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Department of Economics
University of Munich

Volkswirtschaftliche Fakultät
Ludwig-Maximilians-Universität München

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Determinants of Capital Structure in Non-Financial Companies*

Fabian Kühnhausen† and Harald W. Stieber‡

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Abstract

In this paper, we evaluate firm-, industry- and country-specific factors determining a firm's capital structure. The empirical validity of several capital structure theories has been ambiguous so far. We shed light on the main drivers of leverage and depict differences in industry and country characteristics.

Using a short panel data set with a large cross-section, we are able to show that firm size, industry leverage, industry growth and tax shield positively affect leverage ratios, while profitability and liquidity have negative impacts. Moreover, our model is an improvement over Rajan and Zingales' (1995) four-factor core model in terms of explaining data variation. The results are robust against different panel estimators, decompositions and over time.

JEL Codes: F36, G14, G15, G18, G32
Keywords: Capital Structure, Non-Financial Companies, Pecking Order Theory, Trade-off Theory

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†Doctoral Fellow at the International Max Planck Research School for Competition and Innovation (IMPRS-CI) and PhD candidate at Ludwig Maximilian University of Munich. Contact address: Max Planck Institute for Innovation and Competition, Marstallplatz 1, 80539 Munich, Germany, email: fabian.kuehnhausen@imprs-ci.ip.mpg.de.

‡Senior Economist at the Department for Economic Analysis of Financial Markets, Directorate-General for Internal Market and Services, European Commission.
Contact address: European Commission - DG Markt, Rue Spa 2, 1049 Brussels, Belgium email: harald.stieber@ec.europa.eu.

1 Introduction

A recent comprehensive review of structural issues related to corporate finance and economic activity for the Euro Area has pointed to the potential impact of capital structure choices for the financial stability and economic performance of the economy as a whole.[1] In the present study, using a large set of data, we investigate the determinants of funding choices of firms in order to create a solid starting point for further research into access to finance and financial stability questions. In doing so, we take the view that analyzing capital structure choice can inform macro- and micro-prudential policies despite the fact that empirical evidence supports both main capital structure theories (pecking order theory and trade-off theory). We find very similar econometric results as in ECB (2013) as to which firm-specific factors determine (i) the potential use of external funding by non-financial companies (NFCs) and (ii) its degree (leverage), but we extend the discussion by analyzing the impact of additional industry- and country-specific factors.

A stylized fact that motivates our inquiry is the pronounced cross-country variation in NFCs' leverage ratios. Apparently different models of funding structure are compatible with comparable levels of economic activity and well-being. However, leverage ratios within an industry sector seem to follow strong path dependence. At the end of the 1980s the bank-financed German and Japanese models were considered the most sustainable, where banks took important stakes in non-financial (manufacturing) industries and thus had their incentives aligned with the long-term funding needs of research and development intensive sectors. During the 1990s the Japanese

[1] See ECB (2013), page 13.

model became infamous for its "zombie" banks[2] while Germany's costly reunification created a structural break in the economic data for a number of years. At present a new mantra of a well-diversified funding structure is developed in light of the recent financial crisis. However, Germany and some other European economies have done well with NFCs using mainly financing intermediated by banks rather than capital markets.[3] In this context we find it intriguing that among the two major theories that try to explain NFCs' capital structure choices, the pecking order theory seems to better allow for country heterogeneity along the leverage dimension as compared to the trade-off theory.

We build on Rajan and Zingales (1995) and subsequent empirical studies. In addition to the firm-specific factors they have identified, we further investigate which other industry-specific and institutional factors affect capital structure choices. Based on a short panel with a very large cross-section, we can show that firm size, industry leverage, industry growth and tax shield positively affect leverage ratios, while profitability and liquidity have negative impacts. Furthermore, tangibility has a positive impact on leverage for those firms that use long-term debt financing. In addition, we find a strong impact of international capital flows. The results are robust against different panel estimators, decompositions and in yearly cross sections.

The paper is structured as follows. First, we discuss previous literature in the area. In Sections 3 we introduce the data and variables used in our

[2] A zombie bank is a financial institution with negative net worth. They continue to operate as a result of government support that allow these banks to meet debt obligations and avoid bankruptcy.

[3] Accordingly, Aoki and Nikolov (2012) identify this possibility of a stable bank-financed economy and a possible increase in systemic risk as capital markets expand and diversify.

empirical study. Section 4 presents the empirical analysis. In Section 5 we discuss the analytical results, while Section 6 concludes the paper.

2 Literature Review

The determinants of differences in capital structures have been the subject of theoretical as well as empirical research over the past few decades.

2.1 Capital Structure Theories

Theoretical underpinnings go back to Modigliani and Miller (1958) who propose that the capital structure does not affect firm value in a tax-free, full-information, no-agency world. However, given more realistic assumptions about the market in which firms compete for external financing, theoretical papers in the recent literature on capital structure suggested a vast number of dynamics and intuitions.[4] Two main theories prevail. First, the trade-off theory by Kraus and Litzenberger (1973) assumes that an optimal capital structure exists for every firm at any point in time. It postulates that firms trade off tax advantages from debt against refinancing risk where the optimal debt-equity mix depends on tax and bankruptcy codes.

Second, the pecking order theory by Myers and Majluf (1984) and Myers (1984) is based on information asymmetries between companies and investors. Here, firms do not have target leverage ratios but instead consider capital costs and access to finance in order to determine their leverage. Given increasing costs with rising information asymmetries, firms first make use of internal funds such as retained earnings before acquiring debt and lastly,

[4]For an overview of capital structure choice theories including trade-off theory, pecking order theory, market timing theory, cash flow theory and agency theory see Myers (1977, 2001), Goldstein et al. (2001), or Bhamra et al. (2010).

new equity. Bertomeu et al. (2011) show that both a firm's present capital structure and its disclosure policy determine its capital costs.[5]

2.2 Empirical Evidence

Empirical assessments of capital structures have started with research into firm characteristics by Rajan and Zingales (1995). In a cross-sectional study of G7 countries they find four relevant firm level-drivers for leverage - firm size, firm growth opportunities, tangibility and profitability. Moreover, they show that inter-country differences are small. Faulkender and Petersen (2006) and Brav (2009) add to that list two other important factors, age and access to finance. The former examine US firms over two decades and show that access to finance is positively related to leverage while the latter analyzes UK firms over one decade to find that private firms are more levered and leverage restructuring is closer related to firm performance. One intuition is that private equity is more costly than public equity due to information asymmetries.[6]

More recently, studies have also included industry drivers of leverage. Almazan and Molina (2005), MacKay and Phillips (2005), Faulkender and Petersen (2006), Brav (2009), Frank and Goyal (2009) and Degryse et al.

[5] A series of studies test the aforementioned two main capital structure theories. Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) specifically analyze projections from both theories and find evidence in favor of a dynamic trade-off theory in line with Goldstein et al. (2001) but most of the statistical tests employed have weak power.

[6] Bharath et al. (2009), Brav (2009), Huang and Ritter (2009) and Bharath and Dittmar (2010) analyze the implications of information asymmetries on capital structure choice and discuss the decision on security issuance in discrete choice models. For US and UK firms, they find that larger information asymmetries drive leverage and that macroeconomic conditions, market timing and the speed of adjustment towards target leverage ratios are important in a firm's decision to issue securities. De Jong et al. (2011) point out that the pecking order theory better explains levels of debt while the trade-off theory predicts debt issuance and repurchase decisions. In earlier work, Whited and Wu (2006) build a structural model to construct an index for financial constraints of firms based on how information asymmetries impact certain firm characteristics.

(2012) find that inter- and intra-industry effects are important determinants of individual leverage ratios for Dutch, UK and US firms.[7] They are able to show that the effects of firm characteristics on capital structures significantly differ across industries. Chen and Yu (2011) investigate multinational corporations and find significant industry-fixed effects, export intensity, and foreign direct investment which drive capital structure choice. In their study on small Italian firms La Rocca et al. (2011) find that capital structure choice also depends on a firm's business life cycle and subsequently, on growth patterns within industries. Including industry-specific factors in the analysis can also serve as proxy for target leverage ratios and account for correlated but omitted variables.

A third group of studies analyzes the effects of institutional and country factors on capital structure choices. Antoniou et al. (2008), Psillaki and Daskalakis (2009), Frank and Goyal (2009), Fan et al. (2012), Öztekin and Flannery (2012) and Köksal et al. (2013) include a country's legal and financial traditions, inflation, GDP and capital flows in their analyses on G5 countries, Southern Europe, 39 developing and developed countries, and Turkey, respectively. They find that differences in capital structures reflect differences in the economic environment, specifically varying degrees of exposure to capital markets, tax systems, institutions, macroeconomic conditions and corporate governance practices. Whenever such country-specific factors are common, firms determine their capital structure in similar ways.

Two caveats arise from previous empirical research with respect to capital

[7] Some of these studies make use of a very detailed level of data where they use factors such as CEO tenure and compensation, and industry-specific risk hedging for which we do not have data.

structures. First, a series of papers shows that in order to thoroughly assess time-series patterns in leverage ratios, a long time dimension (typically a couple decades) in a dynamic panel model is needed and a common GMM estimator is outperformed by a long-differencing estimator.[8] However, this very much restricts the longitudinal dimension of the data employed, to few industries or few countries. Second, different results from empirical analyses have often been attributed to sample selection bias.[9] Most studies restrict themselves to only a handful of countries or only a few industries. To our knowledge, only recent papers have investigated and compared the impact of industry and country characteristics.[10] However, the industry composition within countries as well as institutional factors vary a lot and can explain the different findings.

Our contribution is thus twofold. First, we tackle the sample selection problem by analyzing a data set with a very large European cross-section, i.e. in the number of firms, of industries and of countries, with respect to firm size and the inclusion of USA and Japan as comparisons. Second, we augment the existing panel analyses with firm-, industry- and country-specific variables that can explain more of the variation in the data on capital structure. Because we only have a short panel data set, we cannot analyze the aforementioned dynamic aspect of capital structure choice, but we show that for the short time period we analyze the data is stationary and our results

[8] Compare Antoniou et al. (2008), Huang and Ritter (2009), Denis and McKeon (2012), and Öztekin and Flannery (2012).

[9] While Faulkender and Petersen (2006), Fan et al. (2012) and Köksal et al. (2013) support the trade-off theory, Brav (2009), La Rocca et al. (2011) and Degryse et al. (2012) support the pecking order theory.

[10] Compare Psillaki and Daskalakis (2009), Frank and Goyal (2009), Degryse et al. (2012), Fan et al. (2012) and Köksal et al. (2013). They are able to show that the importance of capital structure determinants goes from firm-specific to country to industry-specific effects. They show this with (i) the goodness-of-fit of their models and (ii) the size of coefficients of the regressors in their models.

are robust in yearly regressions. Our study provides strong indications that corporate taxation needs to be part of macro-prudential policy for international capital markets in view of the strong effects of national tax codes on leverage ratios.

3 Data

This section explains the (i) data set as well as (ii) definitions and hypotheses to be tested in our empirical analysis.

3.1 Sample

The data set measures capital structures in Europe, Japan and the USA from 2003 until 2012. For firm-level data, we use the ORBIS database[11] which contains company information for unlisted and listed companies. We include firms with either revenue above EUR 1 million, assets above EUR 2 million, or more than 15 employees. Macroeconomic data comes from the World Development Indicators of the World Bank. We identify different industries by using the two-digit industry codes of the European NACE Rev. 2 classification.[12]

We clean the data from coding errors and outliers, and perform some plausibility checks. Any observations with missing data or implausible values for variables (e.g. negative revenues) are dropped. We adjust the data to keep only observations with leverage ratios in the interval [0,1], profitability

[11] The data were kindly provided by the European Commission under a license agreement with Bureau van Dijk.

[12] We exclude firms with missing industry codes and firms operating in agriculture, mining, financial services, public services, education, health, entertainment and other services which constitute NACE Rev. 2 classification sections A, B, K, O, P, Q, R, S, T, and U.

within [-1,1], tangibility and liquidity in [0,1].[13] Firm growth is capped at 100%, i.e. a doubling of revenues from year to year. The final sample is an unbalanced panel of 1,189,708 firms with 6,365,842 firm-year observations. We do not have 10 years of data for all firms because each year some firms enter or exit the sample.

3.2 Variables and Hypotheses

We use three different measures for the capital structure of firms in our analysis: short-term, long-term and total debt over total assets, respectively, determined with book values.[14] Rajan and Zingales (1995) demonstrate that ratios of liabilities to assets are an appropriate measure widely adopted for financial leverage of companies as they serve as a proxy for what is left for shareholders in case of liquidation.[15] On the other hand, the data set consists of three different groups of independent variables: firm characteristics, industry-specific parameters and country-specific variables.[16]

3.2.1 Firm-specific Factors

Firm Size One of the key determinants of leverage is firm size. Larger firms are usually more established in their markets, diversified and less likely to fail. Therefore, it has been argued that size can be seen as an inverse

[13] Section 3.2 provides definitions and shows why these are reasonable boundaries.

[14] In accordance with common nomenclature, short-term debt is any debt payable within one year. Long-term debt is any liability exceeding one year in maturity.

[15] Subsequent studies have followed this approach while other definitions include market values of equity or assets in the denominator (e.g. Shyam-Sunder and Myers (1999), Welch (2004), Faulkender and Petersen (2006), Antoniou et al. (2008), Frank and Goyal (2009)) as a result of the critic against book measures being backward looking. In addition, some studies have used interest coverage or debt maturity to measure leverage of firms (Rajan and Zingales (1995), Welch (2004), Frank and Goyal (2009), Fan et al. (2012)).

[16] See Table A1 in the Appendix for complete descriptions of the variables used here. All financial data is in thousand EUR. Table A2 provides an overview of the distribution of data along several dimensions.

measure of bankruptcy risk. To avoid problems of multicollinearity we use the logarithm of revenues to measure firm size since several of the ratios used in our analyses are in terms of assets. Revenues and total assets are highly correlated.[17] The pecking order theory is ambiguous but the trade-off theory postulates that leverage is positively affected by firm size as shown in most of the empirical studies.

Firm Growth Future business prospects of a company represent another important leverage factor (Rajan and Zingales (1995)). How firms react to investment opportunities determines their profitability and status in their respective markets. In order to mitigate problems of multicollinearity we use growth rates in revenues to measure firm growth since several of the ratios used in our analyses are in terms of assets.[18] While the pecking order theory predicts a positive relation to leverage, the trade-off theory assumes a negative relation. Results from previous literature are mixed.[19]

Profitability More profitable firms usually generate more cash flows and firms generally prefer to finance projects with internal funds. Since retained earnings increase with higher profits, the need for debt financing decreases with higher profitability.[20] In line with Frank and Goyal (2009),

[17] While Rajan and Zingales (1995), Psillaki and Daskalakis (2009), and Köksal et al. (2013) use revenues as a proxy for size, Frank and Goyal (2009), La Rocca et al. (2011), Degryse et al. (2012) and Fan et al. (2012) use data on assets.

[18] Although Brav (2009), La Rocca et al. (2011) and Köksal et al. (2013) use percentage changes in sales, Frank and Goyal (2009), Chen and Yu (2011) and Degryse et al. (2012) use growth in terms of assets.

[19] Brav (2009) and Degryse et al. (2012) find a positive coefficient, while Rajan and Zingales (1995), Faulkender and Petersen (2006) and Fan et al. (2012) find a negative coefficient in their respective analyses.

[20] Causality may vary, however, with younger firms or otherwise financially constrained firms being required to achieve higher profitability in order to access external finance. Still, informational asymmetries where firms have private knowledge about the true value of their assets and firm growth opportunities could explain a wide range of cases.

Psillaki and Daskalakis (2009), and Chen and Yu (2011) we define profitability as earnings before interest and taxes (EBIT) over total assets. While the trade-off theory is ambiguous, the pecking order theory predicts a negative relation as is the consensus in the literature.

Tangibility We define tangibility as the share of fixed assets to total assets. The larger the fraction of fixed assets on a firm's balance sheet, the more assets it can pledge as collateral against debt which diminishes the agency costs borne by the investor. Also, liquidation values ought to be higher and easier to determine. Thus, it should be easier for a firm with more tangible assets to acquire loans. Both capital structure theories predict a positive relation between tangibility and leverage.

Liquidity Firms with less liquidity may find it harder to attract debt as costs of contract enforcement (including during possible insolvency proceedings) increase. Numerous definitions exist. We use cash equivalents over total assets as a proxy for firms' capacity to demand payments from their debtors while holding off on their creditors. Both theories are ambiguous about the expected relation to leverage but Brav (2009) and Köksal et al. (2013) have found a negative coefficient.

Nickell Criterion This factor comes from Nickell and Nicolitsas (1999) and measures financial stress of a company in terms of how much of its cash flow is spent to cover debt expenses. Specifically, this flow measure allows to capture the impact of interest rate changes on debt[21].

[21] While this ratio is potentially interesting from a monetary policy and macro-prudential point of view, it does not have explanatory power in our model.

3.2.2 Industry-specific Factors

Industry Leverage In accordance with Frank and Goyal (2009), Degryse et al. (2012) and Köksal et al. (2013), we measure industry trends with median leverage ratios by grouping firms with the same two-digit industry classification codes. Early work by Harris and Raviv (1991) already suggests a strong relationship between industry affiliation and leverage ratios and highlights existing differences across industries but consistency within them. The trade-off theory supposes that inter-industry effects exist as the optimal leverage ratio may differ across industries. Also, the effects of aforementioned firm characteristics may vary across industries. The pecking order theory does not offer a clear prediction. Moreover, intra-industry effects can arise from competition and agency conflicts within a market. Firms may face higher pressure to assert to the optimal leverage ratio in more competitive situations while increasing leverage might deter takeover attempts or signal firm stability. Empirical evidence shows a strong positive relation between industry and individual firm leverage.

Industry Growth To account for industry-specific demand shifts, we also measure the development of an industry with median growth rates across groups of firms with the same two-digit industry classification codes. La Rocca et al. (2011) find a positive relationship with leverage ratios.

3.2.3 Macroeconomic Factors

Taxation We also measure the impact of a country's fiscal treatment of debt financing. Data on tax payments per firm comes from the ORBIS database. Taxes affect the size of the tax shield for debt financing and they can impact the amount of retained earnings and the dividend policy of a

firm. These impacts tend to favor higher leverage ratios. Faulkender and Petersen (2006), Degryse et al. (2012), Fan et al. (2012), Köksal et al. (2013) and Feld et al. (2013) have shown that an effective debt interest tax shield is positively related to leverage. The pecking order theory is ambivalent about taxation, while the trade-off theory predicts a positive relation between tax shield and leverage ratios. As a proxy for the tax shield per country we compute the actual tax savings for firms with long-term debt compared to firms without long-term debt.

Inflation Following Frank and Goyal (2009), Fan et al. (2012) and Köksal et al. (2013) we include changes in consumer prices.[22] Rising inflation decreases the relative value of debt. Also, tax deductions from debt financing are more valuable when inflation is expected to be higher. Frank and Goyal (2009) and Köksal et al. (2013) find a positive relation between inflation and leverage which is in line with the trade-off theory.

GDP Growth The business cycle also has a profound impact on capital structures. During times of economic prosperity collateral values increase and debt financing becomes easier. Agency problems between firms and investors become more severe in economic downturns. However, internal funds of firms generally increase in economic expansion so that according to the pecking order theory firms might make less use of debt financing. Whited and Wu (2006) find that financially constrained firms' cost of financing diminishes with the duration of the economic upswing. Thus, leverage could be either pro-cyclical or counter-cyclical. Frank and Goyal (2009) find a positive relation while Köksal et al. (2013) find a negative one.

[22]Data for this factor and subsequent macroeconomic factors comes from the World Development Indicators, World Bank.

Capital Flows Antoniou et al. (2008), Fan et al. (2012) and Köksal et al. (2013) argue that developments in capital markets are important to determine firm-level capital structures. Hereby, the size and structure of national capital markets depends heavily on the international allocation and dispersion of capital. Thus, we include a measure for capital flows in our analysis. This takes on positive values whenever money is flowing into a country, effectively representing an increase of foreign ownership of domestic assets. The factor is negative whenever money is flowing out of the country suggesting that a country increases its ownership of foreign assets. Antoniou et al. (2008) and Köksal et al. (2013) find a positive relation between capital flows and leverage.

Unemployment As another business cycle indicator and to account for developments in labor markets, we include the fraction of work force that is unemployed by drawing from World Bank accounts.

Stock Prices We also want to take into consideration how expensive equity for public firms is. Thus, we include data on Standard & Poor's Global Equity Indices collected by the World Bank which measure the performance of various stock exchanges around the world. Welch (2004), Antoniou et al. (2008) and Frank and Goyal (2009) argue that the effect of changing stock prices on capital structure may reflect overall growth prospects, relative price changes in asset classes or differences in agency costs. Firms may take advantage of mispricing in stock markets to reduce their capital costs. Thus, capital structure theories predict and empirical analyses confirm that stock price development and leverage ratios are negatively related.

4 Empirical Analysis

This section explores the determinants of capital structures of NFCs empirically. We first provide (i) a description of the data and then (ii) present the empirical model specification.

4.1 Descriptive Statistics and Properties

Observations are evenly distributed over the time period investigated here. About two thirds of the companies in our sample have between five to eight observations while 25% of firms have eight or more consecutive observations. Some countries like France, Italy and Spain have a large number of data points while we cautiously also include countries with few observations in our sample, like Cyprus, Liechtenstein, Lithuania, Montenegro and Malta. Figure 1 shows the three leverage ratios and their behavior over time. Weak time trends are visible. Long-term leverage seems to increase continuously, while short-term leverage seems to decrease over our sample period which covers after all a full business cycle from trough to trough.

Figure 1: Leverage Ratios over Time

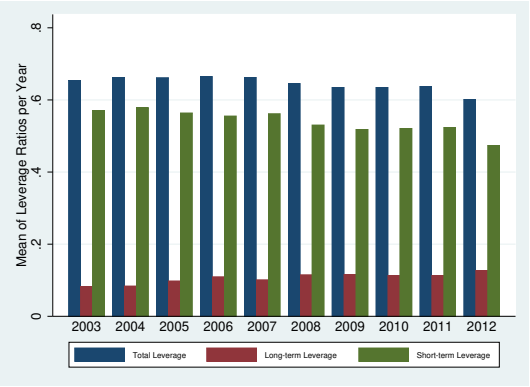


Table 1a provides an overview of the summary statistics of the variables introduced in Section 3.2. It shows that there exists great heterogeneity among

firms in terms of size, growth and profitability as well as large differences across industries and countries. Generally, variances of our variables are quite large. Industry- and country-specific factors are less volatile. Across the sample, firms hold on average 65% debt in terms of total assets. Notably, we find that 40% of the firms in our sample do not hold any long-term debt and subsequently, short-term debt accounts for approximately 84% of total debt. For most variables, mean and median are close, except for firm-level growth and liquidity where we have only a few high-growth companies and only a few firms with large cash reserves.

Table 1a: Summary Statistics of Variables

Variable	**Mean**	**Median**	**Std. Dev.**	**Min.**	**Max.**
St LR	0.545	0.561	0.267	0	1
Lt LR	0.105	0.005	0.181	0	1
Total LR	0.650	0.696	0.249	0	1
Firm Size	7.824	7.681	1.808	0	20.457
Firm Growth	0.393	0.058	3.048	-1	100
Profitability	0.080	0.056	0.127	-1	1
Tangibility	0.329	0.249	0.282	0	1
Liquidity	0.127	0.059	0.164	0	1
Nickell	0.293	0.059	43.068	-18505	83094
St Ind. LR	0.548	0.579	0.108	0.164	0.745
Lt Ind. LR	0.020	0.006	0.029	0	0.325
Total Ind. LR	0.693	0.694	0.053	0.381	0.821
Ind. Growth	0.058	0.065	0.057	-0.288	0.244
Tax Shield	0.005	0.005	0.005	0	0.063
Inflation	2.807	2.166	2.789	-4.480	25.296
GDP Growth	1.359	1.725	3.089	-17.955	12.233
Capital Flows	0.003	0.001	0.005	-0.020	0.042
Unemployment	8.806	8.400	3.479	2.300	37.300
Stock Prices	9.072	13.076	35.392	-82.190	189.230

Notes: N=6,365,842. See Table A1 in the Appendix for definitions of the variables. All variables are ratios, growth rates or logarithms.

We can also compare leverage measures, our explanatory variables as well as balance sheet data and items from the profit-and-loss statement (P&L) across countries. Table 1b depicts the differences for eight major countries in our sample. We find substantial variation in overall capital structure choice, e.g. Italy versus the USA, and in debt maturity, where e.g. Italy and Poland have very small shares of long-term debt to total debt. For our explanatory variables, differences are substantial across countries. While large firms are located in Japan and the USA, Southern European firms have the highest growth rates.

Table 1b: Cross-country Comparison of Variables

	Germany	**UK**	**France**	**Italy**	**Spain**	**Poland**	**USA**	**Japan**
Leverage Measures								
Total LR	0.683	0.605	0.638	0.752	0.608	0.538	0.468	0.542
Long LR	0.241	0.115	0.057	0.077	0.165	0.071	0.142	0.115
Short LR	0.441	0.489	0.582	0.675	0.442	0.468	0.325	0.428
Explanatory Variables								
Firm Size	9.534	9.621	7.914	7.609	7.478	8.582	11.534	12.209
Firm Growth	0.242	0.191	0.207	0.442	0.485	0.289	0.418	0.078
Profitability	0.099	0.080	0.095	0.057	0.062	0.108	-0.007	0.046
Tangibility	0.337	0.358	0.253	0.297	0.365	0.409	0.471	0.441
Liquidity	0.115	0.123	0.190	0.080	0.124	0.108	0.222	0.179
Nickell	1.123	0.386	0.039	0.467	0.314	0.093	0.129	-0.239
Total Ind LR	0.680	0.683	0.696	0.693	0.703	0.684	0.639	0.669
Long Ind LR	0.018	0.019	0.016	0.024	0.021	0.020	0.012	0.014
Short Ind LR	0.538	0.541	0.572	0.534	0.547	0.542	0.516	0.543
Ind Growth	0.058	0.061	0.060	0.054	0.059	0.055	0.068	0.066
Tax Shield	0.009	0.007	0.004	0.004	0.007	0.004	0.002	0.009
Inflation	1.583	2.638	1.725	2.093	2.740	2.983	2.508	-0.127
GDP Growth	1.331	1.349	1.124	0.100	1.661	4.504	1.594	0.821
Capital Flows	-0.001	0.002	0.001	0.001	0.006	0.013	0.001	-0.001
Unemployment	8.481	6.093	8.716	7.576	13.158	11.738	6.615	4.523
Stock Prices	12.191	6.399	5.617	-1.458	11.807	11.465	5.969	6.775
Balance Sheet Items								
Cash Equiv	8068.503	11702.990	2047.225	946.198	1256.842	1508.315	218442.600	168741.100
Fixed Assets	60300.030	96672.770	12213.010	8161.040	9431.051	11214.540	1473932.000	875690.600
Total Assets	109880.300	216787.300	21981.900	16159.260	16731.570	18411.120	2179010.000	1543776.000
Short-term Debt	54035.410	126398.900	11882.790	8756.929	6814.443	7626.083	843778.800	681131.500
Long-term Debt	22638.130	35025.690	3285.930	2507.065	4303.499	1741.117	479997.300	301391.200
Shareholders Equity	33206.710	55362.690	6813.181	4895.263	5613.629	9043.921	855233.800	561253.500
P&L Items								
Revenue	142291.500	145428.500	20566.370	12709.050	12576.800	22002.590	1937623.000	1365154.000
EBITDA	108796.740	14736.450	2014.106	1550.000	1468.947	2270.105	295891.000	146243.300
EBIT	6157.123	9343.033	1233.255	700.344	944.808	1377.137	199215.600	75171.620
Interest	1370.790	6.085	198.418	169.235	131.706	143.710	23221.590	9429.621
Tax Payments	1600.950	2445.634	295.732	258.056	208.171	237.148	56685.990	28232.310
Net Income	3043.198	6891.314	739.105	273.053	605.034	996.280	119308.000	37509.690

Notes: Mean Values per Country. See Table A1 in the Appendix for definitions of the variables. Factors used in regression analyses are ratios, growth rates or logarithms. Balance sheet and P&L items are in thousand EUR.

Profitability is generally low.[23] Tangibility and liquidity are highest for US firms while industry-specific factors are similar. Macroeconomic conditions differ as well, naturally. The composition of firms' balance sheets and P&L statements shows that considerable differences in levels exist. We also find that large firms from Japan and the USA are overrepresented in our sample as country-average levels of balance sheet items vastly exceed those of European firms. This may also explain the significantly lower leverage ratios for US and Japanese firms in the data set.

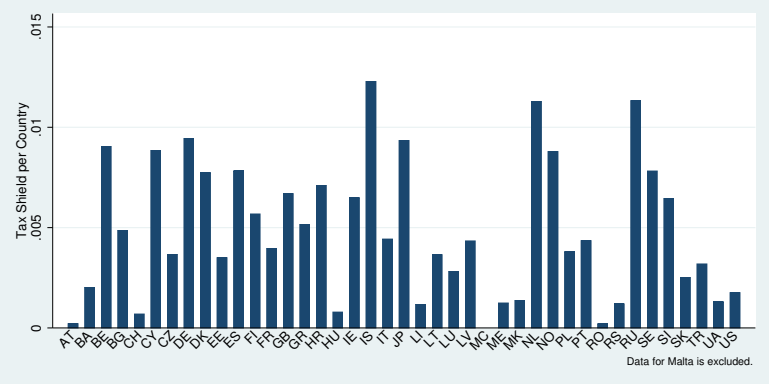
A decomposition of Rajan and Zingales' (1995) four main drivers of leverage reveals great differences across industries and countries.[24] Large firms exist predominantly in Russia, USA, Japan and Switzerland, while most small firms exist in Southern and Eastern Europe. Large firms are mainly operating in the industry clusters electricity, gas and water supply as well as manufacturing. Firms with high growth rates are located in Eastern Europe and active in electricity, gas and water supply as well as ICT and research. The most profitable firms exist in Northern Europe and respectively, in industry clusters ICT and research and services. Most firms show low profitability. About 98% of observations lie within the interval [-0.5,0.5] and about 83% of the data points are within one standard deviation away from the overall mean (0.08). Finally, firms with the largest share of fixed assets are located in Switzerland, Cyprus and Denmark and are active in accommodation and food as well as electricity, gas and water supply.

[23]For the USA, some firms experience significant losses over our sample period which explains the negative average profitability, but the median of profitability for US firms in our sample is 0.057.

[24]For brevity we relegate these Figures A1a, A1b, A2a, A2b, A3a, A3b, A4a and A4b to the Appendix.

Notably, the tax shield differs significantly among countries as depicted in Figure 2 with Iceland, the Netherlands and Russia providing the highest tax incentives for debt financing.[25] Because we compute both the tax shield and the firm-specific factors relative to total assets, we can compare level effects of our variables. Remarkably, the level of most tax shields is much smaller than those of the firm-specific factors. While e.g. profitability, tangibility and liqudity have means 0.080, 0.329 and 0.127, respectively, tax shield has a mean value of 0.005 as indicated in Table 1a. Hence, already small changes in the tax shield can have big impacts on firms' funding structure.

Figure 2: Tax Shield across Countries



Following the descriptives, a variety of univariate analyses provide a first glance at the variables' behavior and properties. Our explanatory variables are all correlated with the leverage ratios.[26] A F-test confirms joint significance. Furthermore, firm characteristics are correlated with each other and over time. We have carefully selected and computed our explanatory indicators with relatively low correlations from the vast group of available variables in the ORBIS database to avoid problems of multicollinearity. We

[25] We exclude Malta from this figure because it has only 221 observations and is considered as a tax haven within the EU. Hence, its average tax savings per firm is far above that from other countries.

[26] See Tables A3a and A3b in the Appendix.

find weak time trends given the data is stationary as indicated in unit root tests. Mann-Whitney U tests and t-tests show that the mean and variance of leverage ratios are significantly different across countries and industries. European firms hold more debt and in particular, firms located in the Euro Area. Investigating capital structure choice across industries, especially firms in trade and transportation have significantly different debt holdings from firms pursuing other economic activities. A robust version of the Wu-Hausman test by Wooldridge (2002) shows that fixed effects modeling is preferred over a random effects setup. Furthermore, Breusch-Pagan, Jarque-Bera and Breusch-Godfrey tests respectively show that the error terms are heteroskedastic, asymptotically normal and correlated with each other within panels.

4.2 Empirical Strategy

We regress firms' leverage ratios on firm characteristics and other controls following the approach of Rajan and Zingales (1995) who have identified four relevant factors for leverage (firm size, firm growth, profitability, tangibility) and that of related empirical studies such as Faulkender and Petersen (2006), Brav (2009), Frank and Goyal (2009), Psillaki and Daskalakis (2009), Degryse et al. (2012), Fan et al. (2012) and Köksal et al. (2013). They analyze similar questions and provide valid frameworks to assess capital structure choices.

Subsequently, we test the predictions of the pecking order vs. trade-off theory with a series of fixed effects panel regressions. Because of the data properties presented above, our baseline model specification is as follows.

$$L_{i,t} = \alpha_z + \beta X_{i,t-1} + \gamma Y_{s,t-1} + \rho Z_{k,t-1} + \delta_t + \epsilon_{i,t} \quad (1)$$

where indices i, s, k represent firms, industries and countries, respectively, and t stands for time. L is the leverage ratio per firm and period. We use here three measures that accordingly reflect short-term, long-term and total debt over total assets. X is the vector of firm characteristics while Y is the vector of industry-specific factors and Z is the vector of country factors. To reduce problems with endogeneity and to include all factors in the information set, we lag our independent variables by one time period. To account for firm heterogeneity and partial skewness in the data of some factors, we use only ratios or logarithms of our variables. The regression model also includes α_z with $z = \{i, s, k\}$ and δ_t to account for omitted firm-, industry- and country-specific effects and year fixed effects, respectively. As suggested by Petersen (2009), we employ two-dimensional clustering of our robust error term ϵ at firm-level and year-level. The asymptotically normal robust standard errors then account for heteroskedasticity and within-panel serial correlation.

5 Results

In this section we discuss the main results and perform a number of robustness checks. We also investigate subsamples and different industry and country charateristics.

5.1 Full Sample

In a first step, we assess the validity of our model specification to account for the data properties presented in Section 4.1. To do so, we compare the panel model set up in Section 4.2 with the three different leverage ratios. Table 2 provides the overview for that. In all regressions we include firm and year fixed effects as well as a constant but suppress their coefficients in the tables. In column 1 of Table 2 we analyze total leverage ratios, in column 2 we look at long-term leverage ratios and in column 3 we apply short-term leverage ratios as the dependent variable.[27] In separate analyses we employ industry and country fixed effects and find that the results do not change. We also run the regressions with the entire sample and with differences of firm leverage from industry median leverage as dependent variables and find qualitatively same results.[28]

For total leverage ratios we discover positive impacts on leverage from firm size, industry leverage, industry growth and tax shield, while profitability and liquidity have negative impacts. Industry-specific factors and capital flows turn negative for long-term leverage ratios. It seems that the business cycle affects long-term capital structure choice differently. On the other hand, tax shield turns negative for short-term leverage ratios, but we have

[27] In column 2 we only include firms that have long-term debt > 0 and in column 3 we only include firms that have short-term debt > 0.

[28] For brevity, we relegate these regressions to Tables A4, A5 and A6 in the Appendix.

Table 2: Baseline Results for Three Leverage Ratios

	(1)	(2)	(3)
Variables	**Total Leverage**	**Long-term Leverage**	**Short-term Leverage**
Firm Size	0.005***	0.001***	0.003***
	(0.000)	(0.000)	(0.000)
Firm Growth	0.001***	0.001***	0.000***
	(0.000)	(0.000)	(0.000)
Profitability	-0.159***	-0.062***	-0.128***
	(0.001)	(0.002)	(0.001)
Tangibility	-0.028***	0.103***	-0.103***
	(0.001)	(0.002)	(0.001)
Liquidity	-0.080***	-0.003**	-0.075***
	(0.001)	(0.002)	(0.001)
Nickell	0.000	0.000***	-0.000
	(0.000)	(0.000)	(0.000)
Total Ind. LR	0.144***		
	(0.008)		
Lt Ind. LR		-0.094***	
		(0.013)	
St Ind. LR			0.158***
			(0.007)
Ind. Growth	0.008***	-0.025***	0.031***
	(0.002)	(0.002)	(0.002)
Tax Shield	1.097***	1.504***	-0.421***
	(0.020)	(0.088)	(0.025)
Inflation	0.001***	-0.000	0.002***
	(0.000)	(0.000)	(0.000)
GDP Growth	0.001***	0.001***	0.000***
	(0.000)	(0.000)	(0.000)
Capital Flows	0.226***	-0.209***	0.465***
	(0.033)	(0.044)	(0.039)
Unemployment	-0.002***	0.002***	-0.002***
	(0.000)	(0.000)	(0.000)
Stock Prices	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y
Firm FE	Y	Y	Y
Constant	Y	Y	Y
Observations	3,265,810	1,794,355	3,263,935
Number of firms	887,514	596,868	887,197
R-squared	0.099	0.136	0.204

Notes: See Table A1 in the Appendix for definitions of the variables. Firm-level data and taxation comes from the ORBIS database. Data for macroeconomic factors comes from the World Bank. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

had no prediction for that relation here since the tax shield is zero for all firms with short-term debt only, and it only applies to firms with long-term debt. The variables firm size, profitability and liquidity provide consistent results across the three different leverage ratios.

In contrast to capital structure theories and most empirical studies, we also find a negative impact of tangibility on total and short-term leverage ratios. We would argue that this comes from the composition of our data set, namely the large majority of small firms.[29] The dominance of short-term debt in our data may reflect that especially small firms use only short-term debt instruments and that asset specificity makes it harder for firms to obtain cash against fixed assets. We hence argue that the trade-off between liquidity and fixed assets as well as the fact that cash equivalents cover short-term debt financing more adequately and reliably in the eyes of investors leads to the negative *beta* coefficient for tangibility for total leverage ratios.[30] For long-term leverage ratios, we find the expected positive coefficient. This is obvious as firms holding long-term debt use fixed assets as collateral against their long-term external financing.[31]

Surprisingly, financial stress, individual and country-specific growth potential as well as stock market developments do not play a role in capital structure choice. The coefficients for the Nickell criterion are not significant and

[29] Remember that about 40% of the firms in our sample do not hold any long-term debt and that short-term debt constitutes most of total liabilities held by firms. Firms that hold short-term debt only do not make use of capital markets, but rather employ overdraft and cash facilities for their external financing. Hence, tangibility is negatively correlated with size, growth, profitability, liquidity and positive related to country-level factors in our sample.

[30] As a robustness check, we also run a regression with an interaction term between firm size and tangibility and find the expected positive and significant coeffient. That is, a larger size allows firms to pledge more fixed assets as collateral against debt financing.

[31] Köksal et al. (2013) find the same dynamics.

the coefficients for firm-level and country-level growth as well as for Standard & Poor's Global Equity Indices are significant but economically not relevant.

In summary, we find that firm size, industry leverage, industry growth and tax shield positively affect leverage ratios, while profitability and liquidity have negative impacts. Our results are quite robust. We compare our regression model to different specifications with an estimator incorporating panel-specific AR(1)-disturbances, the Newey-West heteroskedasticity- and autocorrelation-consistent (HAC) estimator as well as the Driscoll-Kraay (1998) estimator accounting for heteroskedasticity, autocorrelation and spatial correlation and find similar results in terms of signs of coefficients and significance.[32] Our results also do not change for piecewise exclusion of data from USA, Japan, Norway and Switzerland.[33]

Year-by-year regressions show that the size of coefficients changes, but not the signs or significance, except for industry growth (changing signs) and capital flows for which the sign of the ρ coefficient turns negative in 2007, more so in 2009 and 2010. This reflects the reversal in international capital flows during this period. Tax shield coefficients become larger over time.[34] With our definition of tax shield as a share of total assets, we also capture valuation effects in balance sheets of firms. Overall, the yearly regressions indicate that our model is quite robust over time.

[32] We also run dynamic panel models and find qualitatively similar results in terms of significance and signs of coefficients although the goodness-of-fit of theses models is worse given that we work with a short panel with small T and very large N.

[33] These countries exhibit particular structural differences to the majority of the countries in our sample, e.g. a large group of MNEs in the US, the Japanese loose monetary policy, a large sovereign wealth fund owned by the Kingdom of Norway, or the large Swiss financial industry. Our results are not driven by influences of these particularities.

[34] This growing tax distortion merits future research in our view given the possible implications for macro-prudential policies.

We can compare our results to the capital structure theories and previous empirical studies on that matter. This is depicted in Table 3. We find similarities especially with Frank and Goyal (2009), Psillaki and Daskalakis (2009) and Köksal et al. (2013). Moreover, our model is an improvement over Rajan and Zingales' (1995) four-factor core model and subsequent specifications from other empirical studies in terms of explaining data variation.[35] We would argue that our findings, which are based on a much larger cross-section and on a much larger scale in terms of firm characteristics, ought to be more representative of the capital structure choices the average firm in a developed country makes.

[35] For brevity, we relegate the comparison of the different empirical capital structure models to Table A7 in the Appendix. We include in Table A7 only major changes between model specifications.

Table 3: Comparison of Theories and Literature regarding Determinants of Total Leverage Ratios

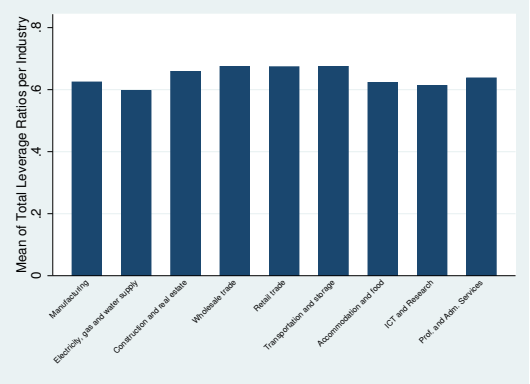
Variables	**Pecking Order Theory**	**Trade-off Theory**	**Rajan/ Zingales (1995)**	**Faulkender/ Petersen (2006)**	**Antoniou et al. (2008)**	**Brav (2009)**	**Frank/ Goyal (2009)**	**Psillaki/ Daskalakis (2009)**	**Chen/ Yu (2011)**	**La Rocca et al. (2011)**	**Degryse et al. (2012)**	**Fan et al. (2012)**	**Köksal et al. (2013)**	**Our Data**
Firm Size	?	+	+	-	+	+	+	+	-	+	+	+	+	+
Firm Growth	+	-	-	-	-	+	-	?	?	+	+	-	?	+
Profitability	-	?	-	-	-	-	-	-	-	-	-	-	-	-
Tangibility	+	+	+	+	+	+	+	-	+	+	+	+	+	-
Liquidity	?	?	n.a.	-	?	-	-	?	?	-	?	?	-	-
Nickell	n.a.	n.a.	n.a.	n.a.	-	n.a.	-	n.a.	n.a.	n.a.	+	n.a.	n.a.	?
Total Ind. LR	?	+	n.a.	+	n.a.	n.a.	+	n.a.	n.a.	n.a.	+	n.a.	+	+
Ind. Growth	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	+	n.a.	n.a.	n.a.	+
Tax Shield	n.a.	+	n.a.	+	+	n.a.	?	n.a.	n.a.	n.a.	+	+	+	+
Inflation	n.a.	+	n.a.	n.a.	n.a.	n.a.	+	n.a.	n.a.	n.a.	n.a.	-	+	+
GDP Growth	+	n.a.	n.a.	n.a.	n.a.	n.a.	+	n.a.	n.a.	n.a.	n.a.	+	-	+
Capital Flows	n.a.	n.a.	n.a.	n.a.	+	n.a.	n.a.	n.a.	+	n.a.	n.a.	+	+	+
Unemployment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-
Stock Prices	-	n.a.	n.a.	-	-	n.a.	-	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	?

Notes: +/- = sign of significant coefficients in respective regressions where total leverage ratio is the dependent variable, ? = theories are ambivalent or results are inconclusive (either coefficient is not significant or switching signs), n.a. = factor was not included in study

5.2 Industry Analysis

Furthermore, we check the robustness of our results for industry dynamics by analysing industry sectors separately. In accordance with ECB (2013), we cluster the two-digit industry codes of the European NACE Rev. 2 classification by their respective economic activity to nine different groups.[36] We then want to disentangle different industry dynamics by analyzing capital structure choice according to economic activity. Figures 3a and 3b show cross-sectional and time-series behavior of capital structures across industry clusters.

Figure 3a: Leverage Ratios across Industries



We find trade and transportation sectors with the highest leverage ratios on average, while electricity, gas and water supply use the least amount of debt. Over time, there is strong persistence in the capital structure choice within

[36] "Manufacturing" encompasses all firms from NACE Rev. 2 classification section C, "Electricity, gas and water supply" includes all firms from NACE Rev. 2 classification sections D and E, "Construction and real estate" groups all firms from NACE Rev. 2 classification sections F and L, "Wholesale trade" encompasses those firms from NACE Rev. 2 classification section G with two-digit industry codes 45 and 46, "Retail trade" includes those firms from NACE Rev. 2 classification section G with two-digit industry code 47, "Transportation and storage" groups all firms from NACE Rev. 2 classification section H, "Accommodation and food" encompasses all firms from NACE Rev. 2 classification section I, "ICT and research" includes all firms from NACE Rev. 2 classification section J and those from section M with two-digit industry code 72, and finally, "Professional and administrative services" groups all firms from NACE Rev. 2 classification sections M and N except those with two-digit industry code 72.

an industry, except for firms active in electricity, gas and water supply for which average total leverage ratios sharply increase over our sample period.

Figure 3b: Leverage Ratios across Industries and Time

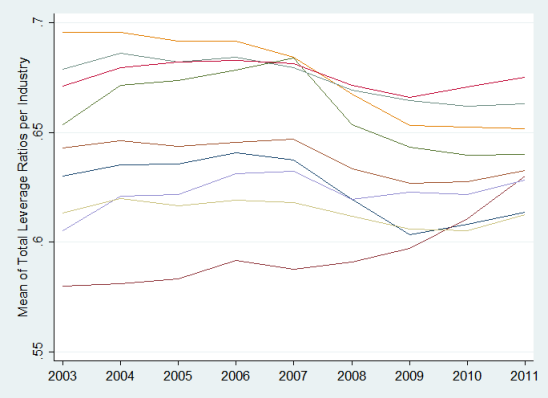


Table 4 provides the results of our model specification presented in Section 4.2 with the sample decomposed into the nine different industry segments. Here, we leave out industry median leverage in the regressions because this is just a level effect in an inter-industry analysis. We also run regressions with deviations of firm leverage from industry median leverage as dependent variables and find qualitatively same results.[37] The variables firm size, firm growth, profitability, liquidity, tax shield, inflation and unemployment provide consistent results across the nine different industery groups. While firm size, firm-level growth, tax shield and inflation have positive impacts on leverage ratios, profitability, liquidity and unemployment have negative impacts. Coefficients for capital flows are positive except for retail trade. Tangibility decreases leverage except for the two sectors retail trade and transportation. Considerable differences in capital structure choice across industries then arise from varying demand in markets and from different levels in the relevant explanatory variables.

[37]For brevity, we relegate these regressions to Table A8 in the Appendix.

Table 4: Results for Total Leverage Ratio across Industries

Variables	**Manufacturing Total Leverage**	**Electricity Total Leverage**	**Construction Total Leverage**	**Wholes. trade Total Leverage**	**Retail trade Total Leverage**	**Transportation Total Leverage**	**Accom. & food Total Leverage**	**ICT & res. Total Leverage**	**PAS Total Leverage**
Firm Size	0.004***	0.011***	0.003***	0.008***	0.004***	0.010***	0.003	0.004***	0.006***
	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Firm Growth	0.001***	0.001**	0.000***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.187***	-0.174***	-0.136***	-0.165***	-0.177***	-0.166***	-0.169***	-0.128***	-0.130***
	(0.003)	(0.010)	(0.003)	(0.003)	(0.004)	(0.005)	(0.006)	(0.005)	(0.003)
Tangibility	-0.038***	0.002	-0.054***	-0.025***	0.011***	0.012**	-0.004	-0.028***	-0.017***
	(0.002)	(0.009)	(0.003)	(0.003)	(0.004)	(0.005)	(0.006)	(0.006)	(0.004)
Liquidity	-0.101***	-0.063***	-0.085***	-0.073***	-0.079***	-0.080***	-0.060***	-0.064***	-0.065***
	(0.002)	(0.010)	(0.002)	(0.002)	(0.004)	(0.005)	(0.006)	(0.005)	(0.003)
Nickell	0.000***	0.000***	-0.000	0.000***	0.000***	0.000	0.000***	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind. Growth	0.030***	-0.022**	-0.034***	-0.040***		-0.174***	-0.075*	-0.084***	0.052***
	(0.003)	(0.010)	(0.007)	(0.009)		(0.029)	(0.043)	(0.024)	(0.008)
Tax Shield	1.140***	1.198***	1.248***	0.910***	0.890***	0.999***	1.364***	1.175***	1.166***
	(0.039)	(0.162)	(0.047)	(0.039)	(0.063)	(0.095)	(0.134)	(0.127)	(0.071)
Inflation	0.002***	0.001***	0.002***	0.000***	0.000**	0.002***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP Growth	0.001***	-0.002***	0.001***	0.001***	0.001***	0.001***	-0.000	0.000	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital Flows	0.304***	1.110***	0.149*	0.029	-0.055	0.422***	0.200	0.436**	0.421***
	(0.062)	(0.240)	(0.084)	(0.063)	(0.107)	(0.145)	(0.191)	(0.201)	(0.136)
Unemployment	-0.001***	-0.005***	-0.002***	-0.002***	-0.001***	-0.002***	0.000	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Stock Prices	0.000***	0.000***	0.000***	0.000***	-0.000	0.000	0.000	0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Constant	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	778,647	58,756	709,282	719,252	295,702	161,189	115,135	111,451	316,396
Number of firms	199,457	16,231	204,332	187,186	79,622	45,485	32,492	31,499	91,210
R-squared	0.094	0.051	0.125	0.110	0.090	0.062	0.051	0.059	0.081

Notes: See Table A1 in the Appendix for definitions of the variables. Firm-level data and taxation comes from the ORBIS database. Data for macroeconomic factors comes from the World Bank. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. The nine industry clusters in the columns are "Manufacturing", "Electricity, gas and water supply", "Construction and real estate", "Wholesale trade", "Retail trade", "Transportation and storage", "Accommodation and food", "ICT and research" and "Professional and administrative services". Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

5.3 Geographic Analysis

We also analyze whether location is an important parameter that affects the way our explanatory variables cause capital structure choice and that accounts for any unobserved effects given geographic characteristics.

5.3.1 Regions

First, we investigate broad geo-political aspects. To do so, we compare firms located in the European Union[38] and within the Euro Area[39] to a control group. We define this control group as all EFTA states and the two non-European countries in our sample. Thus, this group includes Iceland, Liechtenstein, Norway, Switzerland, Japan and the USA.

Initially, we find that mean and variance of leverage ratios when clustered into the aforementioned three groups are significantly different. Firms in the Euro Area have on average higher leverage ratios than firms located in the European Union and more so, than firms in the control group. Table 5 depicts the regression results for the three groups. Higher leverage ratios in the European Union and Euro Area are driven by taxation effects and capital flows. Tangibility and unemployment positively affect debt financing of firms in our control group, while the coefficients remain negative for the other two groups. All other factors have similar effects on capital structure choice of firms. Differences between firms located in the European Union and those in the Euro Area are predominately driven by effects from

[38] We only have 27 countries for the European Union instead of 28 because Croatia acquired membership on July 1, 2013, but our data set ends in 2012.

[39] We exclude Latvia from the Euro Area because it adopted the currency on January 1, 2014 but our data set ends in 2012. However, we include Monaco and Montenegro because the former shares a monetary union with France and the latter is an unilateral adopter of the Euro.

the internal capital market. Firms outside the Euro Area experience exchange rate risks and face tougher lending and reserve requirements, while the common supranational monetary policy within the Euro Area insures against illiquidity and country-specific risks.

Table 5: Results for Total Leverage Ratio across Regions

Variables	**Control Group**[§] **Total Leverage**	**EU27**[†] **Total Leverage**	**Euro Area**[‡] **Total Leverage**
Firm Size	0.005***	0.006***	0.006***
	(0.001)	(0.000)	(0.000)
Firm Growth	0.000**	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Profitability	-0.096***	-0.173***	-0.179***
	(0.004)	(0.001)	(0.001)
Tangiblity	0.026***	-0.026***	-0.032***
	(0.005)	(0.001)	(0.001)
Liquidity	-0.059***	-0.081***	-0.083***
	(0.004)	(0.001)	(0.001)
Nickell	0.000	0.000	0.000***
	(0.000)	(0.000)	(0.000)
Total Ind. LR	0.159***	0.091***	0.066***
	(0.021)	(0.008)	(0.009)
Ind. Growth	0.067***	0.009***	0.008***
	(0.007)	(0.002)	(0.002)
Tax Shielda	0.693***	1.098***	1.066***
	(0.065)	(0.021)	(0.022)
Inflation	0.001	0.001***	-0.000
	(0.001)	(0.000)	(0.000)
GDP Growth	-0.001**	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Capital Flows	-9.900***	0.126***	1.151***
	(1.117)	(0.034)	(0.050)
Unemployment	0.012***	-0.002***	-0.002***
	(0.001)	(0.000)	(0.000)
Stock Prices	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y
Firm FE	Y	Y	Y
Constant	Y	Y	Y
Observations	197,398	2,959,093	2,547,956
Number of firms	46,064	809,574	674,827
R-squared	0.079	0.108	0.113

Notes: See Table A1 in the Appendix for definitions of the variables. Firm-level data and taxation comes from the ORBIS database. Data for macroeconomic factors comes from the World Bank. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. § includes EFTA states (Iceland, Liechtenstein, Norway, Switzerland), USA and Japan. † excludes Croatia. ‡ includes Monaco and Montenegro, excludes Latvia. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

5.3.2 Countries

Second, we disclose the importance of macroeconomic conditions by analyzing cross-country differences in leverage ratios. This heterogeneity is more profound than among industries. Figures 4a and 4b show cross-sectional and time-series behavior of capital structures across countries.[40]

Figure 4a: Leverage Ratios across Countries

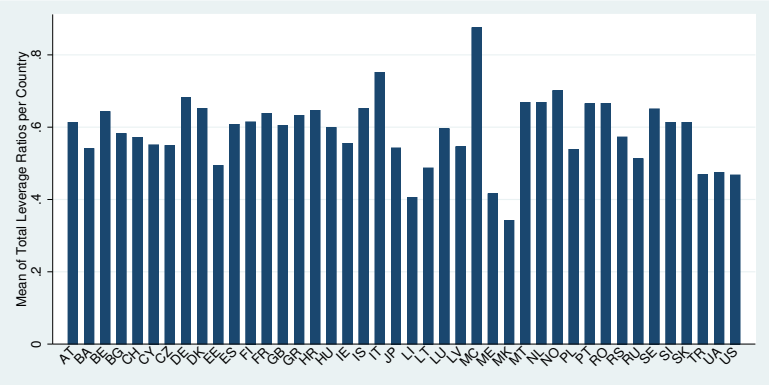
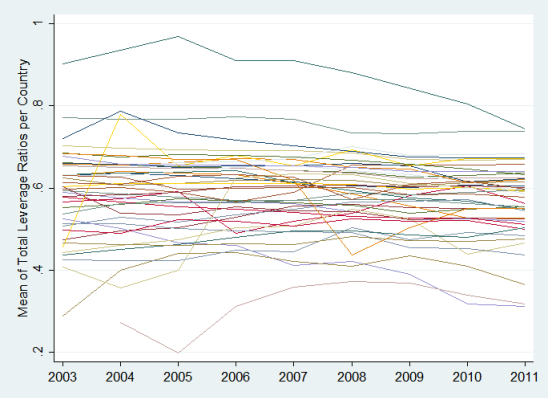


Figure 4b: Leverage Ratios across Countries and Time



[40] We have firm-level data from 42 different countries. Tables and Figures make use of the ISO 3166-1 two-digit country codes. These are: AT = Austria, BA = Bosnia and Herzegovina, BE = Belgium, BG = Bulgaria, CH = Switzerland, CY = Cyprus, CZ = Czech Republic, DE = Germany, DK = Denmark, EE = Estonia, ES = Spain, FI = Finland, FR = France, GB = United Kingdom, GR = Greece, HR = Croatia, HU = Hungary, IE = Ireland, IS = Iceland, IT = Italy, JP = Japan, LI = Liechtenstein, LT = Lithuania, LU = Luxembourg, LV = Latvia, MC = Monaco, ME = Montenegro, MK = Macedonia, MT = Malta, NL = Netherlands, NO = Norway, PL = Poland, PT = Portugal, RO = Romania, RS = Serbia, RU = Russia, SE = Sweden, SI = Slovenia, SK = Slovakia, TR = Turkey, UA = Ukraine, US = USA.

Among the countries with the highest average leverage ratios, we find Germany, Italy, Monaco and Norway, while firms with the least amounts of debt per firm are located in Liechtenstein, Macedonia, Montenegro, Turkey, Ukraine and the USA. Over time, cross-country differences also vary considerably. While most average leverage ratios per countries run in a band between 40 to 80%, yearly differences are significant which do not suggest a strong path dependence.

Table 6 then provides an overview of the results from our country-by-country regressions.[41] We include the three countries with the highest average leverage ratios, namely, Germany, Italy and Norway, as well as the three countries with the lowest average leverage ratios, being Turkey, Ukraine and the USA. In particular, the results suggest that cross-country differences are mainly driven by differences in industry structure and composition within a country.

Firm size has a significant positive impact on leverage ratios for high-leverage countries while it has no effect in low-leverage countries. Profitability and liquidity are consistently negatively related to leverage ratios, while tangibility decreases leverage ratios except in Germany and Norway. The degree of tangibility affects country-specific capital structures through the sectoral distribution of economic activity which percisely has such a large degree. Coefficients for industry median leverage are positive except for firms in Italy whereas tax shields consistenly drive debt financing in all countries. Results for firm-level and industry growth, GDP growth, the Nickell criterion, unemployment and stock prices are inconclusive.

[41] We exclude Liechtenstein, Macedonia, Monaco and Montenegro from the cross-country study due to lack of observations.

Table 6: Results for Total Leverage Ratio across Countries

	high-leverage Countries			low-leverage Countries		
	Germany	**Italy**	**Norway**	**Turkey**	**Ukraine**	**USA**
Variables	**Total Leverage**	**Total Leverage**	**Total Leverage**	**Total Leverage**	**Total Leverage**	**Total Leverage**
Firm Size	0.006***	0.005***	0.008***	-0.017	-0.002	-0.004
	(0.002)	(0.000)	(0.001)	(0.015)	(0.001)	(0.003)
Firm Growth	0.000*	0.000***	0.000***	-0.005	0.001***	-0.001*
	(0.000)	(0.000)	(0.000)	(0.012)	(0.000)	(0.001)
Profitability	-0.116***	-0.199***	-0.090***	-0.128	-0.112***	-0.135***
	(0.007)	(0.003)	(0.004)	(0.116)	(0.005)	(0.012)
Tangibility	0.017**	-0.101***	0.028***	-0.155	-0.095***	-0.044**
	(0.008)	(0.002)	(0.005)	(0.113)	(0.007)	(0.022)
Liquidity	-0.056***	-0.087***	-0.051***	-0.311***	-0.072***	-0.193***
	(0.006)	(0.002)	(0.004)	(0.086)	(0.008)	(0.021)
Nickell	0.000	0.000***	0.000	-0.001*	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Total Ind. LR	0.256***	-0.057***	0.185***	1.510***	0.597***	0.047
	(0.026)	(0.013)	(0.023)	(0.551)	(0.050)	(0.076)
Ind. Growth	-0.000	-0.022***	0.094***	0.012	-0.010	0.015
	(0.007)	(0.003)	(0.008)	(0.092)	(0.014)	(0.019)
Tax Shield	0.730***	0.997***	0.740***	1.374	2.504***	3.721***
	(0.111)	(0.033)	(0.068)	(5.925)	(0.225)	(0.943)
Inflation	0.003***	0.015***	0.000		0.000**	0.008
	(0.001)	(0.000)	(0.001)		(0.000)	(0.006)
GDP Growth	-0.000***	0.002***	0.002	0.001	0.000***	-0.002
	(0.000)	(0.000)	(0.003)	(0.001)	(0.000)	(0.002)
Unemployment		0.016***	0.012***			-0.009***
		(0.000)	(0.003)			(0.001)
Stock Prices	0.000***	0.001***	0.000***	0.000	0.000***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Constant	Y	Y	Y	Y	Y	Y
Observations	97,139	840,289	164,352	401	108,735	16,759
Number of firms	33,904	207,442	38,335	193	31,606	3,933
R-squared	0.065	0.168	0.087	0.208	0.176	0.111

Notes: See Table A1 in the Appendix for definitions of the variables. Firm-level data and taxation comes from the ORBIS database. Data for macroeconomic factors comes from the World Bank. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. Capital flows are excluded for collinearity reasons as are inflation and unemployment for some countries. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

We also run regressions for the eight major countries that we previously investigated in Table 1b. Profitability and liquidity consistently negatively affect capital structures, while tax shields regularly drive leverage ratios positively. Coefficients for tangibility are positive except for Italy, Japan and the USA. Results are inconclusive for firm size and firm-level growth, the Nickell criterion, industry-specific factors, and business cycle indicators.

5.4 Firm Characteristics

Finally, we explore in more detail how different firm characteristics impact the effects of our explanatory variables on capital structure choice. That is, we make refinements to our subsampling in order to capture (i) the impact of information asymmetries between investors and firms through dissecting firms according to their legal status and (ii) how well our model explains the respective capital structure choices of firms of different size. This may indicate whether a firm's position in the life cycle or industry benchmarks have an effect on capital structure choice because large firms tend to be well-established industry leaders.

5.4.1 Public vs. Private Firms

We investigate information asymmetries by subsampling our data set into two groups, publicly traded companies and private firms, respectively.[42] Private firms should encounter greater difficulties in acquiring external financing and in particular, debt, as potential investors incur higher agency costs and the problem of adverse selection is bigger. Not surprisingly, mean and variance of leverage ratios between both groups are significantly different. We find that private firms have higher leverage ratios on average than public

[42]For 162,250 firms with 864,026 firm-year observations, the legal status could not be accurately identified so they are not included in either group.

firms. This may stem from the fact that private firms do not have access to many equity or equity-like financial instruments that publicly traded companies may make use of.

The majority of public firms in our sample is located in France, Greece, Italy and Spain, while Finland, Iceland, Ireland and Spain have the highest share of public companies to total amount of firms in the sample. Most countries have a large share of private firms.

Table 7 provides the overview of our model for the subsamples into public and private firms. Results for both groups are the same as in the baseline model in Table 2 for firm-level and macroeconomic factors, except for capital flows which are positively related to debt financing for public firms only. Also, public firms experience larger effects from industry-specific factors on their leverage ratios. This indicates that public firms adhere more to market pressures in setting leverage targets due to increased transparency and visibility of their business operations. On the other hand, private firms have financing models that are less affected in their capital structure choice by changes in international capital flows. This may arise from the fact that foreign ownership disproportionally increases in publicly traded companies due to better capital market liquidity.

Table 7: Results for Total Leverage Ratio due to Firms' Legal Status

Variables	**public firms Total Leverage**	**private firms Total Leverage**
Firm Size	0.009***	0.004***
	(0.001)	(0.000)
Firm Growth	0.000***	0.001***
	(0.000)	(0.000)
Profitability	-0.183***	-0.155***
	(0.004)	(0.001)
Tangibility	-0.045***	-0.025***
	(0.003)	(0.001)
Liquidity	-0.095***	-0.075***
	(0.003)	(0.001)
Nickell	0.000**	0.000**
	(0.000)	(0.000)
Total Ind. LR	0.230***	0.064***
	(0.018)	(0.009)
Ind. Growth	0.011***	0.003
	(0.004)	(0.002)
Tax Shield	1.771***	1.009***
	(0.057)	(0.024)
Inflation	0.002***	0.001***
	(0.000)	(0.000)
GDP Growth	0.001***	0.001***
	(0.000)	(0.000)
Capital Flows	0.929***	-0.033
	(0.062)	(0.042)
Unemployment	-0.002***	-0.002***
	(0.000)	(0.000)
Stock Prices	0.000***	0.000***
	(0.000)	(0.000)
Year FE	Y	Y
Firm FE	Y	Y
Constant	Y	Y
Observations	533,609	2,280,129
Number of newid	135,724	634,245
R-squared	0.166	0.115

Notes: See Table A1 in the Appendix for definitions of the variables. Firm-level data and taxation comes from the ORBIS database. Data for macroeconomic factors comes from the World Bank. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

5.4.2 Small vs. Large Firms

Another inquiry with respect to information asymmetries, transactions costs and the range of available funding instruments analyzes the effect of firm size on capital structure choice. To do so, we divide our sample in deciles and investigate the lowest and highest groups, namely, the 10% firms in our data set with the smallest firm size and the 10% with the largest firm size. Mean and variance of leverage ratios for small firms are significantly lower than otherwise. On the other hand, average leverage for large firms is close to that of the overall sample. The smallest firms in our data set are located in Italy, Spain and the Ukraine, while the largest firms are located in France, Germany and the United Kingdom.

Table 8 provides the results for both deciles. For most of the explanatory variables, the effects on capital structure choice are the same in both deciles and as in Table 2. Firm size obviously affects only large firms. Industry-specific factors drive down debt financing only for small firms, while it is positively related for large companies. Macroeconomic factors affect large firms to a lesser degree. Overall, it seems that large firms are bound by higher market pressure in concentrated segments within their respective economic activity and benefit overly from industry trends and demand. On the other hand, small firms are more affected by changes in foreign ownership of domestic assets than large firms.

Table 8: Results for Total Leverage Ratio according to Firm Size

Variables	**small firms Total Leverage**	**large firms Total Leverage**
Size	-0.001	0.007***
	(0.001)	(0.001)
Firm Growth	0.000**	0.001***
	(0.000)	(0.000)
Profitability	-0.085***	-0.180***
	(0.006)	(0.004)
Tangibility	-0.066***	-0.013***
	(0.005)	(0.004)
Liquidity	-0.069***	-0.067***
	(0.007)	(0.004)
Nickell	0.000*	0.000
	(0.000)	(0.000)
Total Ind. LR	-0.051*	0.277***
	(0.029)	(0.019)
Ind. Growth	-0.067***	-0.004
	(0.012)	(0.004)
Tax Shield	1.821***	1.020***
	(0.141)	(0.061)
Inflation	0.004***	0.001***
	(0.000)	(0.000)
GDP Growth	0.001***	0.000
	(0.000)	(0.000)
Capital Flows	2.192***	0.505***
	(0.208)	(0.111)
Unemployment	0.001***	-0.001***
	(0.000)	(0.000)
Stock Prices	0.000***	0.000***
	(0.000)	(0.000)
Year FE	Y	Y
Firm FE	Y	Y
Constant	Y	Y
Observations	230,489	358,206
Number of firms	109,319	103,892
R-squared	0.035	0.108

Notes: See Table A1 in the Appendix for definitions of the variables. Firm-level data and taxation comes from the ORBIS database. Data for macroeconomic factors comes from the World Bank. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

6 Conclusion

Capital structure choice is a highly relevant topic for a firm's prosperity and to deduce the right economic and competition policies, especially given the economic development and turmoil over the last decade. Both theoretical and empirical literature has dealt with a number of mechanisms and factors that firms consider and encounter in their financing decisions. In this paper, we follow similar empirical research in conducting a series of panel analyses to determine the most important factors that drive leverage ratios. We append previous work in drawing on a variety of different parameters and indices on firm-, industry- and country-level to explain a greater portion of variation in the data.

We base our analysis on a large cross-sectional data set to mitigate problems of selection and survival biases. Then, we expand empirical frameworks by Frank and Goyal (2009), Fan et al. (2012), Köksal et al. (2013) and the ECB (2013) to quantitatively assess capital structure choices over the past decade with an emphasis on Europe. We show that firm size, industry leverage, industry growth and tax shield positively affect leverage ratios, while profitability and liquidity have negative impacts. Furthermore, tangibility has a positive impact on leverage for those firms that use long-term debt financing. For small firms that mostly make use of short-term debt only, we find a negative relationship due to the trade-off between tangibility and liquidity to serve debt obligations to investors. In addition, we find a strong impact of international capital allocation due to the size of coefficients for our capital flows variable. The results are robust against different panel estimators, decompositions and in yearly cross sections.

Our study makes a deliberate choice in favor of a highly representative sample with a very large cross-section while a majority of empirical studies has previously used much smaller samples of larger (listed) firms. Hence, an important contribution of our paper is to provide a check to what extent previous results may have suffered from a small sample bias, or rather from a selection bias that ignored financial constraints of the vast majority of NFCs. Indeed, we find that previous studies neglected the different capital structure choice of small firms, cross-country differences as well as the effects of the business cycle and the size of national capital markets on leverage. This explains differences in empirical results. Second, our study provides strong indications that corporate taxation needs to be part of macro-prudential policy frameworks in view of the important effects of national tax codes on leverage ratios. Furthermore, our very representative estimates can be seen as an input for future research on the quantification of international intra-group capital mobility and tax-base shifting.

Appendix

Table A1: Overview of Variables, Definitions and Sources

Variables	Definitions	Sources[43]
Leverage Ratios		
Short-term Leverage	short-term debt / total assets	ORBIS
Long-term Leverage	long-term debt / total assets	ORBIS
Total Leverage	(long-term debt + short-term debt) / total assets	ORBIS
Firm-specific Factors		
Firm Size	logarithm of revenues	ORBIS
Firm Growth	percentage change in revenues	ORBIS
Profitability	EBIT / total assets	ORBIS
Tangibility	fixed assets / total assets	ORBIS
Liquidity	cash equivalents / total assets	ORBIS
Nickell Criterion	interest paid / cash flow	computed from ORBIS data
Industry-specific Factors		
Industry Leverage	median of (short-term, long-term, total) leverage per year and industry	computed from ORBIS data
Industry Growth	median percentage change in revenues per year and industry	computed from ORBIS data
Macroeconomic Factors		
Tax Shield	if firms make use of long-term debt: average (taxation / total assets) per country of firms financed without long-term debt — average (taxation / total assets) per country of debt-financed firms; zero otherwise	computed from ORBIS data
Inflation	annual percentage change in consumer prices	WDI[44], World Bank

[43] We define and compute the factors used in the empirical investigation according to common literature. The data for the individual variables is drawn from the respective sources. All financial data is in thousand EUR.

[44] World Development Indicators

Macroeconomic Factors (cont'd)			
GDP Growth	annual percentage change in GDP	WDI, World Bank	
Capital Flows	net capital account / GDP	WDI, World Bank	
Unemployment	total unemployment as percentage of total labor force	WDI, World Bank	
Stock Prices	annual percentage change in Standard & Poor's Global Equity Indices	WDI, World Bank	

Table A2: Data along different Dimensions

Dimensions	Observations
Full Sample	6,365,842
EU27†	5,744,127
Euro Area‡	4,859,829
Industries	
Manufacturing	1,484,855
Electricity, gas and water supply	117,474
Construction and real estate	1,418,791
Wholesale trade	1,375,798
Retail trade	563,192
Transportation and storage	321,420
Accommodation and food	225,965
ICT and research	219,725
Professional and administrative services	638,622
Countries∗	
Germany	298,347
United Kingdom	212,695
France	1,321,317
Italy	1,452,641
Spain	1,018,082
Poland	94,890
USA	29,556
Japan	25,738
Legal Status	
public	1,016,853
private	4,484,963
n.a.	864,026

∗ includes only eight major countries; † excludes Croatia; ‡ includes Monaco and Montenegro, excludes Latvia

Table A3a: Spearman Correlation Coefficients of Leverage Ratios and Firm- & Industry-level Variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
St LR	(1)	—												
Lt LR	(2)	-0.3514***	—											
Total LR	(3)	0.7524***	0.1865***	—										
Firm Size	(4)	0.1264***	0.0064***	0.0479***	—									
Firm Growth	(5)	0.1075***	-0.0209***	0.1047***	0.0519***	—								
Profitability	(6)	-0.0626***	-0.1176***	-0.1825***	0.1036***	0.2342***	—							
Tangibility	(7)	-0.3925***	0.3526***	-0.1774***	-0.1354***	-0.0428***	-0.1728***	—						
Liquidity	(8)	-0.0845***	-0.1931***	-0.2413***	-0.0001	0.0548***	0.3110***	-0.2553***	—					
Nickell	(9)	0.1533***	0.2190***	0.3056***	0.0256***	0.0482***	0.0585***	0.0480***	-0.2444***	—				
St Ind. LR	(10)	0.2468***	—	—	0.1101***	0.0750***	0.1513***	-0.3510***	0.1482***	0.0049***	—			
Lt Ind. LR	(11)	—	0.2120***	—	-0.1481***	-0.0683***	-0.1469***	0.2829***	-0.1503***	0.0373***	-0.6944***	—		
Total Ind. LR	(12)	—	—	0.1563***	-0.0140***	0.0529***	0.0591***	-0.2182***	0.0626***	0.0274***	0.7019***	-0.2094***	—	
Ind. Growth	(13)	0.0964***	-0.0785***	0.0334***	0.0653***	0.2275***	0.1225***	-0.0923***	0.0704***	-0.0130***	0.3578***	-0.3454***	0.1901***	—

Notes: *** p<0.01

Table A3b: Spearman Correlation Coefficients of Leverage Ratios and Macroeconomic Variables

		(1)	(2)	(3)	(14)	(15)	(16)	(17)	(18)	(19)
St LR	(1)	—								
Lt LR	(2)	-0.3514***	—							
Total LR	(3)	0.7524***	0.1865***	—						
Tax Shield	(14)	-0.1911***	0.8211***	0.1489***	—					
Inflation	(15)	-0.0665***	-0.0141***	-0.0524***	0.0010	—				
GDP Growth	(16)	-0.0337***	-0.0375***	-0.0566***	-0.0975***	0.2783***	—			
Capital Flows	(17)	-0.1125***	0.0493***	-0.0903***	-0.0217***	0.2577***	0.0792***	—		
Unemployment	(18)	-0.2190***	0.1208***	-0.1988***	0.0006	-0.0711***	0.0503***	0.3835***	—	
Stock Prices	(19)	0.0045***	-0.0483***	-0.0081***	-0.0614***	-0.3096***	0.2462***	-0.0569***	0.0242***	—

Notes: *** p<0.01

Table A4: Model Specification with different Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	**Total Leverage**	**Total Leverage**	**Total Leverage**	**Long-term Leverage**	**Long-term Leverage**	**Long-term Leverage**	**Short-term Leverage**	**Short-term Leverage**	**Short-term Leverage**
Firm Size	0.005***	0.006***	0.008***	0.001***	0.001***	-0.004***	0.003***	0.004***	0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm Growth	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.159***	-0.184***	-0.182***	-0.062***	-0.056***	-0.052***	-0.128***	-0.164***	-0.165***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tangibility	-0.028***	-0.103***	-0.095***	0.103***	0.118***	0.120***	-0.103***	-0.238***	-0.215***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Liquidity	-0.080***	-0.152***	-0.139***	-0.003**	-0.026***	-0.035***	-0.075***	-0.157***	-0.133***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Nickell	0.000	0.000	0.000	0.000***	0.000*	0.000*	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Total Ind. LR	0.144***	0.136***	0.467***						
	(0.008)	(0.008)	(0.004)						
Lt Ind. LR				-0.094***	-0.005	0.513***			
				(0.013)	(0.008)	(0.006)			
St Ind. LR							0.158***	0.150***	0.424***
							(0.007)	(0.007)	(0.002)
Ind. Growth	0.008***	0.008***	-0.011***	-0.025***	-0.017***	-0.032***	0.031***	0.027***	0.014***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Tax Shield	1.097***	1.827***	1.810***	1.504***	1.881***	1.919***	-0.421***	-0.372***	-0.343***
	(0.020)	(0.019)	(0.019)	(0.088)	(0.045)	(0.055)	(0.025)	(0.066)	(0.066)
Inflation	0.001***	-0.003***	0.001***	-0.000	-0.002***	-0.000***	0.002***	-0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP Growth	0.001***	-0.001***	0.001***	0.001***	0.001***	0.000***	0.000***	-0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital Flows	0.226***	-1.276***	0.250***	-0.209***	0.229***	-0.093***	0.465***	-1.756***	0.496***
	(0.033)	(0.029)	(0.033)	(0.044)	(0.024)	(0.031)	(0.039)	(0.032)	(0.039)
Unemployment	-0.002***	-0.005***	-0.002***	0.002***	0.001***	0.000***	-0.002***	-0.007***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Stock Prices	0.000***	-0.000***	0.000***	0.000***	-0.000***	-0.000***	0.000***	-0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	N	N	Y	N	N	Y	N	N
Industry FE	N	Y	N	N	Y	N	N	Y	N
Country FE	N	N	Y	N	N	Y	N	N	Y
Constant	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3,265,810	3,265,810	3,265,810	1,794,355	1,794,355	1,794,355	3,263,935	3,263,935	3,263,935
Number of firms	887,514	887,514	887,514	596,868	596,868	596,868	887,197	887,197	887,197
R-squared	0.099	0.174	0.208	0.136	0.252	0.272	0.204	0.259	0.305

Notes: See Table A1 in the Appendix for definitions of the variables. All variables are ratios, growth rates or logarithms. In all regressions, I include year fixed effects and a constant but suppress their coefficients in the tables. All columns incorporate the baseline model specification introduced in Section 4.2. Columns 1, 4 and 7 include the same regressions as in Table 2 with firm fixed effects. Columns 2, 5 and 8 include industry fixed effects in regressions for total, long-term and short-term leverage, respectively. Columns 3, 6 and 9 include country fixed effects in regressions for total, long-term and short-term leverage, respectively. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

Table A5: Sample Selection for Long-term and Short-term Leverage Ratios

Variables	full sample Long-term Leverage	lt debt > 0 Long-term Leverage	full sample Short-term Leverage	st debt > 0 Short-term Leverage
Firm Size	0.002***	0.001***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Firm Growth	0.000***	0.001***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.031***	-0.062***	-0.128***	-0.128***
	(0.001)	(0.002)	(0.001)	(0.001)
Tangibility	0.075***	0.103***	-0.103***	-0.103***
	(0.001)	(0.002)	(0.001)	(0.001)
Liquidity	-0.005***	-0.003**	-0.075***	-0.075***
	(0.001)	(0.002)	(0.001)	(0.001)
Nickell	0.000***	0.000***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Lt Ind. LR	-0.023***	-0.094***		
	(0.008)	(0.013)		
St Ind. LR			0.158***	0.158***
			(0.007)	(0.007)
Ind. Growth	-0.023***	-0.025***	0.031***	0.031***
	(0.001)	(0.002)	(0.002)	(0.002)
Tax Shield	1.532***	1.504***	-0.423***	-0.421***
	(0.021)	(0.088)	(0.025)	(0.025)
Inflation	-0.000***	-0.000	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP Growth	0.000***	0.001***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Capital Flows	-0.258***	-0.209***	0.482***	0.465***
	(0.031)	(0.044)	(0.039)	(0.039)
Unemployment	-0.002***	0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Stock Prices	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Constant	Y	Y	Y	Y
Observations	3,265,810	1,794,355	3,265,810	3,263,935
Number of firms	887,514	596,868	887,514	887,197
R-squared	0.211	0.136	0.203	0.204

Notes: See Table A1 in the Appendix for definitions of the variables. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. All columns incorporate the baseline model specification introduced in Section 4.2. Columns 2 and 4 include the same regressions as in Table 2 for long-term and short-term leverage ratios, respectively. Columns 1 and 3 include regressions for long-term and short-term leverage ratios, respectively, with the full sample. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

Table A6: Baseline Results for Leverage Differences

	(1)	(2)	(3)
Variables	**Total Difference**	**Long-term Difference**	**Short-term Difference**
Firm Size	0.005***	0.001***	0.005***
	(0.000)	(0.000)	(0.000)
Firm Growth	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Profitability	-0.158***	-0.064***	-0.158***
	(0.001)	(0.002)	(0.001)
Tangibility	-0.026***	0.103***	-0.026***
	(0.001)	(0.002)	(0.001)
Liquidity	-0.080***	-0.002	-0.080***
	(0.001)	(0.002)	(0.001)
Nickell	0.000	0.000***	0.000
	(0.000)	(0.000)	(0.000)
Ind. Growth	0.002	-0.031***	-0.021***
	(0.002)	(0.002)	(0.002)
Tax Shield	1.082***	1.674***	1.098***
	(0.020)	(0.088)	(0.020)
Inflation	0.001***	-0.000*	0.001***
	(0.000)	(0.000)	(0.000)
GDP Growth	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Capital Flows	0.147***	-0.210***	0.129***
	(0.033)	(0.044)	(0.033)
Unemployment	-0.002***	0.002***	-0.002***
	(0.000)	(0.000)	(0.000)
Stock Prices	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y
Firm FE	Y	Y	Y
Constant	Y	Y	Y
Observations	3,265,810	1,794,355	3,263,935
Number of firms	887,514	596,868	887,197
R-squared	0.097	0.102	0.182

Notes: See Table A1 in the Appendix for definitions of the variables. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. All columns incorporate the baseline model specification introduced in Section 4.2. The dependent variables are differences of firms' total leverage from total industry median leverage in column 1, differences of firms' long-term leverage from long-term industry median leverage in column 2, and differences of firms' short-term leverage from short-term industry median leverage. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

Table A7: Comparison of Empirical Capital Structure Models

Variables	**our model** **Total Leverage**	**Rajan/ Zingales (1995)** **Total Leverage**	**Faulkender/ Petersen (2006)** **Total Leverage**	**Frank/ Goyal (2009)** **Total Leverage**	Köksal et **al. (2013)** **Total Leverage**
Firm Size	0.005***	0.009***	0.008***	0.0008***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm Growth	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.159***	-0.179***	-0.165***	-0.166***	-0.157***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tangibility	-0.028***	-0.006***	-0.028***	-0.028***	-0.028***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Liquidity	-0.080***		-0.087***	-0.088***	-0.078***
	(0.001)		(0.001)	(0.001)	(0.001)
Nickell	0.000			0.000	
	(0.000)			(0.000)	
Total Ind. LR	0.144***		0.190***	0.188***	0.159***
	(0.008)		(0.008)	(0.008)	(0.007)
Ind. Growth	0.008***				
	(0.002)				
Tax Shield	1.097***		1.140***	1.169***	1.083***
	(0.020)		(0.020)	(0.020)	(0.020)
Inflation	0.001***			0.003***	0.002***
	(0.000)			(0.000)	(0.000)
GDP Growth	0.001***			0.001***	0.001***
	(0.000)			(0.000)	(0.000)
Capital Flows	0.226***				0.476***
	(0.000)				(0.032)
Unemployment	-0.002***				
	(0.000)				
Stock Prices	0.000***		-0.000*	0.000***	
	(0.000)		(0.000)	(0.000)	
Year FE	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Constant	Y	Y	Y	Y	Y
Observations	3,265,810	3,265,810	3,265,810	3,265,810	3,265,810
Number of firms	887,514	887,514	887,514	887,514	887,514
R-squared	0.099	0.072	0.082	0.084	0.087

Notes: See Table A1 in the Appendix for definitions of the variables. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. Column 1 incorporates the baseline model specification introduced in Section 4.2 for total leverage ratios. Columns 2 includes Rajan and Zingales' (1995) model. Originally, they run a cross-sectional study on G7 countries in 1991. Column 3 includes Faulkender and Petersen's (2006) model. In their study, they analyze US firms from 1986 to 2000. Column 4 includes Frank and Goyal's (2009) model specification based on an analysis of public US firms from 1950 to 2003. Column 5 includes the model by Köksal et al. (2013). They originally analyze Turkish firms from 1996 to 2009. In order to compare the different model specifications, we use the same sample for all regressions based on our model specification from Section 4.2 and the data set explained in Section 3. Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

Table A8: Results for Leverage Differences across Industries

Variables	Manufacturing Total Difference	Electricity Total Difference	Construction Total Difference	Wholes. trade Total Difference	Retail trade Total Difference	Transportation Total Difference	Accom. & food Total Difference	ICT & res. Total Difference	PAS Total Difference
Firm Size	0.005***	0.012***	0.003***	0.009***	0.005***	0.011***	0.002	0.004***	0.006***
	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Firm Growth	0.001***	0.001**	0.000***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.186***	-0.195***	-0.137***	-0.165***	-0.178***	-0.165***	-0.169***	-0.127***	-0.130***
	(0.003)	(0.010)	(0.003)	(0.003)	(0.004)	(0.005)	(0.006)	(0.005)	(0.003)
Tangibility	-0.036***	0.003	-0.054***	-0.025***	0.011***	0.013**	-0.002	-0.027***	-0.017***
	(0.002)	(0.009)	(0.003)	(0.003)	(0.004)	(0.005)	(0.006)	(0.005)	(0.003)
Liquidity	-0.099***	-0.056***	-0.086***	-0.073***	-0.079***	-0.080***	-0.060***	-0.064***	-0.065***
	(0.002)	(0.010)	(0.002)	(0.002)	(0.004)	(0.005)	(0.006)	(0.005)	(0.003)
Nickell	0.000***	0.000**	-0.000	0.000***	0.000***	0.000	0.000***	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind. Growth	0.017***	0.040***	0.046***	0.050***		-0.043	-0.086**	0.016	0.060***
	(0.003)	(0.010)	(0.007)	(0.009)		(0.029)	(0.043)	(0.024)	(0.008)
Tax Shield	1.133***	1.484***	1.258***	0.895***	0.890***	0.997***	1.364***	1.170***	1.140***
	(0.039)	(0.163)	(0.047)	(0.039)	(0.063)	(0.095)	(0.134)	(0.127)	(0.071)
Inflation	0.002***	0.001**	0.002***	0.000***	0.000***	0.002***	0.002***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP Growth	0.000***	-0.001**	0.000***	0.001***	0.001***	0.001***	-0.000	0.000	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital Flows	0.285***	0.592***	-0.011	0.024	-0.053	0.417***	0.195	0.438**	0.387***
	(0.062)	(0.246)	(0.084)	(0.063)	(0.107)	(0.145)	(0.192)	(0.202)	(0.136)
Unemployment	-0.001***	-0.006***	-0.002***	-0.002***	-0.001***	-0.002***	0.000	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Stock Prices	0.000***	0.000	0.000***	0.000***	-0.000	0.000	-0.000	0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Constant	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	778,647	58,756	709,282	719,252	295,702	161,189	115,135	111,451	316,396
Number of firms	199,457	16,231	204,332	187,186	79,622	45,485	32,492	31,499	91,210
R-squared	0.104	0.049	0.128	0.129	0.066	0.038	0.026	0.076	0.084

Notes: See Table A1 in the Appendix for definitions of the variables. The dependent variables are differences of firms' total leverage from respective total industry median leverage. All variables are ratios, growth rates or logarithms. In all regressions, I include firm and year fixed effects and a constant but suppress their coefficients in the tables. All columns incorporate the baseline model specification introduced in Section 4.2. The nine industry clusters in the columns are "Manufacturing", "Electricity, gas and water supply", "Construction and real estate", "Wholesale trade", "Retail trade", "Transportation and storage", "Accommodation and food", "ICT and research" and "Professional and administrative services". Following Petersen (2009), we employ two-dimensional clustering of robust standard errors at firm-level and year-level. *** p<0.01, ** p<0.05, * p<0.1

Figure A1a: Firm Size across Countries

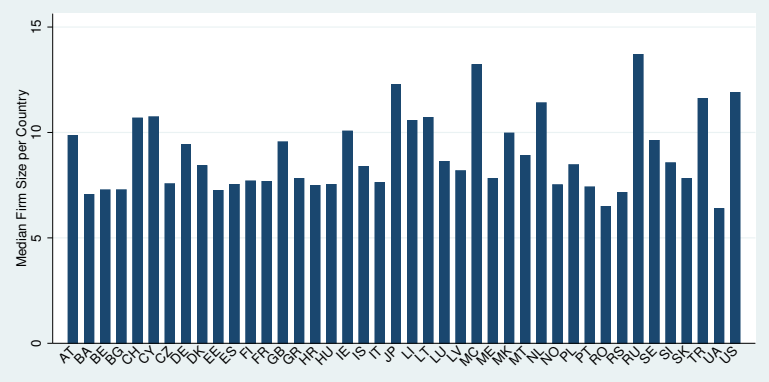


Figure A1b: Firm Size across Industries

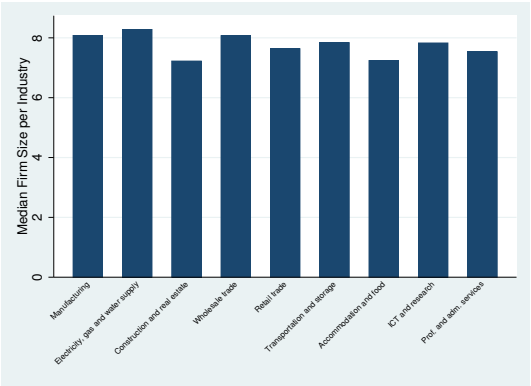


Figure A2a: Growth Rates across Countries

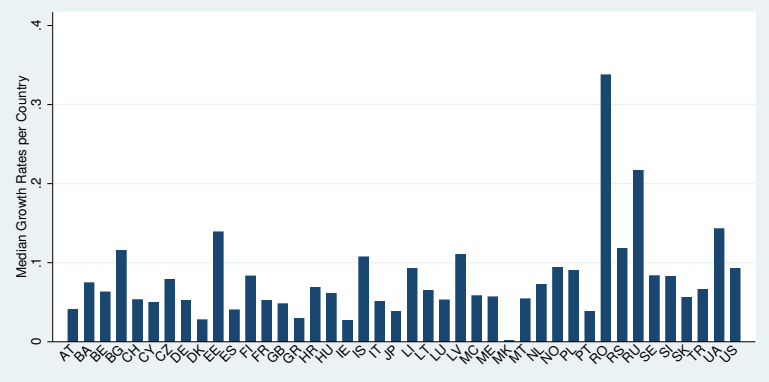


Figure A2b: Growth Rates across Industries

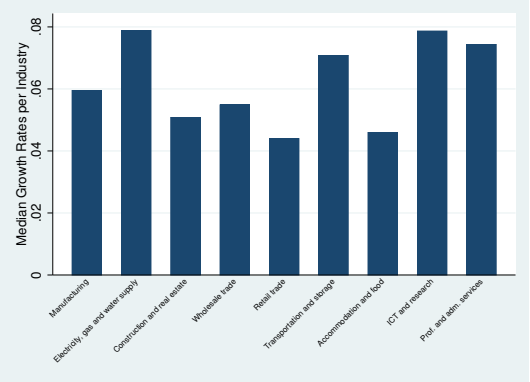


Figure A3a: Profitability across Countries

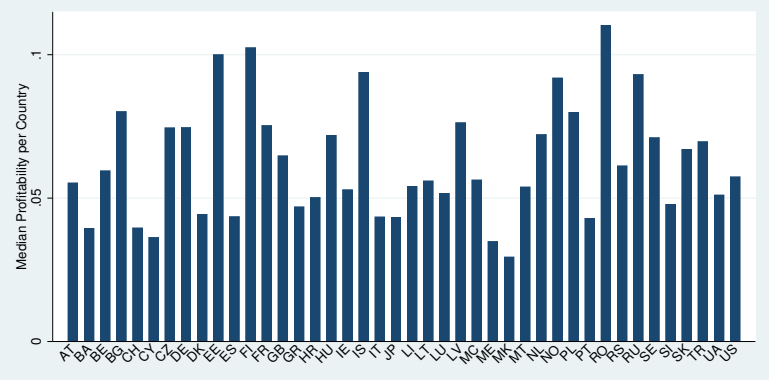


Figure A3b: Profitability across Industries

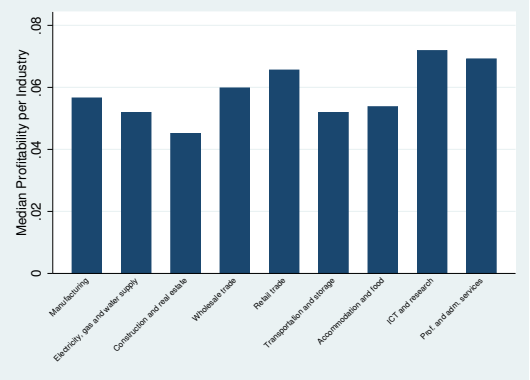


Figure A4a: Tangibility across Countries

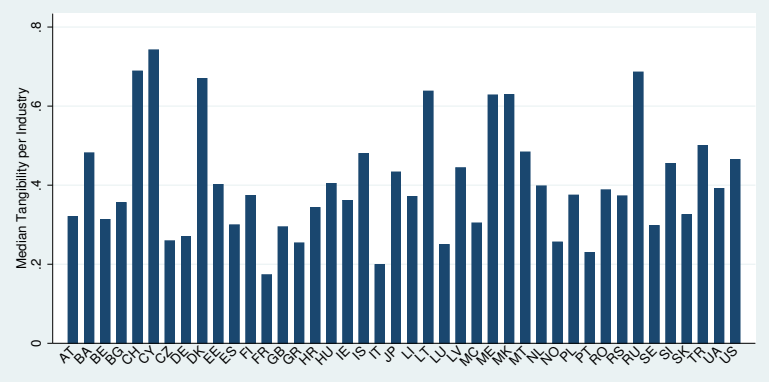
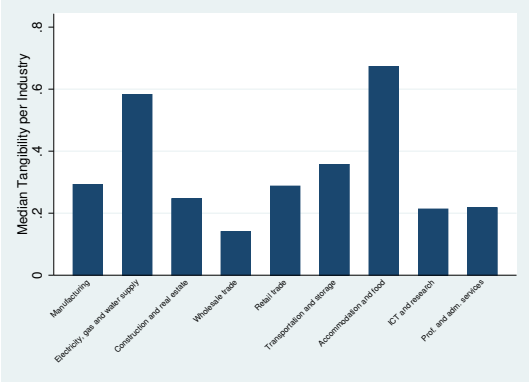


Figure A4b: Tangibility across Industries



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