	0.238	0.005	1.771	3359	0.528	0.211	0.024	1.795
PROF	3173	0.033	0.188	-2.867	0.876	3408	0.047	0.153	-2.803	0.550
SIZE	3149	11.635	2.047	3.324	19.634	3409	12.034	1.948	4.317	18.513
TANG	3168	0.200	0.224	0.000	0.954	3408	0.223	0.211	0.000	0.968
GROWTH	2666	0.133	0.425	-2.441	3.408	2927	0.075	0.308	-2.024	3.109
NDT	3038	0.057	0.079	-0.048	1.416	3358	0.052	0.072	-0.093	2.679
INDMEAN	3831	0.512	0.052	0.318	0.608	3571	0.512	0.046	0.318	0.608
FIRMAGE	3838	10.022	2.699	1	13	3576	18.785	3.315	14	24

	Quartile 3					Quartile 4				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3418	0.522	0.197	0.002	1.727	3418	0.493	0.192	0.011	1.778
PROF	3444	0.061	0.108	-1.718	0.936	3431	0.052	0.105	-2.071	0.495
SIZE	3434	12.622	1.821	4.295	18.296	3422	13.085	2.130	4.949	19.396
TANG	3446	0.219	0.195	0.000	0.991	3431	0.299	0.207	0.000	0.964
GROWTH	2968	0.058	0.261	-1.860	5.199	2953	0.053	0.263	-1.513	4.936
NDT	3406	0.045	0.043	-0.044	1.396	3379	0.046	0.044	-0.037	1.349
INDMEAN	3544	0.511	0.046	0.318	0.608	3616	0.503	0.054	0.318	0.608
FIRMAGE	3544	36.804	9.607	25	57	3616	99.690	26.170	58	210

Table A4. Size

	Quartile 1					Quartile 2				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3104	0.435	0.241	0.010	1.795	3295	0.505	0.204	0.002	1.778
PROF	3216	-0.001	0.210	-2.867	0.876	3326	0.048	0.125	-2.071	0.936
SIZE	3196	9.990	0.944	3.324	12.712	3317	11.440	0.548	8.174	15.086
TANG	3211	0.179	0.209	0.000	0.968	3325	0.223	0.212	0.000	0.991
GROWTH	2732	0.111	0.425	-1.800	4.936	2837	0.077	0.336	-2.441	5.199
NDT	3129	0.056	0.080	-0.021	1.396	3256	0.049	0.059	-0.093	1.416
INDMEAN	3636	0.506	0.050	0.318	0.608	3640	0.509	0.046	0.318	0.608

	Quartile 3					Quartile 4				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3442	0.519	0.199	0.005	1.727	3455	0.553	0.181	0.006	1.771
PROF	3456	0.064	0.105	-1.826	0.550	3458	0.079	0.090	-2.803	0.895
SIZE	3448	12.735	0.602	6.471	15.567	3453	15.059	1.272	10.563	19.634
TANG	3458	0.254	0.203	0.000	0.964	3459	0.282	0.211	0.000	0.953
GROWTH	2977	0.068	0.272	-1.513	3.244	2968	0.060	0.216	-2.024	2.170
NDT	3408	0.049	0.044	0.000	0.635	3388	0.045	0.059	0.000	2.679
INDMEAN	3638	0.508	0.049	0.318	0.608	3648	0.515	0.054	0.318	0.608

Table A5. Investments

	Quartile 1					Quartile 2				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3296	0.486	0.228	0.010	1.778	3380	0.532	0.185	0.029	1.681
PROF	3333	0.001	0.175	-2.867	0.876	3402	0.058	0.086	-0.865	0.936
SIZE	3322	12.113	2.000	4.317	18.836	3399	12.798	2.109	8.053	19.634
TANG	3332	0.287	0.240	0.000	0.991	3403	0.274	0.194	0.000	0.968
GROWTH	2849	-0.017	0.300	-2.441	3.109	2915	0.037	0.203	-2.024	2.979
NDT	3260	0.075	0.096	-0.044	2.679	3337	0.051	0.032	0.001	0.432
INDMEAN	3579	0.505	0.045	0.318	0.608	3579	0.509	0.042	0.318	0.608
INVEST	2782	-0.171	0.699	-17.486	7.904	2869	-0.036	0.121	-1.134	1.170

	Quartile 3					Quartile 4				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
TOTDEBT	3352	0.537	0.202	0.011	1.795	3071	0.470	0.214	0.002	1.727
PROF	3381	0.076	0.104	-2.071	0.895	3135	0.069	0.152	-2.708	0.708
SIZE	3381	12.842	1.926	5.403	18.492	3120	11.778	1.900	4.094	18.571
TANG	3383	0.195	0.163	0.000	0.926	3129	0.184	0.222	0.000	0.964
GROWTH	2909	0.081	0.230	-1.605	2.395	2672	0.214	0.414	-1.163	5.199
NDT	3322	0.038	0.035	-0.021	1.349	3071	0.033	0.044	-0.093	1.396
INDMEAN	3573	0.515	0.047	0.318	0.608	3583	0.510	0.057	0.318	0.608
INVEST	2861	0.001	0.166	-1.775	5.321	2621	0.150	0.907	-19.379	19.154

Table A6. Extended regression output for table 7

	OLS	GMM	BC
Coef.	0.219	0.191	0.222
Std. Error	0.006	0.006	0.006
P-value	0.000	0.000	0.000
R-squared	0.147	0.130	0.161
Nr. of observations	8036	8036	8036

Note: The relatively low r-squared is because this is the second stage of the method of Flannery and Hankins(2007) and few explanatory variables are used.

Table A7. Extended regression output for table 8

$$Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j) Deviation_{i,t-1} + \delta_{i,t}$$

PROF	Quartile 1			Quartile 4		
	OLS	GMM	BC	OLS	GMM	BC
Coef.	0.253	0.235	0.258	0.193	0.179	0.196
Std. Error	0.013	0.012	0.012	0.012	0.011	0.012
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	1897	1897	1897	2001	2001	2001

AGE	Quartile 1			Quartile 4		
	OLS	GMM	BC	OLS	GMM	BC
Coef.	0.287	0.268	0.289	0.144	0.112	0.151
Std. Error	0.013	0.013	0.012	0.011	0.010	0.010
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	1846	1846	1846	2072	2072	2072

SIZE	Quartile 1			Quartile 4		
	OLS	GMM	BC	OLS	GMM	BC
Coef.	0.269	0.259	0.273	0.150	0.128	0.145
Std. Error	0.013	0.013	0.012	0.011	0.010	0.010
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	1849	1849	1849	2085	2085	2085

INV	Quartile 1			Quartile 4		
	OLS	GMM	BC	OLS	GMM	BC
Coef.	0.177	0.155	0.186	0.334	0.302	0.333
Std. Error	0.012	0.012	0.012	0.013	0.012	0.013
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	1980	1980	1980	1866	1866	1866

CASH	Quartile 1			Quartile 4		
	OLS	GMM	BC	OLS	GMM	BC
Coef.	0.280	0.257	0.287	0.230	0.203	0.235
Std. Error	0.013	0.013	0.013	0.012	0.011	0.012
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	1898	1898	1898	1984	1984	1984

Note: The numbers reported are for deviation in equation 11. Coef. is the coefficient for deviation, i.e. $\lambda_0+\lambda_j$.

Table A8. Extended regression output for table 9

$$Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j) Deviation_{i,t-1} + \delta_{i,t}$$

LARGECOSTS-1	OLS	GMM	BC
Coef	.0379	.0370	.0375
Std. Error	.0022	.0021	.0021
P-value	0.000	0.000	0.000
Nr. of observations	785	785	785

LARGECOSTS-2	OLS	GMM	BC
Coef	.0251	.00129	.0257
Std. Error	.0009	.0009	.0009
P-value	0.000	0.000	0.000
Nr. of observations	3436	3436	3436

SMALLCOSTS	OLS	GMM	BC
Coef	.0131	.0122	.0129
Std. Error	.0011	.0010	.0011
P-value	0.000	0.000	0.000
Nr. of observations	1987	1987	1987

SMALL&YOUNG-1	OLS	GMM	BC
Coef	.0268	.0260	.0271
Std. Error	.0010	.0010	.0010
P-value	0.000	0.000	0.000
Nr. of observations	3268	3268	3268

SMALL&YOUNG-2	OLS	GMM	BC
Coef	.0385	.0381	.0371
Std. Error	.0036	.0037	.0033
P-value	0.000	0.000	0.000
Nr. of observations	3268	3268	3268

OLD&LARGE-1	OLS	GMM	BC
Coef	.0137	.0113	.0142
Std. Error	.0008	.0008	.0008
P-value	0.000	0.000	0.000
Nr. of observations	2926	2926	2926

OLD&LARGE2	OLS	GMM	BC
Coef	.0115	.0108	.0113
Std. Error	.0019	.0019	.0019
P-value	0.000	0.000	0.000
Nr. of observations	484	484	484

Note: The numbers reported are for deviation in equation 11. Coef. is the coefficient for deviation, i.e. $\lambda_0+\lambda_j$

Table A9. Extended regression output for table 10

PANEL A

$Change_{i,t} = (\lambda_0 + \lambda_j \Omega_j)Deviation_{i,t-1} + \delta_{i,t}$

PROF	Quartile 1					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.394	0.357	0.430	0.359	0.270	0.273
Std. Error	0.031	0.029	0.029	0.035	0.032	0.027
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	569	569	569	574	574	574

AGE	Quartile 1					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.422	0.376	0.431	0.497	0.399	0.441
Std. Error	0.028	0.026	0.028	0.038	0.036	0.031
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	549	549	549	570	570	570

SIZE	Quartile 1					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.427	0.391	0.460	0.413	0.377	0.368
Std. Error	0.032	0.031	0.030	0.033	0.033	0.028
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	534	534	534	651	651	651

INV	Quartile 1					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.318	0.275	0.348	0.330	0.209	0.247
Std. Error	0.034	0.031	0.032	0.032	0.029	0.024
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	485	485	485	600	600	600

CASH	Quartile 1					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.430	0.354	0.466	0.473	0.365	0.427
Std. Error	0.026	0.023	0.024	0.044	0.042	0.037
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	802	802	802	393	393	393

Note: The numbers reported are for deviation in equation 11. Coef. is the coefficient for deviation, i.e. $\lambda_0+\lambda_j$.

Table A9
PANEL B

PROF	Quartile 4					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.385	0.385	0.369	0.301	0.179	0.270
Std. Error	0.034	0.034	0.034	0.032	0.024	0.029
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	428	428	428	568	568	568

AGE	Quartile 4					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.245	0.166	0.288	0.365	0.205	0.332
Std. Error	0.032	0.030	0.030	0.033	0.026	0.031
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	494	494	494	576	576	576

SIZE	Quartile 4					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.217	0.183	0.219	0.360	0.255	0.221
Std. Error	0.026	0.025	0.026	0.036	0.031	0.024
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	486	486	486	537	537	537

INV	Quartile 4					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.539	0.502	0.541	0.448	0.337	0.421
Std. Error	0.031	0.030	0.030	0.036	0.032	0.033
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	475	475	475	530	530	530

CASH	Quartile 4					
	Underleveraged			Overleveraged		
	OLS	GMM	BC	OLS	GMM	BC
Coef	0.429	0.416	0.423	0.432	0.234	0.388
Std. Error	0.033	0.031	0.032	0.033	0.026	0.030
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Nr. of observations	442	442	442	551	551	551

Note: The numbers reported are for deviation in equation 11. Coef. is the coefficient for deviation, i.e. $\lambda_0+\lambda_j$.

Impact of Institutional Factors on Capital Structure Decisions

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Abstract

This paper examines the effects institutional factors have on capital structure decisions for firms in European countries. Modern research on capital structure often only includes firm specific determinants in the modeling process. This methodology is imperfect because institutional factors also have a direct effect on the firm's capital structure decisions. The goal in this study is to determine which specific factors have the most significant effect and how the effects vary across countries. Regressions are performed on a sample of 18 countries from both Western and Eastern Europe, and institutional factors are found to be significant explanatory variables for capital structure. Investor protection is positively correlated with leverage, as shown in previous research (Fan et al., 2010). Corruption is negatively correlated with leverage, implying more corrupt countries have more debt. Furthermore, firm specific determinants do not change much for different legal systems, confirming results from previous research (e.g. Rajan and Zingales, 1995). Lastly, we find that speeds of adjustment vary for different legal systems.

This research contributes to the field of capital structure by showing that institutional differences among countries in Europe have a significant impact on capital structure decisions. Using an alternative estimator bootstrap based bias correction we find a significant difference in the speed of adjustment for legal systems in Europe. Acknowledging that firms in European countries have different preferences in capital structure is useful for professionals in the financial industry, and especially financial government officials.

Keywords: Capital structure, firm specific determinants, institutional factors, legal systems, speed of adjustment.

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1. Introduction

The majority of research on capital structure only uses firm characteristics as explanatory variables for leverage. To have a better understanding of capital structure amongst countries, institutional factors are included as additional explanatory variables in this study. Similar articles that use this methodology include Rajan and Zingales (1995), De Jong et al. (2008) and Fan et al. (2010). Specifically, we are interested in the relationship between European countries with similar aspects such as legal systems, corruption and investor protection. With a sample of 18 countries from Western and Eastern Europe we test three things. We investigate using regression analysis whether there is a significant relationship between the institutional factors and leverage. We then evaluate different legal systems to determine whether firm specific determinants and institutional factors vary. Lastly, we split our sample into civil law and common law countries and estimate the speeds of adjustment for these different legal systems. Three estimators are used in our regressions; ordinary least squares (OLS), generalized method of moments (GMM) and the alternative bootstrap based bias correction (BC).

Using a dynamic regression model we find a significant relationship between most institutional factors and leverage. Corruption is significantly negative, implying that countries with low corruption index (i.e. more corruption measured) use more debt compared to equity. GDP growth, investor protection and legal systems are significantly positive, implying countries with a larger GDP growth or better investor protection use more leverage. Furthermore, countries with more developed stock market systems use more debt. In general, institutional factors do not change much for firms with different debt maturity.

We analyze different legal systems by applying the same dynamic regression model used to analyze institutional factors, but now splitting the sample into: German civil law, French Civil law, Scandinavian civil law, Common law and Socialist law. We find the firm specific determinants to be similarly correlated across the countries, which is consistent with earlier research (e.g. Rajan and Zingales, 1995).

Lastly, we find a significant difference in speeds of adjustment for legal systems in our sample, which is consistent with the dynamic trade-off theory. Most noteworthy is the significantly larger speed of adjustment in Scandinavian law countries, and the lower speed of adjustment in German, French and Socialist law countries. The difference between Socialist law and Scandinavian law is reasonable since better investor protection, legal enforcement and political governance should be positively correlated with the speed of adjustment (Oztekin and Flannery, 2008).

This paper contributes to ongoing research on capital structure in two ways. By showing institutional factors are significant determinants of capital structure, future researchers will be able to include these factors and have a clearer understanding of capital structure for firms in Europe. Our results are also important for banks and other financial intermediaries, who could benefit from the knowledge that firms in European countries have different preferences of financing their operations. Compared to previous research (Fan et al., 2010; Rajan and Zingales, 1995), our analysis of institutional factors is more comprehensive due to the large sample size spanning a total of 18 European countries. We also illustrate how speeds of adjustment vary among countries with different legal systems. To our knowledge our paper is the first to investigate this topic for firms only in Europe.

The rest of the paper proceeds as follows: section 2 presents literature review, section 3 presents the economic model and the different explanatory variables that we use, section 4 describes the data, section 5 presents the econometric methods and the different estimators, and section 6 present the empirical result and section 7 concludes.

2. Literature Review

There are two main subjects that we consider which greatly influence our research; Legal Systems and Institutional Factors effect on Capital Structure Decisions.

This paper uses the definitions provided by La Porta et al.(1998, 2000) for the different types of legal systems. La Porta et al. (1998) distinguish between two legal traditions used by most countries: civil law and common law. They categorize the civil law system into three versions: French, German and Scandinavian and define common law as the legal system of England. Further separating the law systems by investor protection, company and bankruptcy/reorganization laws they reach the conclusion that common law countries have the strongest emphasis on shareholder rights, while French civil law countries have the weakest. La Porta et al. (1998) suggest three broad conclusions regarding law and capital structure decisions: first, law systems differ around the world, and countries whose legal rules originate in common law tradition tend to protect investors more than countries that use the civil law. Second, law enforcement differs around the world with German and Scandinavian law countries having the best enforcement. Third, countries with poor investor protection tend to have response mechanisms, such as ownership concentration.

La Porta et al. (2000) expand upon La Porta et al. (1998) by introducing the legal approach and the effect it has on corporate governance. They hypothesize that there are three areas in which investor protection is most important; ownership and control, financial markets, and real consequences. A strong investor protection is associated with valuable and broad financial markets, dispersed ownership of shares and efficient allocation of capital across firms.

Rajan and Zingales (1995) published a paper applying the institutional factors to capital structure research. In efforts to determine the existence of cross-country correlation in capital structure decisions they analyze major institutional differences, such as taxes and bankruptcy laws, across the G-7 countries. The overall conclusion from their paper is that firm leverage and determinants are similar across the G-7 countries and future capital structure research needs to provide a more precise explanation of institutional factors and their influence on capital structure decisions in different countries.

Expanding upon Rajan and Zingales (1995), De Jong et al. (2008) and Fan et al. (2010) examine the impact institutional factors have on capital structure. Specifically, De Jong et al. (2008) analyze whether there is a significant relationship between firm specific determinants of capital structure and country-specific variables. Country-specific variables are defined as legal enforcement, shareholder/creditor rights, market/bank-based financial systems, stock/bank-market development and growth rate in a country's GDP. They conclude country-specific factors have a significant impact on the firm specific determinants of capital structure and better law enforcement combined with stable economic conditions are positively correlated with debt usage. Fan et al. (2010) build upon earlier research on institutional factors and examine how cross-country differences in capital structure can be explained by legal systems, tax policies and regulation of financial institutions. They find legal and taxation system, corruption level and preference of capital suppliers as significant variables in capital structure decisions. As theory predicts, a greater taxation seems to have a positive influence on leverage. Furthermore, the bankruptcy code and domestic savings are also significant explanatory variables for debt maturity.

Demirgüç-Kunt and Maksimovic (1996) and Lopez-Iturriaga and Rodriguez-Sanz (2008) study the effect institutional factors have on a firm's choice of debt maturity. Demirgüç-Kunt and Maksimovic (1996) state that inefficient legal systems are costly to use, therefore making short-term debt more desirable than long-term debt. They observe developed countries to have more long-term debt and both large and small firms in countries with effective legal systems have longer debt maturity. Their research also indicates both large and small firms in countries with common law use less long-term debt. Overall they believe legal and institutional differences are significant factors in explaining the variation in the use of long-term debt. The contributions of Lopez-Iturriaga and Rodriguez-Sanz (2008) are twofold: first, they determine whether capital structure differs among countries and secondly, they test whether capital structure decisions depends on legal and institutional characteristics. Their results indicate that there are large differences according to the institutional framework, such as more long-term debt in common law countries while civil law countries have more short-term debt. They also find the determinants of capital structure have similar characteristics between different financial systems, while the effects vary within different legal systems.

3. Economic Model

Capital Structure Theory

A corner stone in modern finance and one of the most cited paper in the field of corporate finance is Miller and Modigliani (1958) where they addressed the value of a firm and its relationship to finance. Academics have since debated on various possibilities, and while there is no certain answer to capital structure, there are two theories that emerge as the best alternatives: The Trade-Off Theory and The Pecking Order Theory.

The static trade-off theory assumes the existence of a target debt ratio. The intuition behind the target debt ratio is the existence of an optimal relation in which firms balance the advantage of corporate tax savings against potential bankruptcy costs (Scott, 1976). The major benefit of debt is the tax advantage of interest deductibility. Primary costs of debt include direct and indirect bankruptcy costs. Direct bankruptcy costs consist of legal expenses, advisory fees and time management spends dealing with creditors. Indirect costs of bankruptcy are often referred to as financial distress costs, and arise most often because of the threat of bankruptcy. These costs affect a company's ability to operate efficiently, since optimal capital structure is found by minimizing the costs of debt and equity financing. Some researchers (i.e Frank and Goyal, 2008) believe the static trade-off theory to be unreliable, and as a substitute Fisher et al. (1989) propose a dynamic trade-off theory, where the financial decision for the next period depends on whether the firm needs to raise funds or is expected to pay out funds (Frank and Goyal, 2008).

The pecking order theory of finance assumes that firms do not have an optimal debt ratio, but instead apply a financial hierarchy. The theory states that there are three major sources of funds available for financing: retained earnings, debt and equity (Myers, 1984). External financing using equity is not desirable because of informational asymmetries between managers and investors (Graham and Harvey, 1999). However, should firms require external financing, they will prefer to use debt, then hybrid securities (e.g. convertible debt), and as a last resort equity.

Firms Specific Determinants

The firm specific variables included in our model are based upon earlier research by Titman and Wessels (1988), Frank and Goyal (2008) and DeAngelo and Masulis(1980). A summary of the different capital structure determinants and their proxies as well as their labels and predictions can be found in table 1.

The dependent variable in our regressions is leverage. There are two forms of leverage; market value and book value, but researchers have yet to agree upon which form the trade off theory and pecking order theory describe. Neither form of leverage is superior and both have been effectively modeled by scholars. Researchers such as Hovakimian (2003) and Flannery and Rangan (2006) chose to use market-value debt ratios while Frank and Goyal (2009) prefer to use book value. We use book value of leverage in our regressions, since book value is a better proxy for assets in place and fluctuate less due to volatility in the financial market.

One of the independent variables used in our research is profitability. The pecking order theory predicts a negative correlation between profitability and leverage. Conversely the trade off theory predicts a positive sign on profit since the firm issues more debt to create a tax shield on their earnings. Previous studies (e.g. Fischer et.al, 1989; Titman and Wessels, 1988) show that profit has a negative correlation with leverage, which conflicts with the trade off theory. We use earnings before interest and taxes (EBIT) over total assets as a proxy for profit.

Another important determinant of capital structure is size, and according to Titman and Wessels (1988) there should be a positive correlation between size and leverage. A possible explanation is because larger firms are more diversified and have a smaller probability of bankruptcy. Other studies (e.g. Warner, 1977) argue that bankruptcy costs tend to contribute to a larger part of the firm value for small firms compared to large firms. The trade-off theory predicts a positive correlation between size and leverage, while the pecking order theory predicts the opposite. We follow Frank and Goyal (2009) and use the natural logarithm of sales as a proxy for size.

Tangibility is often included as a firm specific variable. According to the trade off theory firms may issue debt with security in tangible assets (Myers and Majluf, 1984). In accordance to this assumption the trade-off theory predicts more leverage in companies that have more tangible assets, and because their lenders can use them as securities (Titman and Wessels, 1988). The pecking order theory predicts a negative effect on leverage, as more tangible assets may lower asymmetric information. We use fixed assets as a proxy for tangibility.

Fama and French (2002) and Flannery and Rangan (2006) use growth in their capital structure research. According to Titman and Wessels (1988), growth opportunities add value to the capital assets, but cannot be collateralized, thus the trade-off theory predicts a negative sign. The pecking order theory predicts growth opportunities to have a positive impact on leverage due to the adverse selection of costs associated with equity increase with informational asymmetries. While there are several useful proxies for growth, we use change in assets (Frank and Goyal, 2009).

According to DeAngelo and Masulis (1980) depreciation and tax deductions can be used to substitute the tax benefits of debt financing. The trade-off theory predicts tax benefits to have a negative effect on leverage. Therefore firms with large non-debt tax shields will have less debt than similar firms with lower tax shields. We use depreciation over total assets as a proxy for non-debt tax shield.

In previous studies, industry variables have been found to be a strong significant factor of leverage, which the trade-off theory predicts to be positive (e.g. Faulkender et al. 2008; Bradley et al., 1984). Possible reasons include the unobservable factors, such as business risk, technology or regulations, shared by companies in the same industry. We calculate the industry mean leverages using the standard industrial classification code (SIC).

Table 1. Proxies, labels and predictions for firm specific determinants

Determinant	Proxy	Label	Trade-off theory prediction	Pecking order theory prediction
Profitability	EBIT over total assets	PROF	+	-
Size	Natural log of sales	SIZE	+	-
Tangibility	Fixed assets over total assets	TANG	+	-
Growth	Natural log of total assets over last year's total assets	GROWTH	-	+
Non-debt tax shield	Depreciation over total assets	NDT	-	NA
Industry effects	Industry mean leverage	INDMEAN	+	NA

Institutional Factors

This section discusses the following institutional factors: legal system, law enforcement, shareholder rights, creditor rights, and taxation. Table 2 gives a summary of the proxies and labels used in this paper.

Legal Systems in Europe

La Porta et al. (1998) believe the different legal systems countries implement, explains the difference in their financial characteristics. Previously scholars have shown that most countries legal systems can be categorized into one of two broad legal traditions: civil law or common law. The legal systems are defined on the basis of historical background, theories and hierarchies, working methodology of legal scholars, legal concepts, legal institutions and the divisions of law employed within a legal system (Glendon et al., 1992).

The civil law system originates in the Roman-Germanic legal tradition and is the oldest and most common legal system around the world. Among the countries using the civil law systems we distinguish between three variations: French, German and Scandinavian. The French civil law system is the most common; it has European influences in Belgium, Netherlands, Poland, Luxembourg, Portugal, Spain, Switzerland and Italy (La Porta et al., 1998) as well as influences outside of Europe due to the French colonial era. The German civil law is not as widely adopted outside Europe as the French legal system. This legal system originated in the German Commercial Code written in 1897 after Bismarck`s unification of Germany. The German version of the civil law has influenced legal theory in Austria, Czech Republic, Slovakia, Greece, Hungary, Switzerland and the former republic of Yugoslavia. The Scandinavian version falls under the same category of civil law as the German and French legal systems, but differs because it is a less derivative version of Roman law (La Porta et al., 1998). Scandinavia is commonly referred to as the following countries: Norway, Denmark and Sweden. We also include Finland as a Scandinavian country because their legal system is based upon that of Sweden's (Central Intelligence Agency The World Factbook, 2011).

The common law originated in England and has influenced lawmakers in most of their former colonies. In Europe we only categorize Ireland and Great Britain as countries that use common law. The common law is characterized by judicial decisions as opposed to the Roman law which relies on the contributions by scholars (La Porta et al., 1998). Legal systems also determine the underlying characteristics of the countries, such as shareholder rights, creditor rights, law enforcement, ownership concentration and tax code. Each of these subjects will be thoroughly discussed in the following sections: law enforcement, shareholder and creditor rights and taxation.

Based on earlier research, i.e Lopez-Iturriaga and Rodriguez-Sanz (2008), we have the following hypothesis regarding law systems.

1st Hypothesis *French civil law countries are the most leveraged, and German civil law are the least.*

Our research includes countries from the former Soviet Union, where Socialist law was adopted for a long time. We categorize Eastern- European countries, such as Poland, Ukraine, Russia and Romania, under Socialist law (Djankov et al., 2002).

Law Enforcement

Strong law enforcement can substitute for a weaker legal system, since legal regulators can step in and rescue investors who are abused by management. Effective law enforcement is essential to protect investors. Without enforced rights, company representatives would not have enough incentive to repay creditors or to distribute profits to shareholders. La Porta et al. (1998) use six measurements to evaluate the efficiency of the legal system: efficiency of the judicial system, rule of law, corruption, risk of expropriation, likelihood of contract repudiation by the government and quality of country's accounting standard. The six measurements originate in the Coase (1960) theorem, which relies on a courts ability to enforce complicated contracts. Countries that are subject to political pressure or corruption might be unwilling to invest enough resources to uphold fair law enforcement. However, well functioning judiciaries is not a guarantee for well developed capital markets (La Porta et al., 2000).

Earlier research, such as La Porta et al. (1998), have shown that the quality of law enforcement varies across different legal systems; leading to the following hypothesis.

2nd Hypothesis *Scandinavian countries have the best law enforcement, followed by German civil law countries (La Porta et al., 1997). Better law enforcement is associated with lower debt ratios and greater use of long-term versus short-term debt (Fan et.al, 2010).*

Current research (e.g. Berglof and Pajuste, 2005) have also shown that countries in Central and Eastern Europe suffer from poor law enforcement in disclosure of corporate governance arrangements which leads to the following hypothesis.

3rd Hypothesis *Central and Eastern European countries have the weakest law enforcement, and less long-term debt and more short-term debt compared to other countries.*

Shareholder and Creditor rights

Protected shareholder rights include voting for directors, having security benefits equivalent to insiders, and requesting extraordinary shareholder meetings. (La Porta et al., 2000). Voting rights that are closely linked to dividend rights is one way of protecting shareholders since it prevents insiders from having too much control of the company without having substantial ownership of the company. According to La Porta et al. (1998) there are anti-director rights which determine how strongly the legal system favors minority shareholders against managers or dominate shareholders in capital structure decisions. In our analysis we use stock market development as a proxy for shareholder rights. This proxy represents the significance of the stock market in a country (De Jong et al. 2008). We include countries from Eastern Europe in our empirical analysis. Previous studies (e.g. Berglof and Pajuste, 2005) have shown these countries to have poor shareholder rights as a result of corruption and weak court systems.

4th Hypothesis *Common law countries have the strongest protection of shareholders while Socialist law and French civil law countries have the weakest. We believe an increase of shareholder rights will have a negative effect on leverage.*

Creditor rights are often related to bankruptcy and reorganization procedures in order to protect the creditor against any unnecessary losses. The creditor's seniority claimant is an important issue during bankruptcy proceedings, and the important question is whether the company should liquidate their assets or reorganize. La Porta et al. (1998) give two reasons for the complexity of creditor rights; first, there may be different types of creditors with different interests in the company, i.e. some creditors might want to liquidate under default regardless of the outcome and others might want to preserve the firm under going concern. Secondly there are two main creditor strategies dealing with firms that default: liquidation and reorganization. Both of them require different rights to be effective. For our regression analysis we use bond market development as a proxy for creditor rights.

5th Hypothesis *The French civil law countries offer the weakest protection for creditors. With the exception of the United States, common law countries offer the best creditor protection. We expect better creditor rights to have a positive effect on leverage.*

Another basic prediction is that increased investor protection is positively correlated with the development of financial markets (La Porta et al., 2000). This prediction applies to both the development of lending and equity markets. Shareholder rights give confidence to the development of the equity market, while creditor rights encourage the development of lending.

Taxation

The trade-off theory states that firms who pay more taxes should choose more debt (Modigliani and Miller, 1963). The relative advantage of debt (T) was introduced by Miller (1977) using the statutory corporate tax rate (τ_c), the personal tax rate on interest income (τ_i) and the personal tax rate on equity income (τ_e)

$$T_g = 1 - \frac{(1-\tau_c)(1-\tau_e)}{(1-\tau_i)} \qquad (1)$$

6th Hypothesis *Firms in countries with higher tax gain should have more leverage.*

Fan et al. (2010) use Millers formula for tax gain to test three different tax regimes: classical tax system, dividend relief system and dividend imputation system. The classical system is characterized by dividends taxed at both the corporate and personal level with tax deductible interest payments as corporate expenses. In Europe the tax system exists in Netherlands, Switzerland and Great Britain. In the dividend relief tax system, dividends are taxed at a reduced rate on the personal level. This tax system exists in Austria, Belgium, Denmark, Portugal, Sweden and Turkey. The last tax regime is the dividend imputation tax system where operations can deduct interest payments and domestic shareholders receive tax credits. Among European countries, dividend imputation systems exist in France, Germany, Ireland, Italy, Norway and Spain.

Table 2. Proxies, labels and predictions for institutional factors

The result for each variable exhibits the effect we predicted it would have on leverage. The rule of law variable could have either a positive or negative effect, since it depends which legal system we use. We predict French civil law countries and Socialist law countries to be positively correlated with leverage, and German civil law countries to be negatively correlated with leverage.

Variable	**Source**	**Label**	**Prediction**
Inflation	Inflation is reported by International Monetary Fund (2010a).	INFL	NA
GDP growth	Growth in GDP reported by International monetary fund (2010a) and global-rates.com (2011).	GDPGROW	NA
Corruption	Corruption index of Transparency International (2010). Rates countries on the scale of 1-10, where 10 are the least corrupt and 1 vice versa.	CORRUP	-
Rule of law	We use dummy variables for the different legal systems, where Common Law is the base (Djankov et al., 2002).	LAW	+/-
Investor Protection	Euromonitors (2011) assessment of the investor protection in the government, and rates countries on a scale of 1-10, where 10 is the best investor protection and 1 vice versa.	INVPRO	NA
Stock Market development	Proxy for shareholder rights and the value of listed shares to GDP (World Bank, 2011).	STOCKMDEV	-
Bond Market development	Proxy for creditor rights and public domestic debt securities issued by government as a share of GDP (World Bank. 2011).	BONDMDEV	+
Tax	Tax gain calculated using Millers (1977) formula (equation 1). International Tax Review(2011), Tax Consultants International(2009) and OECD(2011)	TAXG	+
Development economy	International monetary fund's (2010b) classification of a nation as developed. or not developed.	DEVECON	+

4. Data

The financial and accounting data for this paper were collected from the Amadeus database, which contains financial information for European companies. We analyze a panel of listed companies from 18 countries in Europe, which we categorize into Western and Eastern Europe.

Western Europe: Spain, France, Germany, Finland, Sweden, Italy, Switzerland
Eastern Europe: Russia, Ukraine, Slovakia, Poland, Romania, Bulgaria, Baltic countries (Lithuania, Estonia, Latvia)

We chose to study the above countries because they are among the largest countries in Europe according to nominal GDP (GDP, 2007). Table 3 gives the dispersion among the different countries. The financial data was collected from the period 2002-2009 and contains the information for 3,828 companies. We do not include Norway and Denmark in our research due to limited availability of data.

Table 3

Country	Nr. of companies
Balticum	54
Bulgaria	97
Finland	108
France	433
Germany	427
Great Britain	662
Greece	92
Italy	169
Poland	89
Romania	366
Russia	587
Slovakia	57
Spain	107
Sweden	208
Switzerland	160
Ukraine	212
Total	3828

Descriptive statistics

Table 4. Correlogram

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
TOTDEBT	[1]	1.000													
PROF	[2]	-0.125	1.000												
SIZE	[3]	0.165	0.224	1.000											
TANG	[4]	-0.045	-0.007	0.056	1.000										
GROWTH	[5]	-0.017	0.223	-0.044	-0.052	1.000									
NDT	[6]	0.033	**-0.434**	-0.068	0.122	-0.225	1.000								
INDMEAN	[7]	0.18	-0.009	0.065	-0.188	0.016	-0.074	1.000							
INFL	[8]	0.014	0.026	-0.096	0.064	0.059	-0.028	-0.091	1.000						
GDPGROW	[9]	-0.02	0.093	-0.086	0.081	0.189	-0.049	-0.006	0.229	1.000					
CORRUP	[10]	-0.087	0.062	0.097	-0.092	0.019	0.038	0.061	**-0.362**	0.016	1.000				
INVPRO	[11]	0.033	0.004	-0.014	-0.074	-0.016	0.054	-0.099	0.215	-0.093	0.336	1.000			
STOCKMDEV	[12]	-0.04	0.049	0.104	0.009	-0.029	-0.036	0.067	-0.202	-0.11	**0.542**	0.021	1.000		
BONDMDEV	[13]	0.116	-0.023	0.017	-0.034	0.03	-0.065	-0.018	0.054	-0.03	**-0.693**	**-0.37**	**-0.486**	1.000	
TAXG	[14]	-0.056	-0.036	-0.139	0.135	-0.013	0.043	-0.158	0.431	0.077	-0.239	0.324	-0.321	-0.109	1.000

Note: We find some high correlations, especially between bond market development and corruption. This could affect the calculations of the individual explanatory variables, since they could have the same effect on leverage (multicollinearity). However, one of the OLS assumptions is "No perfect multicollinearity", and the variables in this model satisfy this assumption.

Table 5. Summary Statistics: Panel A

	TOTDEBT	SHORTDEBT	LONGDEBT	PROF	SIZE	TANG	GROWTH	NDT	INDMEAN
Balticum	0.384	0.247	0.133	0.056	10.3	0.527	0.094	0.078	0.488
Bulgaria	0.464	0.320	0.143	0.038	9.24	0.502	0.103	0.044	0.474
Finland	0.455	0.321	0.132	0.066	12.4	0.266	0.073	0.052	0.491
France	0.554	0.418	0.136	0.059	12.4	0.177	0.085	0.042	0.501
Germany	0.441	0.279	0.163	0.044	12.35	0.24	0.073	0.058	0.498
Great Britain	0.493	0.344	0.149	0.047	12.1	0.259	0.069	0.051	0.489
Greece	0.524	0.374	0.150	0.041	11.2	0.393	0.110	0.032	0.485
Italy	0.536	0.399	0.137	0.041	12.8	0.254	0.074	0.051	0.490
Poland	0.441	0.411	0.030	0.059	10.9	0.354	0.168	0.046	0.506
Romania	0.419	0.382	0.013	0.046	9.0	0.500	0.130	0.035	0.483
Russia	0.491	0.425	0.066	0.113	10.3	0.365	0.108	-	0.489
Slovakia	0.394	0.354	0.041	0.016	9.37	0.503	0.056	0.054	0.470
Spain	0.556	0.358	0.197	0.064	13.1	0.314	0.140	0.036	0.506
Sweden	0.506	0.348	0.160	0.034	11.9	0.21	0.109	0.048	0.505
Switzerland	0.431	0.288	0.142	0.065	12.8	0.328	0.066	0.043	0.508
Ukraine	0.483	0.412	0.070	0.047	10.8	0.459	0.073	0.036	0.478

Note: Table 5, Panel A reports the average value of the firm specific variables (table 1) by country. TOTDEBT is total debt, SHORT is short-term debt and LONG is long-term debt.

Table 5. Summary Statistics: Panel B

	INFL	GDPGROW	CORRUP	INVPRO	STOCKMDEV	BONDMDEV	TAXG	LAW	DEVECON
Balticum	4.69	4.24	5.09	5.47	0.209	-	0.277	2	0
Bulgaria	6.22	4.67	3.94	6.0	0.357	-	0.050	2	0
Finland	1.38	1.65	9.48	5.7	1.22	0.319	0.260	5	1
France	1.77	1.09	6.99	5.3	0.902	0.512	0.387	3	1
Germany	1.46	0.525	7.79	5.0	0.516	0.391	0.150	4	1
Great Britain	2.21	1.33	8.33	8.0	1.33	0.303	0.100	1	1
Greece	3.08	3.06	4.33	3.3	0.579	0.739	0.250	3	1
Italy	2.10	-0.013	5.32	5.7	0.457	0.811	0.150	3	1
Poland	2.45	4.25	4.0	6.0	0.336	0.333	0.180	2	0
Romania	10.4	4.68	3.21	6.0	0.177	-	0.160	2	0
Russia	11.6	4.95	2.5	5.0	0.788	0.027	0.150	2	0
Slovakia	4.20	5.15	4.35	4.7	0.081	0.256	0.000	2	0
Spain	2.72	2.19	6.76	5.0	0.982	0.375	0.300	3	1
Sweden	1.38	1.74	9.23	6.3	1.15	0.366	0.484	5	1
Switzerland	0.901	1.56	8.86	3.0	2.65	0.279	0.488	4	1
Ukraine	11.4	3.98	2.5	4.7	0.33	-	0.250	2	0

Note: Table 5, Panel B reports the average value of institutional factors (table 2) by country.

Table 6. Summary Statistics for Legal Systems: Panel A

	TOTDEBT	SHORTDEBT	LONGDEBT	PROF	SIZE	TANG	GROWTH	NDT	INDMEAN
All companies	0.486	0.366	0.119	0.058	11.4	0.319	0.092	0.046	0.492
Common law	0.493	0.344	0.149	0.047	12.1	0.259	0.069	0.051	0.489
Socialist law	0.464	0.395	0.063	0.072	10.0	0.433	0.109	0.039	0.485
French law	0.548	0.401	0.146	0.054	12.4	0.234	0.094	0.042	0.497
German law	0.438	0.282	0.157	0.05	12.5	0.265	0.071	0.054	0.501
Scandinavian law	0.488	0.338	0.150	0.045	12.1	0.230	0.096	0.049	0.500
Developed countries	0.498	0.348	0.150	0.05	12.3	0.248	0.081	0.048	0.496

Note: Table 6, Panel A reports average values of firm specific variables by legal system. TOTAL is total debt, SHORT is short-term debt and LONG is long-term debt.

Table 6. Summary Statistics for Legal Systems: Panel B

	INFL	GDPGROW	CORRUP	INVPRO	STOCKMDEV	BONDMDEV	TAXG
All companies	4.89	2.53	6.02	5.68	0.339	0.339	0,225
Common law	2.21	1.33	8.33	8.00	1.33	0.303	0,1
Socialist law	9.82	4.66	3.07	5.34	0.466	0.082	0,161
French law	2.12	1.23	6.35	5.11	0.782	0.583	0,361
German law	1.31	0.808	8.08	4.45	1.10	0.361	0,242
Scandinavian law	1.38	1.71	9.31	6.09	1.18	0.35	0,408
Developed countries	1.84	1.22	7.75	5.89	1.07	0.418	0,265

Note: Table 6, Panel B reports average values of institutional factors by legal system.

5. Methodology

This section presents the models used to assess the importance of the institutional factors in capital structure research. We apply a dynamic panel regression model with two types of explanatory variables: firm specific determinants and institutional factors. The regression model we use is as follows:

$$\begin{aligned} TOTDEBT_{it} = {} & \alpha TOTDEBT_{it-1} + \beta_0 + \{\beta_1 PROF_{it} + \beta_2 TANG_{it} + \beta_3 SIZE_{it} + \beta_4 NDT_{it} + \beta_5 GROWTH_{it} \\ & + \beta_6 INDMEAN_{it}\}_{firm} + \{\beta_7 LAW_{it} + \beta_8 CORRUP_{it} + \beta_9 INVPRO_{it} + \beta_{10} STOCKMDEV_{it} \\ & + \beta_{11} BONDMDEV_{it} + \beta_{12} GDPGROW_{it} + \beta_{13} TAXG_{it} + \beta_{14} INFL_{it} + \\ & \beta_{15} DEVECON_{it}\}_{institutional} + u_i + e_{it} \end{aligned} \quad \textbf{(2)}$$

We use a partial adjustment model to find the speed of adjustment, and assume the target debt ratio to be a function of the firm specific determinants (Flannery and Rangan, 2006). The target ratio is defined as

$$TOTDEBT^{*}_{i,t} = \beta X_{i,t-1} \quad \textbf{(3)}$$

The partial adjustment model of leverage is defined as

$$TOTDEBT_{i,t} - TOTDEBT_{i,t-1} = \lambda\left(TOTDEBT^{*}_{i,t} - TOTDEBT_{i,t-1}\right) + \delta_{i,t} \quad \textbf{(4)}$$

Where λ represents the average speed of adjustment for a firm. Substituting in for the target debt ratio and rearranging, our model becomes

$$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)\left(TOTDEBT_{i,t-1}\right) + \delta_{i,t} \quad \textbf{(5)}$$

To estimate the models we use three estimators: OLS, GMM and the BC estimator. The OLS estimator is popular in regression analysis, but is biased due to the correlation between the standard errors and the lagged dependent variable. Mathematically this is illustrated by taking the expectation of the first difference of equation (2)

$$\triangle TOTDEBT_{it} = \alpha \triangle TOTDEBT_{it-1} + \{\beta \triangle X_{it}\}_{firm} + \{\beta \triangle X_{it}\}_{institutional} + \triangle e_{it} \quad \textbf{(6)}$$

$$E(\triangle TOTDEBT_{it-1} \triangle e_{it}) = E\left((TOTDEBT_{it-1} - TOTDEBT_{it-2})(e_{it} - e_{it-1})\right)$$

$$= -E(TOTDEBT_{it-1} e_{it-1}) = -\sigma_e^{2}$$

$TOTDEBT_{it-1}$ is correlated with e_{it}, therefore the OLS assumption[4] is no longer valid. An alternative estimator is the GMM.

The GMM estimator eludes the problem described in equation 6 by maximizing an object function, where one moment restriction is zero correlation between the lagged dependent variable and the residual. In our research we use the system-GMM, which was developed by

[4] We assume we have a standard regression model on the form $y_{it} = \beta X_{it} + u_i + e_{it}$. OLS is not consistent if $E(X_{it}e_{it}) \neq 0$, i.e e_{it} is correlated with X_{it}.

Arellano-Bover (1995) and Blundell-Bond (1998). The system-GMM is based on the difference-GMM[5], but allows for more instruments by assuming the first difference of the instruments is uncorrelated with the fixed effects. Complicated estimators, including the system GMM, have become easily accessible for researchers with the recent development of software packages, such as Xtabond2 (Rodman, 2006) for STATA. Furthermore, it is important to perform regression diagnostics necessary for specific estimators, such as testing for instrumental validity for the system-GMM (Roodman, 2009). System GMM standard validity tests can be done using the Hansen J-test (Sargan-test) and the difference-in-Sargan test[6]. These tests used are not always accurate and as Roodman (2009) notes, the regression diagnostic for the GMM may give results that look valid, but are invalid. To account for this problem we include an alternative estimator, the iterative bootstrap bias corrected estimator (BC). The purpose of the bias correction is to reduce the bias in the fixed effect estimator using bootstrap simulations. We follow the procedure first introduced by Everaert and Pozzi (2007), which implements an iterative bootstrap algorithm to search over the parameter space until we find the unbiased fixed effect estimator (see econometric methods in appendices).

6. Empirical results

Leverage in Different Countries

From the results in table 6, we evaluate whether a significant difference in leverage exists amongst the 5 categories of legal systems. German civil law countries have less leverage than the other law systems with an average ratio of 0,438. French civil law countries on average have a total leverage ratio at 0,548, well above the German civil law countries. These findings are consistent with previous research (i.e. Lopez-Iturriaga and Rodriguez-Sanz, 2008) as well as our 1st hypothesis. German civil law countries also have more long-term debt in comparison to Socialist law countries which is consistent with our 2nd hypothesis. Demirgüç-Kunt and Maksimovic(1996) have similar findings, indicating that higher quality of legal institutions lead to more long-term debt financing. Scandinavian law countries have more long-term debt compared to Socialist and French civil law countries, verifying our 2nd hypothesis. However, the leverage ratio for Scandinavian countries are 48,8 percent, slightly above the mean value, contradicting our 2nd hypothesis which states Scandinavian countries should have a lower total debt ratio. Our 3rd hypothesis, states that Socialist law countries have higher values of short-term debt compared to German civil law, common law and Scandinavian law countries. This supports Berglof and Pajuste (2005), who advocate that Central and Eastern Europe have weaker law enforcement, resulting in more short-term debt compared to long-term debt.

Dynamic Regressions Models

The following sections present the regression result for equation 2. We use three measurements for debt: total debt, short-term debt and long-term debt.

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[5] The paper Arellano and Bond (1991) first introduced the difference-GMM estimator. This estimator maximizes an objective function with moment restrictions: no correlation between the lagged dependent and residual.

[6] Difference-in-Sargan test checks for validity of a subset of instruments.

Regressions for Total Debt

Table 7.

Table 7 presents the dynamic regressions for total debt, and includes the firm specific determinants and institutional factors as explanatory variables, explained in equation 2. Below each coefficient is the p-value. Please see table A1 in the appendices for diagnostic of the GMM instruments.

$$TOTDEBT_{it} = \alpha TOTDEBT_{it-1} + \beta_0 + \{\beta_1 PROF_{it} + \beta_2 TANG_{it} + \beta_3 SIZE_{it} + \beta_4 NDT_{it} + \beta_5 GROWTH_{it} + \beta_6 INDMEAN_{it}\}_{firm} + \{\beta_7 LAW_{it} + \beta_8 CORRUP_{it} + \beta_9 INVPRO_{it} + \beta_{10} STOCKMDEV_{it} + \beta_{11} BONDMDEV_{it} + \beta_{12} GDPGROW_{it} + \beta_{13} TAXG_{it} + \beta_{14} INFL_{it} + \beta_{15} DEVECON_{it}\}_{institutional} + u_i + e_{it}$$

Variables	OLS	GMM	BC
TOTDEBT-1	0,834***	0,691***	0,771***
	(0,000)	(0,000)	(0,000)
PROF	-0,217***	-0,310***	-0,242***
	(0,000)	(0,000)	(0,000)
SIZE	0,006***	0,024***	0,007***
	(0,000)	(0,000)	(0,000)
TANG	0,002	-0,005	-0,032***
	(0,550	(0,791)	(0,000)
GROWTH	0,024***	0,03***	0,032***
	(0,000)	(0,000)	(0,000)
NDT	0,039**	-0,036	0,027
	(0,025)	(0,586)	(0,190)
INDMEAN	0,157***	0,229***	0,192***
	(0,000)	(0,000)	(0,000)
INFL	-0,004***	-0,002	0,000
	(0,001)	(0,102)	(0,598)
GDPGROW	0,004***	0,005***	0,004***
	(0,000)	(0,000)	(0,000)
CORRUP	-0,020***	-0,020***	-0,012***
	(0,000)	(0,000)	(0,000)
LAW	0,011***	0,011***	0,007***
	(0,000)	(0,000)	(0,000)
INVPRO	0,012***	0,015***	0,011***
	(0,000)	(0,000)	(0,000)
STOCKMDEV	0,016***	0,011***	0,012***
	(0,000)	(0,004)	(0,001)
BONDMDEV	-0,032**	-0,023	omitted
	(0,029)	(0,232)	
TAXG	-0,011	0,014	0,004
	(0,356)	(0,469)	(0,698)
DEVECON	0,048***	0,014	0,024***
	(0,000)	(0,353)	(0,000)
Constant	-0,066***	-0,225***	omitted
	(0,000)	(0,000)	
Number of observations	14664	14664	14064

***is significant at 1% **is significant on 5% *is significant on 10%

OLS

From the OLS results in table 7, size and industry mean leverage are significant and positive, consistent with the trade-off theory. On the other hand, growth and non-debt tax shield are significantly positive which contradicts the trade-off theory. Profitability is significant and negative which has also been established in previous research (e.g. Flannery and Rangan, 2006; Huang and Ritter, 2009).

The coefficients of the institutional factors are all significant on at least a five percent level. The proxy for creditor rights, bond market development, has a negative coefficient, which differs with our initial prediction (4th hypothesis). This result has been reported in similar research (e.g. De Jong et al., 2008), and could be explained by increasing creditor rights, implying debt is more risky since firms are afraid of being forced into bankruptcy. The proxy for shareholder rights, stock market development, has a positive coefficient, which conflicts with our 5th hypothesis. De Jong et al. (2008) predicted countries with more developed stock markets would face lower costs of equity financing, but in their research they also find no significant support for this hypothesis. The coefficient for investor protection is significantly positive thus implying the combined effect of increasing shareholder rights and creditor rights will increase leverage. The tax gain coefficient is not significant. The Corruption index variable is negatively related to leverage; meaning firms in countries with more corruption (i.e. lower corruption index) use more debt. GDP growth and development indicator are positively related to leverage, thus implying countries with more developed economies or higher GDP growth use more leverage. We also find the coefficient for inflation to be significantly negative, which is consistent with the result to Fan et al. (2010).

GMM

The GMM estimator produces the same coefficient signs on the firm specific determinants as the OLS estimator, except for non-debt tax shield. Non-debt tax shield is significant for OLS and insignificant for GMM. Interestingly, non-debt tax shield was the least significant (five percent level) firm specific coefficient in the OLS regression.

Most of the institutional factors have the same coefficients and significance level. There are three differences: bond market development, inflation and development indicator are now insignificant on a five percent level whereas they were significant at a five percent level for OLS.

We report the Arellano-Bond and Sargan test for the GMM-estimator (see table A1 in the appendices). The AR(1) test is rejected for no autocorrelation to differenced residuals. The AR(2)-test for no autocorrelation in levels is not rejected on a five percent level. The Sargan-test is rejected, indicating over identified instruments. Our regression also reports the difference-in-Sargan-test, which is rejected. Overall our diagnostic of the GMM indicates that we have weak instruments, which give non-robust results.

BC

The BC estimator has similar results as GMM and OLS for the firm specific determinants. The only differences being that non-debt tax shield becomes insignificant and tangibility becomes significant. This is consistent with the pecking order theory which predicts that more tangible assets lowers asymmetric information.

Table 8. Short-term debt

Table 8 represents the dynamic regressions for short-term debt. This model includes the firm specific determinants and institutional factors as explanatory variables, explained in equation 2. Below each coefficient is the p-value. Please see table A1 in the appendices for diagnostic of the GMM instruments. Overall our diagnostic of the GMM indicates weak instruments which are correlated with the residuals.

$$SHORTDEBT_{it} = \alpha SHORTDEBT_{it-1} + \beta_0 + \{\beta_1 PROF_{it} + \beta_2 TANG_{it} + \beta_3 SIZE_{it} + \beta_4 NDT_{it} + \beta_5 GROWTH_{it} + \beta_6 INDMEAN_{it}\}_{firm} + \{\beta_7 LAW_{it} + \beta_8 CORRUP_{it} + \beta_9 INVPRO_{it} + \beta_{10} STOCKMDEV_{it} + \beta_{11} BONDMDEV_{it} + \beta_{12} GDPGROW_{it} + \beta_{13} TAXG_{it} + \beta_{14} INFL_{it} + \beta_{15} DEVECON_{it}\}_{institutional} + u_i + e_{it}$$

Variables	OLS	GMM	BC
SHORTDEB-1	0.791***	0.559***	0.733***
	(0.000)	(0.000)	(0.000)
PROF	-0.129***	-0.107***	-0.169***
	(0.000)	(0.000)	(0.000)
SIZE	0.003***	0.004	0.001***
	(0.000)	(0.296)	(0.000)
TANG	-0.054***	-0.021	-0.088***
	(0.000)	(0.326)	(0.000)
GROWTH	-0.014***	0.002	-0.018***
	(0.000)	(0.753)	(0.000)
NDT	0.07***	0.075	0.043**
	(0.000)	(0.104)	(0.034)
INDMEAN	0.126***	0.367***	0.171***
	(0.000)	(0.000)	(0.000)
INFL	-0.002*	-0.001	0.001**
	(0.078)	(0.137)	(0.040)
GDPGROW	0.003***	0.003***	0.001*
	(0.000)	(0.000)	(0.073)
CORRUP	-0.007***	-0.010***	-0.009***
	(0.000)	(0.000)	(0.000)
LAW	-0.000	-0.006**	0.002
	(0.871)	(0.020)	(0.298)
INVPRO	0.004***	0.008***	0.007***
	(0.003)	(0.000)	(0.000)
STOCKMDEV	0.002	-0.005	0.01***
	(0.427)	(0.166)	(0.010)
BONDMDEV	-0.004	-0.001	omitted
	(0.801)	(0.947)	
TAXG	0.032***	0.124***	0.030***
	(0.006)	(0.000)	(0.007)
DEVECON	0.001	-0.004	0.001
	(0.916)	(0.824)	(0.881)
constant	0.018	-0.051	omitted
	(0.301)	(0.314)	
Number of observations	14888	14888	14064

***is significant at 1% **is significant on 5% *is significant on 10%

There is little difference between the result for institutional factors for the BC estimator compared to the GMM and OLS estimators. The bond market development has been omitted, and inflation changes from significant to insignificant on a five percent level.

Regressions with Different Debt Maturity

Short- term Debt

OLS

From table 8, all firm specific coefficients are significant at a five percent level for the OLS. Most variables have the same signs and significance levels compared to the total debt regressions in table 7. The exceptions are growth and tangibility, which are significant and negatively correlated. Negative correlation means firms with more tangible assets or growth choose less short-term debt.

Four institutional factors have changed significance level compared to the total debt regressions: tax gain, development economy indicator, stock market development and bond market development. The tax gain variable is now positive and significant, implying that firms with greater tax benefit use more short-term leverage. The development economy dummy variable is insignificant. Stock market development and bond market development are also insignificant. The Corruption index variable is negative and significant, thus implying firms in countries with more corruption (i.e. lower corruption index) choose more short-term debt. The investor protection variable is highly significant and positive, meaning countries with better investor and credit protection use more short-term debt.

GMM

The GMM estimator produces some results for the firm specific determinants that differ from the results for the OLS: size, tangibility, non-debt tax shields and growth. These four variables change from significant with OLS to insignificant with GMM.

The institutional factors have the same results, with the exception of the rule of law variable. The rule of law variable changes from insignificant to significant on a five percent level; this implies that legal systems have a significant effect on short-term debt.

BC

The firm specific determinants have the same signs and significance level as the OLS regression.

The most notable difference between the BC estimator and the two other estimators is inflation. Inflation under the BC estimator becomes positive and significant at a five percent level. The coefficient for inflation is small since a country with less than ten percent inflation will only have an impact on leverage under one percent. Stock market development is also significant and positive. The development indicator is not significant for the BC, which confirms that it does not have an impact on short term leverage.

Table 9. Long-term debt

Table 9 represents the dynamic regressions for long-term debt. This model includes the firm specific determinants and institutional factors as explanatory variables, explained in equation 2. Below each coefficient is the p-value. Please see table A1 in the appendices for diagnostic of the GMM instruments. Overall our diagnostic of the GMM indicates weak instruments which are correlated with the residuals.

$$LONGDEBT_{it} = \alpha LONGDEBT_{it-1} + \beta_0 + \{\beta_1 PROF_{it} + \beta_2 TANG_{it} + \beta_3 SIZE_{it} + \beta_4 NDT_{it} + \beta_5 GROWTH_{it} + \beta_6 INDMEAN_{it}\}_{firm} + \{\beta_7 LAW_{it} + \beta_8 CORRUP_{it} + \beta_9 INVPRO_{it} + \beta_{10} STOCKMDEV_{it} + \beta_{11} BONDMDEV_{it} + \beta_{12} GDPGROW_{it} + \beta_{13} TAXG_{it} + \beta_{14} INFL_{it} + \beta_{15} DEVECON_{it}\}_{institutional} + u_i + e_{it}$$

Variables	OLS	GMM	BC
LONGDEB-1	0,757***	0,575***	0,728***
	(0,000)	(0,000)	(0,000)
PROF	-0,093***	-0,140***	-0,086***
	(0,000)	(0,000)	(0,000)
SIZE	0,005***	0,018***	0,006***
	(0,000)	(0,000)	(0,000)
TANG	0,063***	0,039**	0,053***
	(0,000)	(0,025)	(0,000)
GROWTH	0,038***	0,029***	0,053***
	(0,000)	(0,000)	(0,000)
NDT	-0,031**	-0,062*	-0,018
	(0,046)	(0,098)	(0,274)
INDMEAN	0,086***	0,041	0,061***
	(0,000)	(0,310)	(0,001)
INFL	-0,001	-0,001	-0,001***
	(0,158)	(0,426)	(0,004)
GDPGROW	0,001*	0,001***	0,001
	(0,076)	(0,004)	(0,232)
CORRUP	-0,013***	-0,013***	-0,005***
	(0,000)	(0,000)	(0,004)
LAW	0,010***	0,013***	0,006***
	(0,000)	(0,000)	(0,001)
INVPRO	0,008***	0,01***	0,005***
	(0,000)	(0,000)	(0,000)
STOCKMDEV	0,010***	0,012***	0,005
	(0,000)	(0,000)	(0,114)
BONDMDEV	-0,038***	-0,030*	Omitted
	(0,004)	(0,058)	
TAXG	-0,027***	-0,050***	-0,021**
	(0,008)	(0,000)	(0,020)
DEVECON	0,056***	0,033***	0,018***
	(0,000)	(0,000)	(0,000)
constant	-0,101***	-0,198***	omitted
	(0,000)	(0,000)	
Number of observations	14674	14674	14064

***is significant at 1% **is significant on 5% *is significant on 10%

Long- term Debt

OLS

From table 9, the firm specific variables have similar results for the OLS regression as the total debt regressions from table 7 with the exception of tangibility and non-debt tax shield. Tangibility becomes positive and significant, while non-debt tax shield becomes negative and significant at a five percent level.

The institutional factors, inflation and GDP growth have the same signs as for total debt, but are now insignificant on a five percent level for the OLS estimator. Corruption, investor protection and stock market development are similar to the total debt results. Bond market development (creditor rights) is more negative compared to the total debt regressions, conflicting with our 4^{th} hypothesis. Our results indicate firms in more developed bond markets have less long-term debt. The tax gain coefficient also has a significantly negative coefficient, signifying firms in countries with larger tax gains use less long term debt.

GMM

The GMM results for firms specific determinants are similar to the OLS results, except for non - debt tax shield and industry mean leverage which are both not significant on a five percent level. Non debt tax shield was the least significant firm specific variable for total debt, therefore it is logical that it is insignificant for long term debt. The insignificance for the industry mean leverage variable is more unexpected, since the previous regressions in table 7 and 8 give significant coefficients at a one percent level.

The two significant differences between the GMM results for institutional factors compared to the OLS results is GDP growth and bond market development. GDP growth is significant on a one percent level, while bond market development is insignificant on a one percent level.

BC

The BC results for firm specific determinants are the same as the OLS results, with the exception of non-debt tax shield which is insignificant.

The institutional factors are also similar to the OLS results, except for inflation, bond market development and stock market development. Inflation is negative and significant on a one percent level, while the stock market development is insignificant and bond market development is omitted.

Discussion

There are some differences between the results for short-term and long-term debt. Tangibility, growth and non-debt tax shield have opposite signs in the short-term debt and long-term debt regressions. Tangibility was insignificant for total debt, while it was significantly positive in the long-term regression and significantly negative in the short-term regression. The results in table 8 and 9 indicate growth firms choose more long-term debt than short-term debt. Furthermore, non-debt tax shields are positively correlated with short-term debt, and negatively correlated with long term debt. In general, most of the institutional factors have similar signs in regressions with different debt maturity. The exceptions being the tax gain variables, which are negative for the long-term debt regressions, and positive for the short-term debt regressions. This result is unexpected, since long-term debt is interest bearing debt and short-term debt is non-interest bearing debt. This result conflicts with the tax clientele argument (Scholes and Wolfson, 1992), which advocates that companies with larger tax advantage use more long-term debt. Our proxy for short-term debt is current liabilities, which is influenced by differences in interest rates. The bond market development variable is not significant in the short-term regression, while it is significantly negative in the long-term regression.

Regressions for Different Law Systems

To further investigate how legal systems affect capital structure decisions, we split our sample into: French civil law, German civil law, Scandinavian civil law, Socialist law, and Common law firms. The purpose is to see whether institutional factors and firm determinants affect leverage differently compared to the regressions in table 7. The tables for total, short-term and long-term debt regressions and each legal system are reported in the appendices (Table A2-A4).

Common Law

Great Britain is the only country based on common law in our sample. This naturally limits some of the regression results. One limitation is some institutional factors being based on a single value. Nevertheless, Great Britain has 662 companies in our sample, which makes it the country in our sample with most firm observations,

Total debt

From table A2, growth and tangibility are the only firm specific determinant with insignificant probabilities. Profitability is smaller compared to our results in table 7. Non-debt tax shield, which was only significant for OLS in table 7, is now positive and significant for both OLS and BC. Apart from these two deviations, the results follow the regressions in table 7. We see from table A2 that many institutional variables are omitted, and among the few that remain only GDP growth is significant for all three estimators.

Long and short term debt

The firm specific determinants follow our results in table 8 and 9, except the GMM and BC estimators' which reports insignificant size coefficient for the short-term debt regression. The institutional factors are mostly insignificant for the short-term and long-term debt regressions, except for inflation which is significant for GMM and BC. Long-term debt and GDP growth are significant at a one percent level for the BC estimator in the long-term debt regression.

Socialist Law

The Socialist law countries are the largest "legal group", consisting of: Russia, Ukraine, Balticum, Bulgaria, Poland, Slovakia and Romania. The sample contains 1462 firms.

Total debt

Non-debt tax shields and industry mean leverage are insignificant on a five percent level for the three estimators. Tangibility, growth, size and profitability are significant at a one percent level. The negative coefficient for tangibility is not consistent with the trade-off theory.

The institutional factors are all insignificant, with the exception of GDP growth, which is significant on a five percent level for the OLS and GMM estimators. Stock market development is significant on a one percent level for the OLS and BC estimators.

Short-term and long-term debt

Table A3 reports profitability and tangibility as significant at a one percent level for the three estimators in the short-term regressions. Size is significant on a five percent level for the OLS and BC estimator. The negative sign on profitability and the positive sign on size are consistent with our predictions. The negative sign on tangibility is consistent with the pecking order theory. Growth and non-debt tax shield are insignificant for the short-term debt regression. Furthermore, profitability and size are significant in the long-term debt regressions, with the exception of size for the BC estimator (table A4). Profitability has a negative sign which is consistent with our prediction, while growth has a positive sign, in line with the pecking order theory.

The institutional factors are mostly insignificant for the short-term regressions. The only significant variable for the OLS and GMM estimator is inflation at the five percent level. The GDP growth variable is significant at the five percent level for the BC estimator. In the long-term debt regression the institutional factors are also insignificant, except inflation which is significant at a one percent level for the OLS and GMM estimators, and five percent level for the BC estimator.

French civil law

The French civil law countries in this sample consist of France, Greece, Italy and Spain, with a total of 801 companies.

Total debt

Performing regressions on only French civil law countries, we find that profitability has a larger negative coefficient for all three regressions compared to the previous regressions in table 7. According to table A2, tangibility is negative for the three estimators, but only significant for OLS and BC. Non-debt tax shield is significantly positive for the OLS and BC estimators, but not significant for the GMM estimator.

Looking at the institutional factors, inflation is significantly negative across all regressions. Investor protection, which was positive in table 7, is now negative and insignificant. French civil law countries are expected to have lower investor protection compared to the German civil law countries.

Long-term and short-term debt

The results for long-term debt do not change much for the firm specific determinants compared to our results in table 9. The institutional factors are mostly insignificant, meaning the variables either do not change much or they are not significant. For short term debt, profitability has a larger coefficient for all three regressions compared to our earlier result in table 8, showing that short term debt in French civil law countries decrease more with increasing profitability. We see that the institutional factors are more significant for the short-term debt regression compared to the long-term regression. GDP growth and corruption are significant on a five percent level for the OLS and GMM estimators.

German civil law

The German civil law countries in our sample are Germany and Switzerland with 587 firms in total.

Total debt

Firm specific variables are mostly significant, excluding tangibility, see table A2. Apart from the positive sign on non-debt tax shields, the signs on the significant variables for the different estimators are similar to our initial predictions.

The OLS estimator finds three significant institutional factors: corruption, stock market development and bond market development. Only two institutional factors are significant for our GMM regression in table A1; inflation and GDP growth. The sign on inflation is negative for both the GMM estimator and OLS estimator. None of the institutional factors are significant for the BC estimator, which is unexpected considering most of the variables were significant for our BC estimates in table 7.

Long-term and short-term debt

For short-term debt (table A3) most firm specific variables are significant for the OLS and BC estimator, with the exception of growth. The GMM estimator for short-term debt only has industry mean leverage significant at a one percent level. According to regressions for long-term debt in table A4 most variables are significant except non debt tax shields. In addition, most of the institutional factors are insignificant for the long-term and short-term debt regressions. The BC estimator has no significant variables, while the GMM and OLS estimator only have GDP growth significant at a one percent level for the short-term debt regression. This proves institutional factors are not significant explanatory variables for short-term and long-term debt.

Scandinavian civil law

Amadeus does not have sufficient data for Danish or Norwegian companies; therefore the Scandinavian law system is represented by Finland and Sweden in our research, with a total of 316 firms.

Total debt

The only difference between the firm specific factors and the results from table 7 is non-debt tax shield, which is significant and negative for the three estimators. While most institutional factors are insignificant or omitted, stock market and bond market development are both significant. The bond market development variable is significantly positive in table A2, while our earlier regression gave mixed and insignificant results. Stock market development is positive from both methodologies.

Long-term and short term debt

For the long term debt regression in table A4, non-debt tax shield is negative and significant, while the industry effects are insignificant. Bond market development is not significant for long term debt, but the stock market variable is significantly positive for all three regressions.

From the short term regression in table A3 the firm specific factors vary slightly. Growth is significant for GMM, while non-debt tax shield is insignificant for all the regressions. In regards to the institutional factors, corruption is positive and only significant for GMM. Bond market development is positive and significant for the OLS and GMM estimator.

Speed of adjustment for different law systems

In this section we estimate the speed of adjustment for different law systems using the partial adjustment model. The purpose is to determine whether there exists a significant difference.

Table 10

Table 10 presents the speed of adjustment (λ) for the two estimators OLS and BC. We calculate the P-value, which is a test for significant difference between two legal systems. All speeds of adjustment are significant on a one percent level. Please see the appendices (table A5-A9) for regression output.

$$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)(TOTDEBT_{i,t-1}) + \delta_{i,t}$$

	OLS	P-value	BC	P-value
Common	0.189	0.79	0.227	0.876
Socialist	0.183		0.229	
Common	0.189	0.059*	0.227	0.057*
French	0.15		0.204	
Common	0.189	0.040**	0.227	0.000***
German	0.145		0.14	
Common	0.189	0.078*	0.227	0.000***
Scandinavian	0.241		0.319	
Socialist	0.183	0.017**	0.229	0.035**
French	0.15		0.204	
Socialist	0.183	0.013**	0.229	0.000***
German	0.145		0.14	
Socialist	0.183	0.064*	0.229	0.000***
Scandinavian	0.241		0.319	
French	0.15	0.8	0.204	0.000***
German	0.145		0.14	
French	0.15	0.00***	0.204	0.000***
Scandinavian	0.241		0.319	
German	0.145	0.00***	0.14	0.000***
Scandinavian	0.241		0.319	

***is significant at 1% **is significant on 5% *is significant on 10%.

From table 10 the speed of adjustment ranges from 14 percent in German civil law countries to 31.9 percent for Scandinavian law countries. There is a significantly higher speed of adjustment for Scandinavian countries compared to the French, German and Socialist legal system, consistent with Oztekin and Flannery (2008). Conversely, Scandinavian countries adjust faster than common law countries, which is not in agreement with Oztekin and Flannery (2009).

The OLS estimator shows no significant difference between the speed of adjustment for firms in German and French Civil law countries. However, the speed of adjustment is significantly different between firms in common law countries and French/German civil law countries. Our results indicate that firms in common law countries adjust faster than firms in French and German civil law countries. The higher speed of adjustment in common law countries compared to civil law countries could be explained by stronger institutions and legal protection to shareholder (La Porta et al., 1998) in common law countries. This gives less adjustment costs and thereby a higher speed of adjustment.

Analyzing the speed of adjustment for firms in Socialist law countries, it is clear that they adjust faster compared to firms in German and French civil law countries. Firms in Scandinavian law countries have a higher speed of adjustment compared to firms in Socialist law countries. There is no significant difference in the speed of adjustment between common and Socialist law countries. A possible explanation for the higher speed of adjustment in Scandinavian civil law countries compared to Socialist law countries is that better investor protection, legal enforcement and political governance are positively correlated with the speed of adjustment (Oztekin and Flannery, 2009). Berglof and Pajuste (2005) argue that there is poor enforcement of corporate disclosure in Eastern-Europe which can explain some of the differences in capital structure preference between Socialist and Scandinavian countries. Law enforcement cannot be the only explanation since firms in Socialist countries have a faster speed of adjustment compared to firms in German and French civil law countries, this is not consistent with our previous argument. Firms in countries with German and French civil law have similar speeds of adjustment, but different average leverage (table 6). The smaller speed of adjustment for firms in French civil law countries compared to firms in Socialist law countries could be explained by the weaker protection of creditor rights, thereby increasing adjustment costs and decreasing speed of adjustment. It is more difficult to explain the smaller speed of adjustment for firms in German civil law countries, since they have strong law enforcement and political governance. The result is nonetheless intriguing, since the significant difference in speeds of adjustment is consistent with dynamic trade-off theory.

7. Conclusion

This paper examines the impact institutional factors have on firm leverage and adjustment speed across European countries. We set forth six hypotheses regarding the economic impact of institutional factors.

The results from table 6 confirm our 1st hypothesis that French civil law countries are the most leveraged while German civil law countries are the least. Our 2nd hypothesis, as discussed by La Porta et al. (1997), predicts Scandinavian and German civil law countries to have the best law enforcement. We find both legal systems to have relatively more long-term debt, which is a possible indication of better law enforcement, see table 6. The 3rd hypothesis states that Central and Eastern European countries have the weakest law enforcement, thereby incurring more short-term debt compared to other countries. Our results from table 6 confirm this hypothesis since Socialist countries have more short-term debt compared to most legal systems in our sample, except French civil law countries. The 4th and 5th Hypotheses state predictions regarding shareholder and creditor rights impact on leverage. Our proxy for shareholder rights is significant and positive, which contradicts with our 4th hypothesis. Our proxy for creditor rights is correlated with three institutional factors, which explains why it has been either omitted or insignificant in most of our regressions. We also include in our analysis a proxy for investor protection, which is generally positive and significant, thus implying the combined effect of shareholder and creditor rights is positively related with leverage. Our regressions do not provide enough evidence to accept the 4th and 5th hypotheses. Our 6th hypothesis states that countries with higher tax gain use more debt, however there is no significant relationship according to the BC estimator in table 7. Overall we see that many of the institutional factors are significant, thus implying they could be included in a dynamic capital structure model.

From our analysis of the speed of adjustment, we conclude a significant difference for the various legal systems in our sample. This is consistent with the dynamic trade-off theory. Most notable is the significantly larger speed of adjustment in Scandinavian civil law countries, compared to German and Socialist law countries.

Our research contributes to corporate finance in two ways. First, we show that institutional factors are significant explanatory variables for leverage. Second, this is the first paper that tests whether there is a significant difference in the speed of adjustment for legal systems in Europe. Oztekin and Flannery (2008) have a similar research topic; however our paper builds upon their article by using the BC estimator for this purpose. Our results are important for financial econometricians as well as individuals who work in the financial industry. Banks and other financial intermediaries will benefit from the knowledge that firms in European countries have different preferences of financing their operations. This information is useful for financial intermediaries in their decision of how to target firms in different European countries, i.e. firms in Ukraine have a preference for short-term debt and therefore adjust their leverage quicker compared to firms in Germany who prefer more long-term debt and adjust their leverage more slowly. Financial government officials benefit from our analysis, because they can use our results to make changes in their financial policy and attract firms from European countries with a particular preference of capital structure.

Further research could benefit from better proxies for some of the institutional factors, since they suffer from multicollinearity (e.g. stock market development, bond market development). Also our sample only includes listed firms in Europe, and further research may include non-listed firms to give a better impression of the overall capital structure policy.

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Appendices

Econometric methods

Iterative bootstrap bias corrected estimator (BC)

(1) Estimate the fixed effect estimators $\hat{\xi}$ for original sample and set $\hat{\xi} = \bar{\xi}$.

(2) Estimate the vector of individual effects.

(3) Calculate the residuals $\widehat{\delta_{i,t}}$

$$\widehat{\delta_{i,t}} = TOTDEBT_{i,t} - \tilde{\rho}\, TOTDEBT_{i,t-1} - \tilde{\eta} X_{i,t-1} \tag{X.1}$$

Then rescale them according to (MacKinnon, 2002), which gives $\widetilde{\delta_{i,t}}$.

(4) Generate the first bootstrap sample. For each cross section (i) draw with replacement a sample $\widetilde{\delta_{i,t}}^{n}$ of size T.

(5) Using the estimator and sample in step 1 calculate the new bootstrap sample $BDR_{i,t}{}^{n}$, where starting value is your first sample value $BDR_{i,t}$.

$$TOTDEBT_{i,t}{}^{n} = \tilde{\eta} X_{i,t-1} + \tilde{\rho} TOTDEBT_{i,t-1}{}^{n} + \widetilde{\delta_{i,t}}^{n} \tag{X.2}$$

(6) Find the fixed effect estimator, $\widetilde{\xi_J}^{\,n} = (\tilde{\rho}_j{}^{n}, \tilde{\eta}_j{}^{n})$ for bootstrap sample n.

(7) Duplicate steps 4-6 N times, N is the number of bootstraps chosen, and calculate the empirical mean, $\bar{\xi}_0 = \frac{1}{N}\sum_{j=1}^{N} \widetilde{\xi_J}^{\,n}(\widetilde{\xi_J}(0))$. The difference between empirical mean and the estimator ($\hat{\xi}$) in step one is $\hat{\xi} - \bar{\xi}_0 = \omega$, which is the convergence criteria. We stop when ω ≈ 0, which means $\bar{\xi}_0$ is an unbiased estimator of ξ. If the convergence criterion is not accomplished repeat steps 2-7 for an updated value $\tilde{\xi}^{b}(k+1) = \tilde{\xi}^{b} + \omega_k$ until equation (15) is satisfied.

Notes: λβ = η , (1 − λ) = ρ , T = number of years, the *vector of unknown parameters* $\xi = (\rho, \eta)`$, $\hat{\xi}^{*}{}_{n}(\bar{\xi})$ *is sampled estimators from a population with parameter* $\bar{\xi}$ *. An unbiased estimator of* $\bar{\xi}$ *needs to satisfy the equation:*

$$\hat{\xi} = \lim_{N\to\infty} \frac{I}{N}\sum_{n=1}^{N} \hat{\xi}^{*}{}_{n}(\bar{\xi}).$$

Empirical Analysis

Regression Diagnostic of the GMM estimator

Table A1 presents the diagnostic of the instrumental variables used in the GMM estimator (equation 2).

Table A1. Diagnostic of GMM instruments

	TOTDEBT	SHORTDEBT	LONGDEBT
AR(1)	-13,53***	-12,4***	-12,04***
P-value	0,00	0,00	0,00
AR(2)	1,66*	1,71*	1,87*
P-value	0,098	0,086	0,062
Sargan test	914,06***	675,87***	1138,71***
P-value	0,00	0,00	0,00
Diff-in Sargan - GMM	82,41***	95,64***	102,74***
P-value	0,00	0,00	0,00
Diff in Sargan - IV	44,69***	16,25*	34,34***
P-value	0,00***	0,093	0,00

Note: ***is significant at 1% **is significant on 5% *is significant on 10%. We reject the AR(1) test for autocorrelation to differenced residuals for all three regressions. The AR(2)-test for autocorrelation in levels is also rejected on a ten percent level. The Sargan-test and difference-in-Sargan-test are rejected, indicating over identified instruments. Overall our diagnostic of the GMM indicates that we have instruments which are weak and most likely correlated with the residuals for all of our three regressions: total debt, short-term debt and long-term debt.

Regressions for different law systems

The different legal systems are defined as the following
Rule of Law 1 = Common (Great Britain)
Rule of Law 2 = Socialist
Rule of Law 3 = French
Rule of Law 4 = German
Rule of Law 5 = Scandinavian

The following tables (A2-A4) presents the dynamic regression model for total, short- and long-term debt. We split our sample into: French civil law, German civil law, Scandinavian, Socialist law firms, and Common law firms. Below each coefficient we report the t-statistic.

Total Debt

$$TOTDEBT_{it} = \alpha TOTDEBT_{it-1} + \beta_0 + \{\beta_1 PROF_{it} + \beta_2 TANG_{it} + \beta_3 SIZE_{it} + \beta_4 NDT_{it} + \beta_5 GROWTH_{it} + \beta_6 INDMEAN_{it}\}_{firm} + \{\beta_7 LAW_{it} + \beta_8 CORRUP_{it} + \beta_9 INVPRO_{it} + \beta_{10} STOCKMDEV_{it} + \beta_{11} BONDMDEV_{it} + \beta_{12} GDPGROW_{it} + \beta_{13} TAXG_{it} + \beta_{14} INFL_{it} + \beta_{15} DEVECON_{it}\}_{institutional} + u_i + e_{it}$$

Table A2. Regressions for different law systems: Panel A

	Rule of law-1			Rule of law-2			Rule of law-3		
Variables	OLS	GMM	BC	OLS	GMM	BC	OLS	GMM	BC
TOTDEBT-1	0,825***	0,698***	0,787***	0,759***	0,619***	0,658***	0,842***	0,675***	0,802***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
PROF	-0,152***	-0,178***	-0,089***	-0,517***	-0,610***	-0,548***	-0,308	-0,459***	-0,262
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
SIZE	0,008***	0,02***	0,006***	0,005***	0,011	-0,006***	0,005***	0,009*	0,002**
	(0,000)	(0,000)	(0,000)	(0,003)	(0,273)	(0,003)	(0,000)	(0,085)	(0,014)
TANG	0,010	0,026	0,007	-0,15***	-0,394***	-0,208***	-0,023***	-0,023	-0,035***
	(0,156)	(0,372)	(0,308)	(0,000)	(0,000)	(0,000)	(0,001)	(0,508)	(0,000)
GROWTH	0,001	0,027**	-0,010	0,034***	0,032**	0,052***	0,036***	0,036**	0,037***
	(0,825)	(0,046)	(0,169)	(0,000)	(0,033)	(0,000)	(0,000)	(0,013)	(0,000)
NDT	0,126***	0,094	0,126***	-0,002	0,049	0,025	0,148***	0,099	0,113***
	(0,000)	(0,184)	(0,000)	(0,983)	(0,873)	(0,811)	(0,000)	(0,478)	(0,002)
INDMEAN	0,167***	0,334	0,167***	0,032	0,037	0,089*	0,185***	0,357***	0,128***
	(0,000)	(0,000)	(0,000)	(0,506)	(0,707)	(0,064)	(0,000)	(0,001)	(0,001)
INFL	0,013	-0,007	0,024***	0,000	0,001	0,001	-0,014***	-0,010***	-0,017***
	(0,584)	(0,569)	(0,001)	(0,413)	(0,363)	(0,522)	(0,000)	(0,000)	(0,001)
GDPGROW	0,01**	0,008***	0,01***	0,002**	0,002**	0,006**	0,007***	0,006***	-0,003
	(0,023)	(0,000)	(0,000)	(0,020)	(0,011)	(0,015)	(0,000)	(0,000)	(0,391)
CORRUP	-0,028	-0,053***	omitted	-0,002	-0,007	0,033**	-0,021***	-0,017***	-0,012
	(0,193)	(0,000)		(0,785)	(0,557)	(0,019)	(0,000)	(0,000)	(0,116)
INVPRO	omitted	omitted	omitted	-0,007	-0,005	0,006	-0,001	-0,011	-0,012
				(0,134)	(0,646)	(0,348)	(0,884)	(0,346)	(0,773)
STOCKMDEV	-0,182	0,029	omitted	0,047***	0,033*	0,096***	0,020*	0,009	0,007
	(0,538)	(0,571)		(0,000)	(0,072)	(0,006)	(0,063)	(0,414)	(0,806)
BONDMDEV	0,731	omitted	omitted	omitted	omitted	omitted	-0,047**	-0,073***	omitted
	(0,478)						(0,034)	(0,004)	
TAXG	omitted	omitted	omitted	0,013	-0,054	0,170	0,047	0,176	-0,289*
				(0,846)	(0,0652)	(0,064)	(0,566)	(0,254)	(0,055)
DEVECON	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted
Constant	0,106	0,137	omitted	0,142**	0,294*	omitted	0,093***	0,065	omitted
	(0,510)	(0,128)		(0,014)	(0,060)		(0,009)	(0,357)	
Nr. of observations	4027	4027	3201	3103	3103	2672	4919	4919	4213

***is significant at 1% **is significant on 5% *is significant on 10%.

Table A2. Regressions for different law systems: Panel B

	Rule of law-4			Rule of law-5		
Variables	OLS	GMM	BC	OLS	GMM	BC
TOTDEBT-1	0,839***	0,690***	0,855***	0,753***	0,622***	0,691***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
PROF	-0,240***	-0,336***	-0,213***	-0,264***	-0,377***	-0,290***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
SIZE	0,007***	0,031***	0,001	0,005***	0,013*	0,016
	(0,000)	(0,000)	(0,435)	(0,001)	(0,059)	(0,000)
TANG	0,013	-0,002	-0,001	0,014	0,051	0,012
	(0,112)	(0,970)	(0,926)	(0,222)	(0,139)	(0,233)
GROWTH	0,05***	0,057***	0,091***	0,017**	0,029*	0,035***
	(0,000)	(0,002)	(0,000)	(0,046)	(0,066)	(0,004)
NDT	0,108***	0,103	0,128***	-0,276***	-0,43***	-0,358***
	(0,001)	(0,361)	(0,000)	(0,000)	(0,004)	(0,000)
INDMEAN	0,166**	0,412**	0,146**	0,211**	0,376*	0,168*
	(0,017)	(0,027)	(0,020)	(0,035)	(0,075)	(0,089)
INFL	-0,008***	-0,006***	-0,004	0,010*	0,012**	0,006
	(0,005)	(0,003)	(0,939)	(0,080)	(0,031)	(0,420)
GDPGROW	0,003***	0,003***	-0,002	-0,001	-0,002	0,006
	(0,001)	(0,000)	(0,972)	(0,595)	(0,422)	(0,350)
CORRUP	-0,035***	-0,017	-0,008	0,021	0,040	0,027
	(0,006)	(0,150)	(0,965)	(0,431)	(0,154)	(0,324)
INVPRO	0,003	-0,001	-0,015	-0,001	0,006	0,026**
	(0,803)	(0,948)	(0,8968)	(0,956)	(0,737)	(0,042)
STOCKMDEV	0,033***	0,008	-0,013	0,062**	0,072**	0,135*
	(0,003)	(0,459)	(0,578)	(0,020)	(0,015)	(0,063)
BONDMDEV	0,396**	0,202	omitted	0,38**	0,406**	omitted
	(0,047)	(0,223)		(0,049)	(0,043)	
TAXG	omitted	omitted	omitted	omitted	omitted	omitted
DEVECON	omitted	omitted	omitted	omitted	omitted	omitted
Constant	-0,008	-0,394**	omitted	-0,423	-0,773**	omitted
	(0,930)	(0,020)		(0,170)	(0,035)	
Nr. of observations	3551	3551	2551	1787	1787	1427

***is significant at 1% **is significant on 5% *is significant on 10%.

Short-term debt

$$SHORTDEBT_{it} = \alpha SHORTDEBT_{it-1} + \beta_0 + \{\beta_1 PROF_{it} + \beta_2 TANG_{it} + \beta_3 SIZE_{it} + \beta_4 NDT_{it} + \beta_5 GROWTH_{it} + \beta_6 INDMEAN_{it}\}_{firm} + \{\beta_7 LAW_{it} + \beta_8 CORRUP_{it} + \beta_9 INVPRO_{it} + \beta_{10} STOCKMDEV_{it} + \beta_{11} BONDMDEV_{it} + \beta_{12} GDPGROW_{it} + \beta_{13} TAXG_{it} + \beta_{14} INFL_{it} + \beta_{15} DEVECON_{it}\}_{institutional} + u_i + e_{it}$$

Table A3. Regressions for different law systems: Panel A

	Rule of law-1			Rule of law-2			Rule of law-3		
Variables	OLS	GMM	BC	OLS	GMM	BC	OLS	GMM	BC
SHORTDEBT-1	0,803***	0,595***	0,759***	0,757***	0,650***	0,661***	0,808***	0,562***	0,776***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
PROF	-0,098***	-0,069	-0,049***	-0,458***	-0,396***	-0,457***	-0,238***	-0,266***	-0,198***
	(0,000)	(0,191)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
SIZE	0,003***	0,002	0,001	0,003**	0,005	-0,004**	0,001*	-0,008	0,002*
	(0,000)	(0,694)	(0,554)	(0,039)	(0,500)	(0,027)	(0,063)	(0,214)	(0,065)
TANG	-0,042***	-0,020	-0,051***	-0,160***	-0,275***	-0,214***	-0,078***	-0,070	-0,093***
	(0,000)	(0,542)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,123)	(0,000)
GROWTH	-0,019***	0,000	-0,042***	-0,003	-0,005	0,010	-0,005	-0,002	-0,014**
	(0,000)	(0,996)	(0,000)	(0,696)	(0,720)	(0,332)	(0,317)	(0,893)	(0,022)
NDT	0,118***	0,111	0,087***	0,098	0,295	0,039	0,158***	0,287**	0,085**
	(0,000)	(0,146)	(0,008)	(0,207)	(0,174)	(0,702)	(0,000)	(0,018)	(0,027)
INDMEAN	0,134***	0,362***	0,103***	0,064	0,133*	0,118**	0,125***	0,389***	0,070
	(0,000)	(0,000)	(0,001)	(0,126)	(0,063)	(0,011)	(0,004)	(0,000)	(0,098)*
INFL	0,002	-0,017	-0,009	0,002***	0,001**	0,002	-0,003	-0,002	-0,002
	(0,939)	(0,287)	(0,231)	(0,002)	(0,019)	(0,157)	(0,288)	(0,320)	(0,773)
GDPGROW	0,005	0,001	0,002	0,001	0,001	0,006**	0,004***	0,004***	-0,002
	(0,325)	(0,807)	(0,449)	(0,279)	(0,152)	(0,026)	(0,003)	(0,004)	(0,546)
CORRUP	-0,008	-0,032**	omitted	0,001	-0,006	0,010	-0,012***	-0,009**	-0,014*
	(0,689)	(0,037)		(0,883)	(0,430)	(0,450)	(0,002)	(0,011)	(0,067)
INVPRO	omitted	omitted	omitted	-0,003	-0,003	0,008	-0,006	-0,008	-0,045
				-0,422	(0,765)	(0,198)	(0,275)	(0,553)	(0,306)
STOCKMDEV	-0,073	0,172	omitted	-0,012	-0,013	0,042	-0,001	-0,009	0,003
	(0,794)	(0,412)		-0,237	(0,385)	(0,220)	(0,948)	(0,446)	(0,932)
BONDMDEV	0,177	-0,781	omitted	omitted	omitted	omitted	-0.042*	-0,044	omitted
	(0,856)	(0,303)					(0,075)	(0,104)	
TAXG	omitted	omitted	omitted	0,034	0,009	0,077	0,164*	0,340*	0,105
				(0,470)	(0,916)	(0,377)	(0,063)	(0,058)	(0,519)
DEVECON	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted
Constant	0,078	0,254*	omitted	0,118***	0,168	omitted	0,096**	0,103	omitted
	(0,608)	(0,079)		(0,008)	(0,141)		(0,012)	(0,148)	
Nr. of observations	4172	4172	3201	4051	4051	2672	4929	4929	4213

***is significant at 1% **is significant on 5% *is significant on 10%.

Table A3. Regressions for different law systems: Panel B

	Rule of law-4			Rule of law-5		
Variables	OLS	GMM	BC	OLS	GMM	BC
SHORTDEBT-1	0,716***	0,492***	0,665***	0,769***	0,544***	0,773***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
PROF	-0,107***	-0,092*	-0,129***	-0,119***	-0,206***	-0,157***
	(0,000)	(0,056)	(0,000)	(0,000)	(0,006)	(0,000)
SIZE	0,005***	0,012*	0,002	0,002	0,013**	0,008***
	(0,000)	(0,088)	(0,221)	(0,100)	(0,027)	(0,000)
TANG	-0,059***	-0,061	-0,094***	-0,047***	-0,063	-0,054***
	(0,000)	(0,223)	(0,000)	(0,000)	(0,114)	(0,000)
GROWTH	0,010	0,008	0,011	-0,055***	-0,031**	-0,032***
	(0,132)	(0,547)	(0,266)	(0,000)	(0,032)	(0,001)
NDT	0,090**	0,091	0,120***	-0,044	-0,162	-0,025
	(0,010)	(0,357)	(0,003)	(0,252)	(0,213)	(0,575)
INDMEAN	0,164**	0,400***	0,084	0,171**	0,378**	0,194**
	(0,022)	(0,000)	(0,245)	(0,047)	(0,020)	(0,012)
INFL	-0,004	-0,002	-0,036	0,007	0,007*	0,001
	(0,125)	(0,235)	(0,523)	(0,171)	(0,092)	(0,928)
GDPGROW	0,003***	0,003***	0,041	-0,001	-0,001	0,003
	(0,000)	(0,001)	(0,416)	(0,572)	(0,569)	(0,598)
CORRUP	-0,004	-0,004	0,149	0,036	0,035*	0,029
	(0,763)	(0,712)	(0,495)	(0,125)	(0,070)	(0,166)
INVPRO	-0,004	-0,011	0,077	-0,009	-0,004	0,005
	(0,679)	(0,283)	(0,575)	(0,443)	(0,794)	(0,642)
STOCKMDEV	-0,001	-0,009	-0,028	0,024	0,02	0,003
	(0,904)	(0,368)	(0,311)	(0,290)	(0,366)	(0,957)
BONDMDEV	0,007	-0,030	omitted	0,285*	0,260**	omitted
	(0,971)	(0,866)		(0,093)	(0,043)	
TAXG	omitted	omitted	omitted	omitted	omitted	omitted
DEVECON	omitted	omitted	omitted	omitted	omitted	omitted
Constant	0,006	-0,088	omitted	-0,416	-0,582**	omitted
	(0,945)	(0,555)		(0,120)	(0,023)	
Nr. of observations	3557	3557	2551	1838	1838	2551

***is significant at 1% **is significant on 5% *is significant on 10%.

Long-term debt

$$LONGDEBT_{it} = \alpha LONGDEBT_{it-1} + \beta_0 + \{\beta_1 PROF_{it} + \beta_2 TANG_{it} + \beta_3 SIZE_{it} + \beta_4 NDT_{it} + \beta_5 GROWTH_{it} + \beta_6 INDMEAN_{it}\}_{firm} + \{\beta_7 LAW_{it} + \beta_8 CORRUP_{it} + \beta_9 INVPRO_{it} + \beta_{10} STOCKMDEV_{it} + \beta_{11} BONDMDEV_{it} + \beta_{12} GDPGROW_{it} + \beta_{13} TAXG_{it} + \beta_{14} INFL_{it} + \beta_{15} DEVECON_{it}\}_{institutional} + u_i + e_{it}$$

Table A4 Regressions for different law systems: Panel A

	Rule of law-1			Rule of law-2			Rule of law-3		
Variables	OLS	GMM	BC	OLS	GMM	BC	OLS	GMM	BC
LONGDEBT-1	0,784***	0,660***	0,776***	0,767***	0,681***	0,680***	0,753***	0,645***	0,697***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
PROF	-0,078***	-0,112***	-0,035***	-0,088***	-0,062**	-0,082***	-0,091***	-0,133***	-0,095***
	(0,000)	(0,000)	(0,004)	(0,000)	(0,014)	(0,000)	(0,000)	(0,000)	(0,000)
SIZE	0,006***	0,014***	0,005***	0,003***	0,013***	-0,001	0,005***	0,007**	0,001
	(0,000)	(0,000)	(0,000)	(0,004)	(0,005)	(0,181)	(0,000)	(0,015)	(0,464)
TANG	0,055***	0,027	0,053***	0,013	-0,032	0,010	0,060***	0,072**	0,076***
	(0,000)	(0,272)	(0,000)	(0,112)	(0,117)	(0,222)	(0,000)	(0,014)	(0,000)
GROWTH	0,027***	0,028***	0,031***	0,031***	0,011*	0,041***	0,045***	0,042***	0,060***
	(0,000)	(0,001)	(0,000)	(0,000)	(0,082)	(0,000)	(0,000)	(0,000)	(0,000)
NDT	0,002	-0,065	0,026	-0,070	-0,004	-0,037	-0,015	-0,042	0,013
	(0,938)	(0,174)	(0,400)	(0,226)	(0,975)	(0,550)	(0,647)	(0,365)	(0,711)
INDMEAN	0,068**	0,069	0,078***	-0,048	-0,036	-0,013	0,099***	0,118*	0,095**
	(0,026)	(0,212)	(0,005)	(0,110)	(0,325)	(0,645)	(0,006)	(0,071)	(0,010)
INFL	0,013	-0,001	0,025***	-0,001***	-0,001***	-0,002**	-0,010***	-0,007***	-0,12**
	(0,537)	(0,926)	(0,000)	(0,004)	(0,008)	(0,029)	(0,000)	(0,000)	(0,013)
GDPGROW	0,006	0,004***	0,007***	0,001*	0,001	-0,000	0,002	0,000	-0,002
	(0,134)	(0,004)	(0,000)	(0,083)	(0,170)	(0,862)	(0,124)	(0,731)	(0,530)
CORRUP	-0,017	-0,030***	omitted	0,002	-0,008	0,014*	-0,007**	-0,006**	-0,001
	(0,368)	(0,000)		(0,687)	(0,204)	(0,081)	(0,027)	(0,020)	(0,901)
INVPRO	omitted	omitted	omitted	-0,001	0,011**	-0,005	0,004	0,002	0,008
				(0,769)	(0,041)	(0,145)	(0,413)	(0,755)	(0,845)
STOCKMDEV	-0,103	0,022	omitted	0,05***	0,025**	0,037*	0,014	0,004	0,009
	(0,685)	(0,543)		(0,000)	(0,012)	(0,073)	(0,143)	(0,642)	(0,726)
BONDMDEV	0,518	omitted	omitted	omitted	omitted	omitted	-0,014	-0,032*	omitted
	(0,558)						(0,486)	(0,074)	
TAXG	omitted	omitted	omitted	0,002	-0,125**	0,050	-0,126*	-0,107	-0,278*
				(0,961)	(0,039)	(0,349)	(0,087)	(0,360)	(0,050)
DEVECON	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted
Constant	-0,013	0,058	omitted	0,000	-0,086	omitted	-0,003	-0,012	omitted
	(0,924)	(0,81)		(0,998)	(0,277)		(0,930)	(0,788)	
Nr. of observations	4027	4027	3201	3103	3103	2672	4919	4919	4213

***is significant at 1% **is significant on 5% *is significant on 10%

Table A4 Regressions for different law systems: Panel B

	Rule of law-4			Rule of law-5		
Variables	OLS	GMM	BC	OLS	GMM	BC
LONGDEBT-1	0,730***	0,512***	0,703***	0,724***	0,662***	0,63***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
PROF	-0,149***	-0,179***	-0,156***	-0,098***	-0,123***	-0,137***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,003)	(0,000)
SIZE	0,005***	0,017***	0,001	0,003**	0,001	0,007***
	(0,000)	(0,000)	(0,311)	(0,013)	(0,777)	(0,001)
TANG	0,085***	0,059	0,095***	0,076***	0,116***	0,105***
	(0,000)	(0,139)	(0,000)	(0,000)	(0,000)	(0,000)
GROWTH	0,038***	0,024**	0,070***	0,058***	0,054***	0,08***
	(0,000)	(0,020)	(0,000)	(0,000)	(0,000)	(0,000)
NDT	0,013	0,022	0,01	-0,183***	-0,223***	-0,315***
	(0,682)	(0,763)	(0,779)	(0,000)	(0,001)	(0,000)
INDMEAN	0,129*	(0,200)	0,164**	0,047	0,087	-0,036
	(0,056)	(0,179)	(0,011)	(0,563)	(0,330)	(0,675)
INFL	-0,003	-0,001	-0,022	0,005	0,006	0,003
	(0,228)	-0,477	(0,645)	(0,310)	(0,139)	(0,718)
GDPGROW	-0,000	-0,001	0,007	-0,001	-0,001	0,005
	(0,618)	(0,255)	(0,877)	(0,773)	(0,559)	(0,328)
CORRUP	-0,029**	-0,024**	0,013	-0,011	0,001	0,011
	(0,021)	(0,021)	(0,807)	(0,611)	(0,936)	(0,627)
INVPRO	0,006	-0,004	0,03	0,009	0,011	0,031***
	(0,518)	(0,679)	(0,981)	(0,421)	(0,294)	(0,007)
STOCKMDEV	0,031***	0,010	0,001	0,041*	0,039**	0,162***
	(0,005)	-0,306		(0,061)	(0,039)	(0,010)
BONDMDEV	0,372*	0,269	omitted	0,118	0,099	omitted
	(0,056)	(0,100)		(0,462)	(0,427)	
TAXG	omitted	omitted	omitted	omitted	omitted	omitted
DEVECON	omitted	omitted	omitted	omitted	omitted	omitted
Constant	-0,061	-0,161	omitted	-0,071	-0,192	omitted
	(0,490)	(0,187)		(0,781)	(0,431)	
Nr. of observations	3559	3559	2551	1789	1789	1427

***is significant at 1% **is significant on 5% *is significant on 10%.

Speed of adjustment for different legal systems

Table A5. Common Law

Table A5shows the detailed regressions for common law firms. We use the partial adjustment model (equation 5) to calculate our coefficients. Speed of adjustment (λ) is calculated by 1- Leverage (-1). The p-values are reported below each coefficient.

$$\mathrm{TOTDEBT}_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)\left(\mathrm{TOTDEBT}_{i,t-1}\right) + \delta_{i,t}$$

Common law	OLS	BC
TOTDEBT-1	0.811***	0.773***
	(0.000)	(0.000)
PROF-1	-0.024*	-0.030*
	(0.088)	(0.0612)
SIZE-1	0.007***	0.009***
	(0.000)	(0.000)
TANG-1	-0.007	-0.014*
	(0.355)	(0.0620)
GROWTH-1	0.004	-0.024***
	(0.486)	(0.002)
NDT-1	0.025	0.010
	(0.486)	(0.829)
INDMEAN-1	0.132***	0.151***
	(0.001)	(0.000)
Constant	-0.058***	omitted
	(0.008)	-
R-squared	0.756	-
Number of observations	3398	3678

***is significant at 1% **is significant on 5% *is significant on 10%.

Table A6. Socialist Law

Table A6 shows the detailed regressions for Socialist law firms. We use the partial adjustment model (equation 5) to calculate our coefficients. Speed of adjustment (λ) is calculated by 1- Leverage (-1). The p-values are reported below each coefficient.

$$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)(TOTDEBT_{i,t-1}) + \delta_{i,t}$$

Socialist law	OLS	BC
TOTDEBT-1	0.817***	0.771***
	(0.000)	(0.000)
PROF-1	-0.079***	-0.260***
	(0.004)	(0.000)
SIZE-1	0.003**	0.006***
	(0.045)	(0.000)
TANG-1	-0.020	-0.106***
	(0.200)	(0.000)
GROWTH-1	-0.003	-0.005
	(0.777)	(0.395)
NDT-1	-0.179*	omitted
	(0.096)	
INDMEAN-1	0.102*	0.068*
	(0.073)	(0.735)
Constant	0.029	omitted
	(0.408)	-
R-squared	0.696	-
Number of observations	2741	3678

***is significant at 1% **is significant on 5% *is significant on 10%.

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Table A7. French Civil Law

Table A7 shows the detailed regressions for French civil law firms. We use the partial adjustment model (equation 5) to calculate our coefficients. Speed of adjustment (λ) is calculated by 1- Leverage (-1). The p-values are reported below each coefficient.

$$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)(TOTDEBT_{i,t-1}) + \delta_{i,t}$$

French law	OLS	BC
TOTDEBT-1	0.850***	0.796***
	(0.000)	(0.000)
PROF-1	-0.110***	-0.170***
	(0.000)	(0.000)
SIZE-1	0.002**	0.001
	(0.036)	(0.468)
TANG-1	-0.006	-0.019***
	(0.461)	(0.009)
GROWTH-1	0.010**	0.009
	(0.038)	(0.127)
NDT-1	-0.117***	-0.065
	(0.007)	(0.138)
INDMEAN-1	0.167***	0.242***
	(0.000)	(0.000)
Constant	-0.011	omitted
	(0.647)	-
R-squared	0.750	-
Number of observations	4203	4737

***is significant at 1% **is significant on 5% *is significant on 10%.

Table A8. German Civil Law

Table A8 shows the detailed regressions for German civil law firms. We use the partial adjustment model (equation 5) to calculate our coefficients. Speed of adjustment (λ) is calculated by 1- Leverage (-1). The p-values are reported below each coefficient.

$$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)(TOTDEBT_{i,t-1}) + \delta_{i,t}$$

German law	OLS	BC
TOTDEBT-1	0.855***	0.860***
	(0.000)	(0.000)
PROF-1	-0.060***	-0.066***
	(0.001)	(0.001)
SIZE-1	0.004***	-0.002
	(0.000)	(0.147)
TANG-1	0.011	0.013
	(0.222)	(0.114)
GROWTH-1	0.018***	0.030***
	(0.005)	(0.001)
NDT-1	-0.010	0.019
	(0.780)	(0.445)
INDMEAN-1	0.134*	0.049
	(0.068)	(0.490)
Constant	-0.049	omitted
	(0.218)	
R-squared	0.768	-
Number of observations	2970	2932

***is significant at 1% **is significant on 5% *is significant on 10%.

Table A9. Scandinavian Civil Law

Table A9 shows the detailed regressions for Scandinavian civil law firms. We use the partial adjustment model (equation 5) to calculate our coefficients. Speed of adjustment (λ) is calculated by 1- Leverage (-1). The p-values are reported below each coefficient.

$$TOTDEBT_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)(TOTDEBT_{i,t-1}) + \delta_{i,t}$$

Scandinavian law	OLS	BC
TOTDEBT-1	0.759***	0.681***
	(0.000)	(0.000)
PROF-1	-0.071***	-0.156***
	(0.004)	(0.000)
SIZE-1	0.002	0.001
	(0.171)	(0.787)
TANG-1	0.004	0.013
	(0.780)	(0.298)
GROWTH-1	0.005	-0.026*
	(0.591)	(0.054)
NDT-1	0.008	-0.183**
	(0.869)	(0.0128)
INDMEAN-1	0.161	0.309***
	(0.143)	(0.009)
Constant	0.015	omitted
	(0.789)	
R-squared	0.626	-
Number of observations	1501	1642

***is significant at 1% **is significant on 5% *is significant on 10%.