CERGE
Center for Economics Research and Graduate Education
Charles University Prague

Essays in Corporate Finance

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Dissertation

Prague, July 2007

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Introduction

This dissertation consists of three essays about firm financing. The first essay detects the bank-firm relationship in a transition country while the second and third essays address the importance of country factors in a company's capital structure decisions.

There is an extensive literature on financial crises and their effects on the economy. However, quantitative analyses at the firm level are rare. Therefore, an important issue to study is the effect of financial sector difficulties on the firm's "real" decisions: investment, profitability, etc. The issue is particularly under-explored in the context of transition economies, where the financial systems are fragile and the occurrence of financial crises is common. My first essay fills that gap in the literature: I study the effect of an Estonian bank's failure in 1998 on its corporate loan clients by comparing the performance of clients to that of a random sample of other firms. First, I analyze whether bank bankruptcy causes the bankruptcy of client firms. I find that client firms are less likely to survive until 2000 even after controlling for their pre-bank bankruptcy performance. Hence, the bank-firm relationship has a significant value in a transition country. Second, I analyze the behavior of firms' profitability, liquidity, and growth of fixed assets by differences in differences analyses. I find liquidity to be the only variable that decreases for client firms compared to control firms after bank bankruptcy. This suggests that liquidity is the channel through which the bank failure transfers to the failure of the clients.

The optimal capital structure of a firm has found lot of attention in the corporate finance literature. Many different factors are proposed as potential determinants of firm leverage. It appears that firm capital structure emerges from three sources: firm-specific, country-institutional and macroeconomic factors. In my second essay I evaluate the importance of each source in explaining the firm leverage variation simultaneously. I use a large European dataset covering almost 600,000 firms from 10 Western European countries over 1995-2002. The data are well balanced across firm sizes and industries. The unique feature of this dataset is that it allows me to study the capital structure of small firms, which has not been studied to date due to lack of data. I show that the country institutions and macroeconomic factors are significant

determinants of firm leverage and that their significance varies across firm types. These factors are primary determinants of small and unlisted company leverage. This finding supports the belief that small firms are financially constrained and are less independent in determining their own leverage. Therefore, the conclusions of previous studies based on large stock market-listed firms are not portable to the average firm and additional research in the field is needed.

The third essay is interested in capital structure determinants in the transition countries. Market-based financial institutions emerged just recently in these economies, indicating that imperfections in financial markets, which explain the leverage level of firms, might be especially large. This study is based on a large sample of listed and unlisted companies from nine Eastern European countries. I find that country-specific factors explain the largest share of leverage variation for small unlisted firms while firm-specific factors explain the most for listed and large unlisted companies. This finding is well in line with the results based on Western European firms. Hence, it seems that the development level of the local financial market does not make country-specific factors more prominent.

Does bank failure affect client firms? Micro evidence from Estonia

Karin Jõeveer*

Abstract

I explore the effect of a bank's failure on its client firms using the 1998 bankruptcy of a middle-sized Estonian bank. I compare the performance of firms receiving credit from the failed bank to that of a randomly selected set of firms between 1996 and 2000. I find the client firms to be more likely to go out of business after their bank's failure even after controlling for firm performance before the event. I also observe a decrease in client firms' liquid assets just after the bank failure, suggesting that the loss of liquidity may be the channel through which bank failure transfers to the failure of clients.

Keywords: bank failure, client firm performance, firm survival.

JEL classification: G14, G21, G3

*I am deeply indebted to Štěpán Jurajda for many valuable discussions and suggestions. I am grateful to Ronald Anderson, Riku Kinnunen, Jan Svejnar and Tyler Shumway for helpful comments. Contact: Economics Institute, Academy of Sciences of the Czech Republic CERGE-EI P.O. Box 882, Politickych veznu 7, 11121 Prague 1, Czech Republic. E-mail: karin.joeveer@cerge-ei.cz

1 Introduction

The bank-firm relationship, like any other lender-borrower relationship, involves asymmetry of information. This imperfection of the market allows firms to reap a cost advantage from long-term relationships with banks (Diamond 1991). Hence, it is natural to expect that the failure of a bank should affect its client firms' future performance due to the breakdown of the favored-credit channel.

Several studies, based on bank crashes in the U.S., Japan, and Korea (Slovin, Sushka, and Polonchek 1993, Gibson 1995, Kang and Stulz 2000, Yamori and Murakami 1999, Miyajima and Yafeh 2007, Bae, Kang, and Lim 2002) confirm this prediction and imply that the bank-firm relationship has economic value. Furthermore, this effect apparently differs across countries according to the availability of equity financing. In particular, Ongena, Smith, and Michalsen (2003) do not find any effects of the banking crisis in Norway in 1988-91 on firms' equity value. The authors explain this departure from the results typical for Japan or Korea by the fact that Norwegian firms were using relatively more public equity financing.

To date, there has been no empirical evaluation of the effect of bank failure on client firm performance in the context of a transition economy. This is surprising because the specific nature of transition economies makes this issue particularly important. First, bank failures are common in transition economies (Caprio and Klingebiel 1996, 2002).[1] Second, the majority of firms in transition countries are relatively young and lack reputation. Diamond (1991) suggests that such firms are more likely to depend on borrowing from banks as opposed to direct borrowing (issuing bonds or commercial papers). The stock markets are young as well and their level of activity is low (Grosfeld and Roland 1997). Bank borrowing is therefore the main external financing channel in transition economies (Cornelli, Portes, and Schaffer 1998).[2] Further, empirical evidence from Korea (Bae, Kang, and Lim 2002) implies that the failure of a bank has

[1]For example all ten new European Union Central and Eastern European member states suffered a systematic banking crisis sometime in the 1990's (Caprio and Klingebiel 2002).

[2]Calvo and Coricelli (1997) suggest that at least 20% of the output collapse in early transition was explained by contraction in credit.

comparatively more severe effects on those firms that rely mainly on banks for their financing.

In this paper, I fill the gap in the literature by evaluating the bank-client relationship in a transition economy. I choose Estonia, as it is an important case to study for several reasons. First, it has had a currency board system since 1992. Hence, monetary policy has not been used to respond to the shocks in the financial market. Second, Estonia is also one of the most economically free countries in the world.[3] A liberal policy has exposed Estonian firms to international shocks and allows for an analysis of market forces not affected by numerous distorting government policies. Third, Estonia had a banking crisis at the beginning of its transition period (1992-1995)[4] and suffered another banking crisis in 1998. This study considers the later crisis. The 1998 crisis was triggered by exogenous shocks to the financial system from the Asian and later from the Russian crisis. Given that the primary cause of the crisis was not related to a bad loan portfolio, it offers a unique opportunity to investigate the impact of bank failure on firm performance.

Estonia had twelve banks at the beginning of 1998 but only six at the end of the year. Eesti Maapank (the Land Bank of Estonia) was the first to disappear.[5] It lost its license in June 1998 because of permanent insolvency.[6] At the beginning of 1998, the bank was ranked the seventh-largest based on total assets and covered 4% of the market. The first part of my sample consists of 119 firms that were clients of the Land Bank of Estonia.

The client firms of the failed bank were not listed on the Estonian Stock Exchange. Hence, in contrast to earlier studies on the effect of bank failure on client firms, I am

[3]The Heritage Index of Economic Freedom 2003 (http://cf.heritage.org/index/indexoffreedom.cfm) placed Estonia in the sixth position among 156 countries.

[4]For more details see Hansson and Tombak (1999) and Fleming, Chu, and Bakker (1996).

[5]Later, in the summer of 1998 two middle-sized banks merged with the two biggest banks in Estonia and in the fall, after the negative shock from Russia, two small banks went bankrupt and two other small banks merged with each other.

[6]The shareholders tried to recapitalize the bank in April 1998 but failed. The main reasons for insolvency were the mismanagement of the loan and securities portfolio. The potential bad loan portfolio of the bank should be considered with caution because the direction of causality between bank failure and firm failure is not clear. I address this issue in the analysis by controlling for firm financial characteristics before the bank crash.

not able to quantify the effect on firms' equity values. This also means that the firms in my sample do not rely on public equity financing; bank loans are the main external source of finance.[7] To measure performance I rely on information in the firms' balance sheets and income statements. To analyse the potential effect of bank failure on firm performance I use a comparison group of 114 randomly selected Estonian firms. Even though I do not have any information about the bank-specific lending relationship for my comparison group firms, I assume that the probability that they were clients of some other bankrupt bank is small.[8] The data cover the years 1996-2000.

The analysis is split into two parts. The first part examines the survival of the firm to detect whether the bank failure is followed by client firm failure. The second part of the analysis studies the effect of the bank failure on firm performance measures. I find that client firms of the failed bank are more likely to exit the sample and I find that one out of three performance measures studied was affected by the bank failure. Particularly, I find a negative effect on client firm liquidity.

The paper is organized as follows. In the next section, I review theoretical and empirical studies of the bank-firm relationship. In this section I also spell out my testable hypothesis. The data and methodology section follows. Section 4 presents the results, and I conclude in section 5.

2 The Bank-Firm Relationship

The theoretical foundations of the benefits of the bank-firm relationship are pointed out by Diamond (1984). Diamond stresses that financial intermediaries with a diversified asset portfolio are in a better position to monitor borrowers and therefore are better off in overcoming the issue of asymmetric information.[9] Diamond (1991) finds

[7] 34% of firm financing came from internal resources in 1998 in Estonia. Domestic bank loans constituted 29% of total external financing of Estonian firms. Together with loans from the foreign sector the share of resources from banking is 51% (Kangur, Rajasalu, and Randveer 1999) compared to 66% in Japan and 39% in the U.S. (Gibson 1995).

[8] The two other bankrupt banks covered together approximately 4% of the market (see also footnote 5).

[9] The bank-firm relationship may also have a negative effect on banks, see Giannetti (2003).

that firms that have long credit records — older firms with long relationships with a bank — face cheaper borrowing. On the other hand, firms with good reputations are likely to rely on financial markets directly by issuing bonds and equity for satisfying their external finance needs, so their financing decisions are less dependent on bank credit. Holmstrom and Tirole (1997) consider in more detail the firm's choice between borrowing from a financial intermediary or directly from the market. They show that only large firms can borrow directly from the market. Intermediate-size firms borrow from banks and the smallest firms do not have any access to outside financing. The explicit inference of this is that large firms are more flexible in their borrowing decisions and they should find it easier to switch from one financier to another.

There is now an extensive empirical literature evaluating the bank-firm relationship. Slovin, Sushka, and Polonchek (1993) explore the effect of the near failure of the Continental Illinois Bank in 1984. They identify the effect of bad news in the banking sector on client firms' equity value by combining the loan clients of Continental Illinois Bank into a single portfolio and comparing the return of this portfolio to the market portfolio. They find that firms that have a borrowing relationship with the distressed bank have significant negative excess returns in the period of bank difficulties, in this particular case in the two and a half months before the rescue. The bank rescue announcement turned the excess returns positive, but they remained lower compared to the negative returns made at the time of bank distress.

Yamori and Murakami (1999) carry out a similar study for the Japanese Hokkaido Takusyoku Bank in 1997. In addition, they were able to answer the question of whether the closeness of the relation with the failed bank had an effect on the firm, since in Japan firms report annually the banks they use, in order of significance. Yamori and Murakami identify large negative abnormal returns to firms having a tighter relationship with the failed bank on the day of the bank failure and the day after. More generally Miyajima and Yafeh (2007) investigate the influence of many different events related to the Japanese financial sector in the 1990's to company stock prices. They find that small firms in low-tech sectors with high leverage, a low credit rating and often with a low market-to-book ratio are affected the most. The whole banking sector crash

in Norway in 1988-91 and its influence on firms is considered by Ongena, Smith, and Michalsen (2003). Surprisingly, they find that firms' equity values slightly increased at the time of the crisis. Although banks were the major source of external financing in Norway, the banking distress did not damage the investment abilities of the firms. One of the explanations of the contrasting results compared to previous studies is that Norwegian firms were issuing on average new equity more often.[10]

Another branch of the empirical literature detects what type of firms are more affected by banking crises and whether we can identify a real effect (i.e., a decrease in investment). Gibson (1995) finds that a firm's investment depends on its main bank's credit rating. The client of a lower-rated bank invested less during the banking sector weakness (1991-92) in Japan. Besides looking at bank characteristics, Kang and Stulz (2000) show that a firm's performance during the banking crisis depends also on firm characteristics, such as its financing structure. The firm that uses mainly bank loans for financing investments invested less during the contraction of the Japanese banking industry at the beginning of the 1990's. Also the stock performance of a more bank-dependent firm is worse at the time of a banking crisis. Bae, Kang, and Lim (2002) find support for the previous hypothesis in the case of Korea in 1997-98. In addition they find that a financially weaker firm (e.g. less profitable) is more affected by the health of the banking sector.

The studies mentioned in the previous paragraph are more directly connected to my research agenda in that they do not concentrate narrowly on changes in stock prices, but rather deal with longer-term effects. In my study I consider the effect of bank failure on firm bankruptcy probability, as well as on profitability, liquidity, and investment. Based on existing theory and empirical studies I formulate the following hypotheses: the failure of the bank increases the bankruptcy probability of the client firms, and it decreases client firms' profitability, liquidity, and investments. In Table 1, I summarize the testable predictions and the definitions of the financial ratios I use. I define profitability as net profit (loss) from normal operations to total assets. By

[10] 33% of Norwegian firms issued equity in each year compared to 10% of Japanese firms (Ongena, Smith, and Michalsen 2003).

liquidity I mean the share of liquid assets (current assets) to total assets. Investment is defined as the growth rate of fixed assets, where fixed assets are expressed in 1997 prices.

3 Data and Methodology

The present analysis is focused on a bank failure that occurred in June 1998 in Estonia. The analysis is based on an annual panel of loan clients of the bank under study and a random sample of Estonian firms. From now on, I will refer to those firms that were served by the bankrupt bank as the treatment group and the other firms as the control group. I use a 1997 sample of firms and follow their performance until 2000. My data also cover information from 1996 for some firms. The firms' balance sheets and income statements were obtained from the Estonian Center of Registers. This is an institution that collects and records the data across different registers including the Enterprise Register. All Estonian firms are legally required to report balance sheet and income statement data for each fiscal year.

The 119 firms in my treatment group were drawn from a list of the 450 Land Bank loan clients in June 1998. The random sampling procedure was stratified by industry. Industrial firms were over-sampled because this sector is considered to be less correlated with the business cycle compared to the trade and construction sectors, for example, and therefore the change in firm performance can be more directly assigned to bank failure. About 40% of the enterprises are from the industrial sector. The control group consists of 114 enterprises with similar size and industrial structure as the treatment group in 1997. The firms in my sample are privately owned with a few exceptional municipal firms. Less than 10 firms are foreign-owned.

Table 2 gives the summary statistics for the firms in the sample in 1997, the start of my sample frame. Average annual sales is higher for treatment firms while the medians are at a similar level for both groups. The average profit is higher for the treatment group while the median is higher for control firms. In section 4 I explore more deeply the differences between the financial ratios of the two groups of firms. The

age structure of the firms in both groups is similar. The average age is a little more than six years. The share of exporting firms is higher in the control group, where 53% of firms were involved in exporting their products versus 43% in the treatment group.

A first look at the data reveals significant firm attrition. Almost 35% of treatment and 18% of control firms were erased from the Enterprise Register by 2002.[11] Hence, it is important to explore whether this attrition is related to the bank failure or not. I analyze firm survival with a logit model conditioning on 1997 firm performance, that is, performance before the bank crash. In particular, I control for 1997 profitability, leverage, size, age, and industry. Next, I also estimate a duration model of firm exit hazard — the per-period probability of firm bankruptcy.[12] This model allows me to focus on the timing (year) of the exit, which is important for detecting the lag between the bank failure and firm failure. I define the firm exit year as the last year when the firm submitted its financial statements to the Enterprise Register.[13]

After analysing firm survival, I explore the evolution of several firms' performance indicators. In order to identify the specific channel through which bank failure affects firms I look at profitability, liquidity, and the growth rate of fixed assets. First, I present a simple before-and-after analysis — the difference in differences comparisons of treatment and control firms' performance. Specifically, I calculate the mean values of performance measures for the years before and after the bank failure and I compare the change in the treatment firms' performance with that of control firms.[14] Second, I use yearly panel data to test for the presence of a "treatment effect" on firm performance after conditioning for industry and firm fixed effects. Compared to the difference in differences analysis, panel data estimation allows one to identify the year in which the client firms' performance deteriorates.

[11]Firms exit from the register either because of bankruptcy or liquidation. In both cases the firm is out of business.

[12]See Shumway (2001) for an application of hazard models to firm bankruptcy.

[13]The official bankruptcy date therefore may differ from the one used by me (the courts work slowly) but I consider that following the financial statements reveals the firm's struggle well.

[14]I exclude the 1998 values in this analysis.

4 Results

4.1 Firm Survival

In this section I first estimate the probability for a firm to survive untill 2002.[15] Specifically, I ask whether the chances of survival are different for the failed bank clients compared to other firms. I estimate the logit model and control for the treatment dummy, a constant term, a set of industry indicators, and 1997 firm-specific performance information. The binary dependent variable "Survival" in the logit model has a value of 1 if the firm is still in my sample in 2002 and 0 if, by 2002, the firm is bankrupt or liquidated. The results are presented in column (1) of Table 3.[16]

All included firm-specific variables are statistically significant. The coefficient on the 1997 profitability variable has a positive sign and the coefficient on the 1997 leverage ratio has a negative sign,[17] suggesting that more profitable and less leveraged firms are more likely to survive.

The logarithm of sales is included in the regression in order to control for the size of the firm.[18] The coefficient on this variable has a negative sign, suggesting that small firms are more likely to survive. This is a somewhat puzzling result because usually small firms are considered more likely to go bankrupt (Ohlson 1980).[19]

I also test for the effect of firm age. Column (1) in Table 3 includes a dummy for the youngest firms established in 1996-97. The coefficient of this variable is significantly negative. Firms established in 1996-97 are 19% more likely to go bankrupt than the firms established before 1996.[20] This result is consistent with theoretical predictions

[15]Ohlson (1980) was one of the first to use logit analysis in the context of firm bankruptcy.

[16]In column (2) of Table 3 are the marginal effects. All the marginal effects in the logit and later in the hazard estimation are calculated at the means of the independent variables.

[17]I define leverage as total liabilities to total assets. The results are robust if the loans to total assets ratio would be used instead.

[18]Results are robust to the use of the logarithm of total assets as an alternative proxy for firm size.

[19]The negative coefficient of the logarithm of sales variable might be accounted for by the restructuring of the large Soviet-time firms (see also footnote 20 for more details).

[20]In an unreported specification I also test (1) whether less liquid firms are more likely to fail; (2) whether the large firms established during Soviet times were more likely to be the ones which collapse after the bank failure (note that in my data I do not observe the renaming and reorganization of

(Diamond 1991) as well as empirical findings (Westgaard and van der Wijst 2001).[21]

The most important result is the statistically significant negative coefficient on the treatment dummy. Treatment firms are 13% more likely to go bankrupt compared to control firms. This result means either that treatment firms are weaker firms than firms in the control group (but this weakness is not accounted for by the 1997 financial characteristics) or that the bank failure has had a negative effect on the treatment firms.[22] Therefore it is important to understand the reasons for the bank bankruptcy.

After bank closure both bad loans as well as weak security portfolio management were pointed out as reasons for bank failure. An argument against the reverse causality story (bad loan portfolio) is provided by the Bank of Estonia's Banks Inspection report. In this report the Banks Inspectorate evaluated the Land Bank's last balance sheet. On the asset side an additional 12 million kroons (approximately 1% of total assets) were added for the provision of credit. At the same time shares and bonds were written off in the amount of 286.6 million kroons (23% of total assets). The Land Bank's exposure to the stock market was much larger compared to peer banks. At the beginning of 1997 the share of securities in total assets was 15%, while for the peer banks the average figure was 14%. By September (one month before the stock market crash) the Land Bank's share of securities had risen to 33%, while for the other banks the average figure was 19%. In absolute terms the Land Bank's security portfolio increased 5.5 times from January to September while the loans to commercial undertakings almost did not change. This is direct evidence that the decline in the stock market at the end of 1997 had a much larger effect on the failed bank compared to the other banks.

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firms); (3) whether firms with and without credit behave differently; (4) whether exporting firms are more likely to go out of business after 1998; and (5) whether firms with a credit line in the failed bank (this provides a proxy for the closeness of the bank-firm relationship) are affected more by the bank failure. None of these hypotheses were supported by the data.

[21] In estimations not reported here I also confirm that treatment firm survival is not different from control firms with respect to performance measures. I did this by adding to the logit regression interaction terms of treatment dummy and performance measures but the observed coefficients were insignificant.

[22] A possible problem of this methodological approach is that the control firms may differ from treatment firms based on some financial characteristics. Hence, there might be the question whether we compare similar firms to start with. To overcome this I use a propensity score matching based on firms' observables to detect the treatment effect on firm survival. The treatment effect is still found and it is highly statistically significant. See section 4.2 for details.

Big damages in the stock market caused the bank's loss of liquidity. The Land Bank suffered also because of changes in the commercial bank regulations introduced by the Bank of Estonia. In summer 1997 the risk weight on local government lending was increased from 50% to 100% and in October the capital adequacy ratio was increased from 8% to 10%.

To shed light on the issue of bank failure as a trigger of firm failure, it is important to test when exactly the exit of firms occurred. If treatment firms went out of business shortly after bank failure, this would help to support the hypothesis that the bank bust causes client firm failure. I estimate a discrete-time logit-specification duration model, where duration corresponds to years of firm presence in my sample. Duration models build upon the concept of a hazard function, which is defined as the probability of leaving a given state at a specific duration conditional upon staying there up to that point. Such a simple duration model boils down to a logit estimation using each year of firm presence in the data as one observation.[23]

In the duration analysis, each observation corresponds to a firms' submission of an end-of-year financial report to the Enterprise Register.[24] The dependent variable has a value of 0 if a firm exists in the next (year) period and equals 1 if a given firm exits the sample in the next period. I control for the differences in initial financial characteristics of firms by including the 1997 firm-specific data into my duration model. I also include year dummies (to absorb the economy-wide effects), industry dummies, and the interaction terms of treatment and year dummies. The last regressors are of interest since they detect whether the exit hazard for treatment firms is higher in some particular year after a bank crash.

The results are reported in column (3) of Table 3. The initial firm profitability is negatively related to going bankrupt in the next period. Firms with high profit ratios are less likely to disappear but this coefficient is estimated imprecisely. Also, more leveraged, large and young firms are more likely to exit the sample, confirming the

[23]I do not consider unobservable heterogeneity in the duration model (Heckman and Singer 1984) due to the small amount of data available.

[24]My sample was selected based on the firms existing in 1997. Therefore the 1996 data are conditional on firms existing in 1997 and are not useful in this estimation.

results from the logit regression for survival. The coefficients of treatment and year dummies interaction terms are positive and significant for 1998 and 1999. This means that treatment firms were more likely to exit than other firms in 1998 and 1999. In year 2000, 2001 and 2002 the interaction terms are insignificant, suggesting little difference between the exit rates of treatment and control firms. Hence, the hazard estimation confirms that treatment firms are more likely to fail just after their bank's failure and that the effect decreases over time.

The analysis in this section confirms that treatment firms are more likely to go out of business compared to other firms. My analysis allows for the interpretation of this result as the effect of the bank failure. Hence, I find a real long term negative effect of bank failure on the economy. Compared to the firm-level studies on bank failure in the U.S. or Japan (Slovin, Sushka, and Polonchek 1993, Yamori and Murakami 1999), which detect the announcement effect (negative returns to the failed bank client firms assets prices) the effect I find is more severe.[25] The reason for the different size of the effect may be that Estonian firms in the study are smaller and more dependent on bank finance. Those firms do not use public equity and the main source of outside financing is bank credit. The result found might be magnified because of the change of environment. The bank failure in 1998 was shortly followed by the Russian crisis, causing the general tightening of bank credit in Estonia in 1999.[26]

4.2 Firm Performance

After identifying the impact of bank failure on client firms' existence it is natural to ask whether the effect of bank failure is manifested in firms' performance measures. In the following analysis I consider the evolution of three measures: profitability, liquidity and growth rate of fixed assets as a proxy for investment (see Table 1 for the definitions of variables).

It is natural to expect bank failure to affect firm liquidity. The client firms' accounts

[25]In a recent study on U.S. county-level data, Ashcraft (2005) shows that local bank failure has a permanent negative effect on real county income.

[26]Estonian total banking sector credit volume was 127, 164 and 151 billion 1997 Estonian kroons for 1997, 1998 and 1999, respectively.

in the failed bank were frozen. Therefore as long as the client firm kept most of its liquid assets in the failed bank, the liquidity of the firm has to decrease. The effect on client firms' profitability may bite through competition from firms which do not experience any liquidity difficulties. The growth rate of fixed assets is expected to decrease after bank failure due to the difficulties of changing creditors. Hence, there are fewer sources of funds available for investment.

I start out by conducting a difference in differences analysis across treatment and control groups over time; the results are reported in Table 4. First, profitability was significantly lower for treatment firms before 1998. This may be explained by the fact that more profitable firms generate enough internal funds and they do not need to borrow from the bank.[27] After 1998 the means of the profitability of the two groups becomes insignificantly different because of a significant decrease of profitability in the control group. Second, the share of liquid assets was smaller in both time periods for treatment firms, but more importantly the liquidity of treatment firms decreases over time while the control firms' liquidity does not change. This is in accord with the prediction that bank failure adversely affects the client firms' financial state. Third, the means of investment were not statistically different across the two groups of firms before and after 1998. Investments decreased significantly for both groups of firms over time. Note that the number of firms is much lower in the first period (due to calculating growth rates we lose one firm-year). Hence, the investments from the first period is likely to be biased since the youngest firms' growth rates are not represented.

Based on a comparison of the two groups we see that some treatment firms' financial characteristics are different from the control firms' before bank failure but only liquidity reveals the deterioration of client firms' performance after the bank crash compared to the other firms.

Still, the differences in treatment and control firm financial characteristics before the bank failure might signal that the control firms are really not comparable to treatment firms. To overcome this, I perform simple one-to-one matching[28] based on 1997

[27]See Bartowski, Grosfeld, and Rostowski (2000) for more information about investment and finance in de novo private firms in transition countries.

[28]I use the psmatch2 command in STATA. The matching was done on common support with

profitability and liquidity to focus only on firms with similar characteristics before bank failure. As a result 84 treatment firms are matched with 80 control firms.

Table 5 reproduces Table 4 results on the matched subsample of firms only. In this subsample the financial characteristics of firms in the treatment and control group before 1998 are not statistically different (this was the objective of the matching). The significant loss of liquidity for treatment firms over time is still present in the data. In Table 6 the results of Table 3 are reproduced on a subsample of matched firms. The first two columns refer to the firm survival analysis with a simple logit model. The treatment dummy has a negative and statistically significant coefficient but more importantly the magnitude of the effect is identical to the one obtained on a complete sample. I find that the treatment firms are now 12% more likely to exit than control firms compared to 12.8% on the complete sample. The rest of the coefficients are very similar to the results in Table 3 except that the estimate of the profitability has increased from 0.294 in the complete sample estimation to 0.833 in the subsample. Hence, one unit increase in profitability contributes more for the firm survival in the subsample than in the complete sample of firms. The results of the Hazard function estimation are reported in column 3-4 in Table 6 and they are similar to the results in Table 3. The only concern is that none of the marginal effects of the interaction terms shown between the year and treatment dummies are significant. The most significant is the interaction of the 1998 year dummy and the treatment dummy at the 11% significance level. Hence, the results from the subsample analysis still support the original finding that the failure of a bank is closely followed by the failure of the client firms only at the lower significance level.

Next, I perform panel data estimation using the same three financial ratios as in the difference in differences analysis. The panel data estimation allows one to detect the yearly changes in the treatment firm performance compared to control firms. I run a fixed effect model. The estimated regression is of the following form:

$Y_{it} = \alpha_0 + \alpha_i + \delta T_i + \beta D_t + \gamma T_i * D_t + \varepsilon_{it}$,

where i=1 to 233 is the firm index and t=1 to 5 is the year index. Y is either

replacement and trimming at the 30% level.

profitability, liquidity or investment. ε_{it} is a symmetrically distributed error term. D is the year dummy, T is the treatment group dummy and $T * D$ is the interaction term between the treatment and year dummies. The interaction term is calculated for the years 1998, 1999 and 2000 to capture the potentially different behavior of the treatment group after the bank crash. The interaction terms are of interest in this regression analysis.[29] All regressions include industry dummies.

Table 7 contains the results of the fixed effect model but, for brevity, only the interaction terms of treatment and year dummies are presented. If the failed bank's client firms are performing worse than other firms after 1998 then the coefficients in front of the interaction terms should be negative and significant. I find only one statistically significant estimate of interaction terms. The coefficient of the interaction of 1999 and the treatment dummy in the liquidity regression has a negative significant estimate. Hence, treatment firms' liquid assets decreased in 1999 more than the control firms'. This confirms the findings from the difference in differences analysis — bank failure decreases clients' liquid asset base just one year after bank bankruptcy.

However, note that if a firm went out of business, we do not see it anymore in the sample and it is not taken into account in calculating the means of financial ratios. So the difference in differences and the fixed effect analyses are biased since the comparison samples are conditional on the firm's existence. I face a sample selection problem — the exit of firms may be related to unobservables in the performance equations. The bias is likely to be larger for the profitability and liquidity variables, which are well known bankruptcy predictors (Altman 1968).

There are several ways to overcome the sample selection issue. One may want to use the procedure proposed by Heckman (1976), which incorporates the inverse Mill's ratio from a probit estimation of firm survival into the least-square estimation method of firm performance measures. I cannot execute this procedure because I lack an exclusion restriction. I do not observe any measure that would be connected only to firm failure

[29]It is found in the empirical studies of corporate finance that firm characteristics like size, sales growth, etc. help to determine firm profitability, liquidity, and investment. However, the inclusion of other co-variates raises the potential issue of simultaneous equation bias. In unreported regressions I included firm characteristics in my basic specification. This did not change the estimates of the interactions of the treatment and year dummies.

but not to firm performance. However, the Symmetrically Trimmed Least Squares estimation method (STLS) (Chay and Powell 2001) is available for testing liquidity and profitability — the two measures that are linked with firm exit. The observed values of the dependent variables are truncated and therefore the dependent variables have an asymmetric distribution. STLS restores symmetry by trimming the data from above, which allows one to use the least-squares method of estimation. The standard errors are bootstraped.

Table 8 presents the results of the STLS estimation.[30] Again, only the coefficients of the treatment dummy and the interaction terms between the treatment and year dummies are reported. The treatment dummy is a significant regressor in both regressions. This supports the difference in differences analysis — the negative sign in front of the treatment dummy confirms that the treatment firms are less profitable and less liquid. The coefficients in front of the interaction terms between the treatment and year dummies are insignificant, except for the interaction of the year 1999 and treatment dummy in liquidity estimation. The estimate of this interaction term is negative and statistically significant at the 10% level. Therefore, the STLS estimation confirms the fixed effects analysis, although at a lower confidence level.

The analyses in this section confirm that the bank failure has had a negative effect on client firms' liquidity while it has had no negative effect on clients' profitability and investments compared to other firms. Hence, liquidity seems to be the channel linking the failure of the bank to the failure of client firms.

5 Conclusions

This paper investigates the effect of bank failure on client firm performance. The study is based on a bank bankruptcy in Estonia in 1998. Since bank financing is a significant source of external funds for firms in countries undergoing market reforms, the question of the impact of bank failure is an important field of study.

The research based on bank failures in the U.S. and Japan argues that negative

[30]The STLS results are robust to the truncation level of the dependent variable.

news about a bank causes a decrease in the client firms' stock price. The length of the effect varies from a few days to a few months. In my study the client firms are not listed on the stock market. My analyses rely on yearly firm financial statements. I find that client firms are 13% less likely to survive until 2002 compared to other firms. The exit rate of client firms is higher just after bank failure compared to other firms, supporting the idea that the bank's closure was the reason why the firms went out of business. I find that young, more leveraged, less profitable and large firms are more likely to fail.

I also study the effect on the performance measures of firms. I find that the client firms' share of liquid assets to total assets decreases after bank failure compared to the other firms. The loss of liquidity may be the channel through which bank failure transfers to client firms' failures. My results confirm that bank dependence is an important issue in transition economies. An important policy implication of my paper's finding is that banking authorities should seriously bear in mind the spill-over effect of bank failure on firms when considering whether to offer a bailout package to a failed bank or not.

This study relates to several research areas. First, it links to the literature on the effects of banking crises on economic conditions (Bernanke 1983). Second, by looking at the relationship between company performance and bank insolvency, the paper also provides microeconomic insight into the rich body of research on the link between financial system and economic growth (see e.g. Levine and Zervos 1998, Rajan and Zingales 1998, and Filer, Hanousek, and Campos 1999). Third, the paper also fits into the growing corporate finance literature on the determinants of company performance and the impact of financing constraints on the behavior of firms (Fazzari, Hubbard, and Petersen 1988).

In light of my results further research should be encouraged on the bank failure effects on client firms in financially less developed and more bank-dependent economies. It also would be interesting to know whether the bank failure affects stock market-listed and unlisted firms differently in developed countries.

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TABLE 1—TESTABLE PREDICTIONS

Characteristics	Proxies	Predicted relationship
Profitability	Return on assets (pf) = profit from normal activities / total assets	$pf_A < pf_B$
Liquidity	Liquidity (liquid) = (current assets - current liabilities) / total assets	$liquid_A < liquid_B$
Investment	Growth rate in fixed assets (grfa)= change in fixed assets / fixed assets	$grfa_A < grfa_B$

NOTE: Here subscript A (B) refers to the ratio after (before) the bank crash.

TABLE 2—SUMMARY STATISTICS

	Treatment group			Control group		
Variable	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Industry structure						
Agriculture	6.72			7.02		
Manufacturing	40.34			40.35		
Trade	34.45			34.21		
Transport	5.04			5.26		
Real estate	8.40			8.77		
Other	5.04			4.39		
Sales	24,30	5,45	92,70	15,40	5,25	40,60
Profit from normal operations	0,27	0,02	1,92	-0,11	0,11	3,54
Age (in years)	6,28	4	11,2	6,54	4	12,9
Share of firms exporting	43.70		49.81	52.63		50.15
Share of survived firms	64.70		47.99	82.45		38.20
Number of firms	119			114		

NOTE: Sales and profits are given in millions of 1997 Estonian kroons.

TABLE 3—LOGIT AND HAZARD RESULTS FOR FIRM SURVIVAL

	Logit	Marginal Ef.	Hazard	Marginal Ef.
	(1)	(2)	(3)	(4)
Treatment dummy	-.782	-.128		
	(.36)**	(.057)**		
Profitability in 1997	1.791	.294	-.677	-.021
	(1.065)*	(.175)*	(.749)	(.749)
Leverage in 1997	-2.18	-.358	1.346	.042
	(.732)***	(.118)***	(.501)***	(.016)***
Log sales in 1997	-.349	-.057	.268	.008
	(.117)***	(.018)***	(.087)***	(.003)***
Established in 1996-97 dummy	-.992	-.196	.787	.033
	(.525)*	(.116)*	(.391)**	(.021)
1998 * Treatment dummy			2.02	.142
			(.691)***	(.080)*
1999 * Treatment dummy			1.827	.120
			(.697)***	(.078)
2000 * Treatment dummy			.65	.026
			(.617)	(.032)
2001 * Treatment dummy			.03	.001
			(.6)	(.019)
2002 * Treatment dummy			.715	.030
			(.887)	(.048)
Const.	10.075		-11.053	
	(2.198)***		(1.82)***	
Obs.	233	233	1132	1132
Pseudo R^2	.194		.133	

NOTES: Standard errors are in brackets. ***, ** and * denote significance at the 1, 5 and 10 percent levels, respectively. Treatment dummy equals 1 if the firms was a client of the failed bank and 0 otherwise. Profitability is defined as profit from normal activities / total assets. Leverage is defined as total liabilities / total assets. All regressions include industry and year dummies. Marginal effects are calculated at the means of independent variables.

TABLE 4—DIFFERENCE IN DIFFERENCES ANALYSIS

Profitability		Before	After	Difference	t-statistic
	Treatment	-.044(119)	-.042(95)	-.002	-.048
	Control	.069(114)	-.011(108)	.080	1.875
	Difference	-.113	-.031	-.082	
	t-statistic	-3.912	-.633		
Liquidity		Before	After	Difference	t-statistic
	Treatment	.490(119)	.413(95)	.077	2.199
	Control	.585(114)	.579(108)	.006	.165
	Difference	-.095	-.166	.071	
	t-statistic	-2.773	-4.372		
Investments		Before	After	Difference	t-statistic
	Treatment	.206(58)	-.169(95)	.375	4.268
	Control	.225(49)	-.04(99)	.264	3.284
	Difference	-.019	-.13	.111	
	t-statistic	-.239	-1.47		

NOTES: Number of firms is in brackets. Profitability is defined as profit from normal activities / total assets. Liquidity is defined as (current assets - current liabilities) / total assets. Investments are defined as change in fixed assets / fixed assets.

TABLE 5—DIFFERENCE IN DIFFERENCES ANALYSIS IN SUBSAMPLE

Profitability		Before	After	Difference	t-statistic
	Treatment	.014(84)	-.030(67)	-.044	1.078
	Control	.044(80)	-.003(77)	-.046	1.165
	Difference	.029	.027	-.002	
	t-statistic	-1.419	-.506		
Liquidity		Before	After	Difference	t-statistic
	Treatment	.000(84)	-.114(67)	-.114	2.050
	Control	-.010(80)	-.024(77)	-.014	.171
	Difference	-.010	.090	.100	
	t-statistic	.322	-.948		
Investments		Before	After	Difference	t-statistic
	Treatment	.194(43)	-.086(67)	-.280	3.080
	Control	.225(40)	-.075(70)	-.300	3.462
	Difference	.031	.011	-.020	
	t-statistic	-.357	-.122		

NOTES: Number of firms is in brackets. Profitability is defined as profit from normal activities / total assets. Liquidity is defined as (current assets - current liabilities) / total assets. Investments are defined as change in fixed assets / fixed assets.

TABLE 6—LOGIT AND HAZARD RESULTS FOR FIRM SURVIVAL ON SUBSAMPLE

	Logit	Marginal Ef.	Hazard	Marginal Ef.
	(1)	(2)	(3)	(4)
Treatment dummy	-.931	-.120		
	(.43)**	(.054)**		
Profitability in 1997	6.452	.833	-4.697	-.116
	(2.105)***	(.257)***	(1.666)***	(.041)***
Leverage in 1997	-3.042	-.393	2.188	.054
	(1.036)***	(.134)***	(.698)***	(.019)***
Log sales in 1997	-.297	-.038	.237	.006
	(.142)**	(.018)**	(.118)**	(.003)**
Established in 1996-97 dummy	-.892	-.142	.484	.014
	(.617)	(.117)	(.459)	(.016)
1998 * Treatment dummy			2.41	.164
			(.857)***	(.104)
1999 * Treatment dummy			2.982	.259
			(1.119)***	(.19)
2000 * Treatment dummy			.843	.029
			(.749)	(.036)
2001 * Treatment dummy			.163	.004
			(.717)	(.02)
2002 * Treatment dummy			-.332	-.007
			(1.258)	(.024)
Const.	26.219		-10.066	
	(2.734)***		(2.443)***	
Obs.	164	164	807	807
Pseudo R^2	.2		.163	

NOTES: Standard errors are in brackets. ***, ** and * denote significance at the 1, 5 and 10 percent levels, respectively. Treatment dummy equals 1 if the firm was a client of the failed bank and 0 otherwise. Profitability is defined as profit from normal activities / total assets. Leverage is defined as total liabilities / total assets. All regressions include industry and year dummies. Marginal effects are calculated at the means of independent variables.

Table 7—Fixed Effect Estimation Results

	Profitability	Liquidity	Investment
	(1)	(4)	(5)
1998*Treatment dummy	.047	-.017	.725
	(.045)	(.045)	(1.06)
1999*Treatment dummy	.046	-.054	1.005
	(.047)	(.025)**	(1.093)
2000*Treatment dummy	.049	-.038	.799
	(.048)	(.026)	(1.093)
Obs.	946	948	704

Notes: Standard errors are in brackets. ***, ** and * denote significance at the 1, 5 and 10 percent levels, respectively. Treatment dummy equals 1 if the firms was a client of the failed bank and 0 otherwise. All regressions include industry and year dummies.

Table 8—STLS Estimation Results

	Profitability	Liquidity
	(1)	(3)
Treatment dummy	-.105	-.071
	(.023)***	(.024)***
1999 * Treatment dummy	.054	-.041
	(.045)	(.034)
2000 * Treatment dummy	.069	-.079
	(.056)	(.047)*
2001 * Treatment dummy	.065	-.062
	(.046)	(.049)
Obs.	946	946

Notes: Standard errors are in brackets. ***, ** and * denote significance at the 1, 5 and 10 percent levels, respectively. The standard errors are bootstraped: based on 100 replications of the data the model is re-estimated revealing the variations of the coefficients. Treatment dummy equals 1 if the firms was a client of the failed bank and 0 otherwise. All regressions include industry and year dummies.

What Do We Know about the Capital Structure of Small Firms?

Karin Jõeveer*

Abstract

There are no stylized facts about the capital structure of small firms. Therefore, in this paper I use firm data from 10 Western European countries to contrast the sources of leverage across small and large firms. Specifically, I jointly evaluate the explanatory power of firm-specific, country of incorporation institutional, and macroeconomic factors. Using data that is more comprehensive in coverage than that used in the existing research, I confirm the stylized facts of the capital structure literature for large and listed firms, but I obtain contrasting evidence for smaller companies: First, the country of incorporation carries much more information for small firms, supporting the idea that small firms are more financially constrained and face non-firm-specific hurdles in their capital structure choice. Second, using two different leverage measures I show that the relationship of firm size and tangibility to leverage is robust to the measure used for listed, but not for unlisted, firms.

Keywords: capital structure, publicly traded and privately hold companies, Europe.

JEL classification: G32

*I am indebted to Štěpán Jurajda for many valuable discussions and comments. I thank Ron Anderson and Jan Svejnar for their helpful comments. The paper was written while I was visiting the William Davidson Institute (WDI), University of Michigan Business School. I would like to thank WDI for their hospitality and data access. I gratefully acknowledge financial support from CERGE-EI and partial support from Charles University research grant GAUK 348/2005. Contact: CERGE-EI, P.O. Box 882, Politickych veznu 7, 11121 Prague 1, Czech Republic. E-mail: karin.joeveer@cerge-ei.cz.

1 Introduction

More than a decade ago Rajan and Zingales (1995) wrote a pioneering empirical capital structure study using international data. Since then a handful of papers in the field have emerged providing new evidence mostly based on large listed companies.[1] By contrast, the current study examines whether the capital structure findings from large companies are portable for small companies.

Differences between large and small firms have been pointed out in the firm growth literature. Evans (1987) shows that small firms have higher growth rates than large firms. More relevant to the study of capital structure, Carpenter and Petersen (2002) show that the growth of small firms is constrained by internal finance. Therefore, it appears very important to explore the capital structure of small firms as well as large firms. Small firms are huge, when taken as a whole. The European Commission and Eurostat (2001, page 15) claim that firms with less than 250 employees account for two-thirds of all jobs and about half of the turnover of the non-agricultural sector in the European Union.

Based on theoretical capital structure studies we know that firm capital structure emerges from three sources: firm specific, country institutional, and macroeconomic factors.[2] The implications of theoretical studies have been tested in numerous empirical papers. The most attention has been placed on firm-specific characteristics determining the capital structure (Bradley, Jarrell, and Kim 1984, Titman and Wessel 1988). The latest study, based on U.S. firms (Frank and Goyal 2004), has found that firm characteristics explain approximately 30% of within-country firm leverage variation. Among firm variables, industry is a significant determinant of leverage. Industry alone

[1]This is largely due to the data availability. Stock market-listed firms are required to report annual financial records by law, and usually the accounting standards for those firms across countries are the same.

[2]For example, Harris and Raviv's (1990) agency cost model shows that leverage is positively related to firm value and liquidation value, and Myers (1977) points out the importance of firm growth opportunities. In Modigliani and Miller's (1963) trade-off theory, firms trade off the benefits from tax shields of debt with potential bankruptcy costs. Hence, the tax rate is considered an important determinant of firm leverage as is the legal and administrative costs of bankruptcy. Jensen and Meckling (1976) stress the importance of investor protection in a country. Finally, Levy and Hennessy (2007) spells out the importance of domestic macroeconomic factors.

has been found to explain up to 25% of within-country leverage variation (Bradley, Jarrell, and Kim 1984). Korajczyk and Levy (2003) show that for U.S. firms, macroeconomic variables can explain as high a share of leverage variation as firm factors. A cross-country capital structure study by Booth, Aivazian, Demirgüç-Kunt, and Maksimovic (2001) find that country dummies explain 43% of firm leverage variation in a sample of 10 developing countries during the period 1980-90. In more detail, Desai, Foley, and Hines (2004) show that the country tax rate explains the firm leverage level in different countries. Hence, there is empirical evidence for the importance of all three factors — firm, institutional, and macroeconomic — in determining firm capital structure. However, there is still a lack of studies spanning a large number of countries and different firm types simultaneously.

In this paper, I study both the effects of firm and country factors on small as well as on large firm leverage. This is important from two perspectives. First, I manage to quantify the relative importance of different sources across firm size and secondly, I overcome the possible omitted variable biases by including simultaneously factors from different sources.

In my study, I use firm data from 10 Western European countries. This data set has a number of attractive features for studying the determinants of capital structure. First, the firm coverage of my sample is well-balanced across firm sizes and industries. Second, my sample includes countries that have not yet been studied. Third, I use recent data (1995-2002).

I perform the analysis by using two different leverage measures. First, I use the broadest definition of leverage — total liabilities to total assets ratio. Second, I use a narrower leverage definition — total debt over debt plus shareholders funds ratio. The results are sensitive to the measure of leverage used for unlisted firms but not for listed firms. The mean for unlisted firms is much smaller than for listed firms, 18 and 432 employees, respectively.

I use analysis of variance (ANOVA) to answer the question of the relative importance of different sources (firm and country characteristics) for explaining firm leverage. I show that the influence of the factors on firm leverage differs across firm types. In

particular, country factors are less important determinants of capital structure for large firms than for small firms. This finding is in accord with Holmstrom and Tirole's (1997) prediction that small firms do not qualify to get external finance, and hence, the domestic macroeconomic and institutional factors are likely to contribute more to the determination of leverage. Large firms are more likely (Claessens and Schmukler 2007) to cross-list in international equity markets, confirming that for those firms the domestic financial market situation is less important. In a richer model, I add along with country dummies a set of country-specific variables known in the literature to explain firm leverage. Even after controlling for observable country variables, the country dummies still explain 11% of leverage variation for listed firms and 25% for unlisted firms. This finding suggests that there are significant (unobservable) institutional differences across countries explaining firm leverage.

In the last part of my analysis, I estimate a leverage regression on pooled cross-country data. I include in the regression firm-specific variables, country factors, and country and year dummies. Regressions with narrow leverage as a dependent variable produce consistent results across listed and unlisted firms. Coefficients of firm-specific factors have the same signs as in previous capital structure studies. Interestingly the signs are different for tangibility and size in the unlisted firm broad leverage regression. The main difference between my leverage definitions is that the narrow leverage does not include trade credit or other short-term non-debt liabilities. These items cover a large share of unlisted firm liabilities. Still, I show that the larger share of those items does not explain the different signs in leverage regressions.

In addition to the existing capital structure literature, my study is also related to several research areas in the field of corporate finance and industrial organization. First, it is closely connected to the literature on financial constraints and external finance dependence. Second, it is related to the firm growth and firm size distribution literature. Third, the stock market returns literature, which explores the significance of firm, industry and country characteristics in explaining stock returns, is also linked to the leverage of listed firms.[3]

[3]Morck, Yeung, and Yu (2000) show that stock prices move together more in poor economies than

The paper is organized as follows. In the next section, I briefly review the relevant empirical studies of capital structure. There I also introduce my question of interest and the empirical methodology for answering it. The data section follows and section 4 presents the results. Finally, I conclude and discuss the policy implications in section 5.

2 Determinants of Leverage and Methodology

As Myers (2003) notes, the present theories of capital structure are conditional. They are relevant in different settings. This is well documented in empirical studies of capital structure, which have found support for all theories. Firm behavior seems to be a hybrid of the proposed theoretical foundations.[4]

In a recent study, Frank and Goyal (2004) use U.S. publicly-traded firms over 1950-2000 and evaluate the importance of 36 factors (both firm- and economy-specific) on leverage.[5] They conclude that seven factors — median industry leverage, market-to-book ratio, collateral, profits, dividend paying, logarithm of assets, and expected inflation — are the most reliable.

The present empirical evidence on capital structure is that profitability as well as market-to-book ratio and dividend paying are negatively related to leverage. More profitable firms have larger internal slack and therefore a smaller need for external finance. Market-to-book ratio proxies growth opportunities and are negatively related to leverage due to the agency costs between the owners and bondholders. Dividend-paying firms are considered to be financially unconstrained, and unconstrained firms are expected to be less dependent on debt. Median industry leverage, collateral, log of assets, and expected inflation are found to be positively related with leverage. It

in rich ones — country factors matter more for firm stock price in poor markets. Campbell, Lettau, Malkiel, and Xu (2001) show that in the U.S., firm-specific factors gained importance over market factors during 1967-1997. Hence, it would be interesting to analyse how the importance of firm, industry and country effects has changed in terms of firm market leverage on long time-series data.

[4]Beside Myers (2003), see Harris and Raviv (1991) for a detailed review of theoretical and empirical capital structure studies.

[5]Frank and Goyal (2004) use Compustat data.

is natural to think that firms with more assets and more collateral available face less obstacles in receiving debt, and, hence have higher leverage. The expectation of high inflation makes credit cheaper today and therefore is positively related to leverage. Industry leverage is important since firms in the same industry are exposed to the same technology and therefore are likely to have a similar optimal financial structure.[6]

In contrast to Frank and Goyal (2004), Korajczyk and Levy (2003) find that the domestic macroeconomic conditions, besides inflation, help determine a firm's leverage.[7] They show that financially unconstrained firms take into account the macroeconomic situation when issuing debt or equity more than constrained firms, whose issue choice follows less the macroeconomic movements in the country.

Few papers have taken the challenge to pool firm data from different countries and shed light upon the effects of country differences on firm leverage. While controlling for macroeconomic factors, Demirgüç-Kunt and Maksimovic (1996) and Schmukler and Vesperoni (2001) try to pin down the importance of institutional factors. Demirgüç-Kunt and Maksimovic (1996) study the relation of firm financial structure to local capital market development. They aggregate firm level data to country averages. Their sample consisted of 30 developed and developing countries in 1981-1991. They find a statistically significant negative relation between the stock market development and the debt/equity ratio. They also observe a positive relationship between the local banking sector size and leverage.

Schmukler and Vesperoni (2001) are interested in the effect of a country's financial liberalization on firm capital structure. Their analysis is based on seven developing countries from Asia and South America in the 1980's and 1990's. Interestingly, they find that after financial liberalization (after achieving access to international debt and equity markets), the debt-to-equity ratios did not change, but the share of short-term

[6]MacKay and Phillips (2005) show that not only industry dummies but also firm position in its industry matters (e.g. proximity to median industry capital/labor ratio). Frank and Goyal (2004) show that omitting industry from the leverage regression turns many other firm characteristics significant. Hence, apparently industry captures a number of different effects.

[7]They use three macroeconomic variables — 2-year aggregate domestic non-financial corporation profit growth and 2-year equity market returns and commercial paper spreads — to describe overall tendencies in the market.

debt increased. So financial liberalization alters debt structure but not the debt/equity ratio.

The cross-country studies cited above show that some institutional factors are quantifiable and significant determinants of firm leverage even after controlling for macroeconomic variables.[8] In my research, I focus on the significance of country factors in leverage estimation and whether the effects of those factors are the same across firm types. Considering that previous research on the topic has been done on relatively large companies my study will shed light on small firm capital structure as well.

An important issue for empirical studies and their comparability is the precise definition of leverage used. Rajan and Zingales (1995) offer six different definitions of leverage.[9] Due to data limitations, I use two of them. First, the broadest definition of leverage — ratio of total liabilities to total assets — does not differentiate between the different sources of debt (accounts payable, bank debt, or bonds). Second, the narrow definition of leverage is the ratio of total debt (short- plus long-term credit) to debt plus shareholders funds. From now on I call the first measure "broad leverage" or "Leverage 1" and the second measure "narrow leverage" or "Leverage 2". I use only book leverage in my analysis because for unlisted firms the market ratio does not exist.[10] The theory of capital structure refers to the liabilities that are used for financing. Hence, the predictions of theory are more closely related to the narrow leverage measure (the broad measure includes also short-term items which might be used for transactions instead). Narrow leverage corresponds to the leverage Rajan and Zingales (1995) use in their empirical analysis.

I contrast the importance of firm characteristics with country characteristics in

[8]Frank and Goyal (2004) use only U.S. data and therefore only observe the time variation of country variables while not observing cross-sectional variation.

[9]Rajan and Zingales (1995) divide the leverage measures into two groups. The first group includes measures that evaluate the ratio of debt to assets, where the definitions of debt and assets vary across different measures. The debt can be measured as broadly as total liabilities. The second group includes measures that evaluate interest coverage.

[10]For listed firms I computed both book and market leverage ratios. I estimated exactly the same leverage specification as Rajan and Zingales (1995) and received similar estimates (the results of those estimates are available upon request). Hence, I conclude that my data quality is comparable to the data used in the existing capital structure studies.

determining the firm leverage ratio. I ask whether country effects have the same influence on all types of firms in a country. Is listed firm leverage determined by the same factors as that of unlisted firms? Do firms of different size have the same leverage determinants?

In answering these questions, I use two approaches. First, I perform an analysis of variance (ANOVA) of leverage for detecting the importance of the size, industry, and country factors in leverage variation. Second, I use regression analyses for comparing my study to previous research in the field.

The ANOVA exercise explains how much of the variation of the variable of interest is explained by different sets of variables. I use four sets of explanatory variables — size, industry, country, and year.[11] I categorize firms into five size classes[12] and use the 3-digit NACE industry classification (I have 51 industries).

Besides analysing how many different types of factors explain the leverage variation, I run a simple leverage regression to observe the direction of the effects. The basic form of the regression is the following:

$$Y_{ijt} = \alpha + \beta_j + \gamma_t + \delta X_{ijt} + \varepsilon_{ijt},$$

where i is the index of firm, j is the index of country, and t is the index of year. X_{ijt} contains the firm-specific variables profitability, tangibility, logarithm of assets, and median industry leverage. β_j is the country fixed effect and γ_t is the year effect. ε_{ij} is the random disturbance. In the next step, I am also interested in determining the country factors that matter to a firm's capital structure. Therefore, I add country-specific variables to the regression:

$$Y_{ijt} = \alpha + \beta_j + \gamma_t + \delta X_{ijt} + \zeta C_{jt} + \varepsilon_{ijt},$$

where C_{jt} are the country variables. Many different country characteristics have been proposed by earlier studies. Since some of those variables are strongly correlated

[11]The ANOVA estimation finds the total sum of squares of the dependent variable (SST), which is decomposed to the sum of squares of the model (SSR) and the sum of squares of the error term (SSE). Note that the ratio SSR/SST is the R^2 in the OLS regression. Also, ANOVA calculates for each explanatory variable the partial sum of squares.

[12]Class 1 firms have total assets smaller than $1 million. Class 2 firms have total assets between $1 and 2 million. Class 3 firms have total assets between $2 and 5 million. Class 4 firms have total assets between $5 to 50 million and finally, Class 5 firms have total assets above $50 million. The median number of employees in each size group is 10, 15, 22, 55 and 391, respectively.

with each other, I selected five measures to pin down the country effect. From macro factors I include GDP growth and inflation as Demirgüç-Kunt and Maksimovic (1996) did. GDP growth rate proxies the firms' growth opportunities. Since high-growth firms are expected to rely more on internal funds, the correlation of this variable with leverage is expected to be negative. The correlation of inflation and leverage is expected to be positive. As Holmstrom and Tirole (1997) note, it is important to consider the capital constraints of financial intermediaries. Total domestic savings to GDP proxies the capital supply of the domestic financial sector. A higher savings ratio should cause higher leverage levels. From institutional factors, I add the statutory corporate tax rate (including local taxes) and total market capitalization to GDP. Higher taxes should cause higher leverage while higher stock market development is expected to lead to lower levels of leverage.

3 Data

I use firm-level data from the Amadeus (Analyse Major Databases from European Sources) database, collected by Bureau Van Dijk. The company accounting statements are harmonized by Bureau Van Dijk making the cross-country comparisons reliable. Data are also available for unlisted firms. Due to national legislations, the coverage of financial variables varies across countries. This limits the number of countries included in the analysis[13] and affects my choice of variables.

The firms selected are the Amadeus Top 1 million companies (online version in February and March 2004). Those firms had to meet at least one of the following criteria to be included in Amadeus: operating revenue greater than 1 million euros, total assets greater than 2 million euros, and number of employees greater than 10. For firms from the United Kingdom, Germany, France, and Italy these cut offs were 1.5, 3 and 15, respectively. The European Commission defines firms with less than 10 employees as micro-enterprises. Hence, the Amadeus inclusion criteria bias the sample only against the smallest firms but provide an excellent possibility to analyse

[13]Amadeus data cover firms from 37 European countries.

the behavior of small and medium-sized firms.

I exclude a firm if: total assets were not given or were negative; the sum of detailed balance sheet items deviated more than 5% from total assets given; shareholders funds, current liabilities or non-current liabilities were not given; industry was missing; it was from the financial intermediation sector;[14] or the leverage ratio was less than 3 times the inter quartile range (IQR) away from 25th percentile or more than 3 times the IQR away from the 75th percentile (eliminating outliers).

My study is based on firms from 10 Western European countries. I compare the coverage of the final sample I use with data from "Enterprises in Europe" provided by the European Commission and Eurostat. These data cover the number of firms, employment and production of firms from the European Union and the European Free Trade Agreement countries. "Enterprises in Europe" is expected to cover the whole population of firms in the country.[15] I assess the representativeness of Amadeus data across firm size and industry. For comparison I divide firms into three size and six industry classes.[16]

Table 1 in the appendix presents the correlations of firm size distributions across industries and industry distribution correlations for each country. Amadeus data are well representative for most of the countries, except Germany and Switzerland. From Germany a small number of mainly large firms are covered by my data.[17] The industry representativeness of Amadeus is good on average. Manufacturing firms are over-sampled from all countries, while services, trade, and construction are under-represented in some countries.[18]

[14]The financial intermediation sector has a specific balance sheet structure. It is standard to disregard these firms in capital structure studies.

[15]For more details about "Enterprises in Europe" see Kumar, Rajan, and Zingales (2002).

[16]Note that firms are divided into size classes based on the number of employees. Only two-thirds of firms in my data report employment. Therefore, the coverage figures presented should be taken as proxies for the coverage of a full sample.

[17]Small- and medium-sized German firms are not legally forced to disclose (Desai, Gompers, and Lerner 2003).

[18]The representativeness of the Amadeus data is also presented in Gomez-Salvador, Messina, and Vallanti (2004). They find that firms in the Amadeus data cover on average 25% of the employment in National Labor Force Surveys. Different industries are well represented in Amadeus data. Gomez-Salvador, Messina, and Vallanti (2004) conclude that the industry coverage is similar across countries

The number of firms reaches 482,783 in 2000 in my sample. This is an order of magnitude more than in any present cross-country capital structure study of which I am aware. The existing cross-country studies use mainly the Global Vantage database (Rajan and Zingales 1995 and Demirgüç-Kunt and Maksimovic 1996) or International Finance Corporations (IFC) data (Booth, Aivazian, Demirgüç-Kunt, and Maksimovic 2001, Schmukler and Vesperoni 2001). In Rajan and Zingales's (1995) study of seven developed countries the largest sample of firms is from the U.S. (2583 firms) and the smallest from Italy (118 firms). In Booth, Aivazian, Demirgüç-Kunt, and Maksimovic (2001) the number of firms from each country remains below one hundred. Table 2 in the appendix presents the sources and sample sizes of the most cited cross-country capital structure studies. The average firm size in those databases is much larger than in my sample. Therefore, my study gives a better understanding of the average firm leverage.

Table 1 presents the balance sheet structure of the firms in my sample in the year 2000. Panel A has information about listed firms. The first four columns are comparable to Rajan and Zingales's (1995) Table 2. French and Italian firms' share of long-term debt is much lower in my sample. More than half of the firms from those countries do not report any long-term debt. My sample of firms is larger than Rajan and Zingales and it is likely that their sample covered a larger fraction of firms with long-term debt.[19] An interesting finding from comparing listed (Panel A) and unlisted (Panel B) firms is that the fraction of current liabilities is much larger for unlisted firms while the share of non-current liabilities as well as shareholder funds is larger for listed firms.

Table 2 presents mean and median leverage ratios across countries, stock market-listed and market-unlisted firms and two different leverage measures in 2000. Both leverage measures are higher for unlisted firms.[20] This confirms the finding of Table 1 that shareholders' funds are a more common source of finance for listed firms. Broad

and stable over time.

[19]See also a discussion about French and Italian firms' balance sheet structure in Giannetti (2003, page 190-191), who used the Amadeus sample as well.

[20]One exception is the narrow leverage in France. French unlisted firms use very little debt finance.

leverage is higher than narrow leverage and its level varies less across countries. The median broad leverage varies from 86% in Italy to 67% in Finland among unlisted firms and from 64% in Portugal to 50% in the United Kingdom (means are slightly lower) among listed firms. Median narrow leverage varies from 51% in Portugal to 0% in Italy among unlisted firms and from 51% in Portugal to 15% in Sweden among listed firms. The large difference between leverage measures in Italy documents that most of the Italian firms' financing comes from short-term non-debt financial sources.

I also make use of country-specific variables. Macro data (inflation, GDP growth ratio, and saving ratio) and capital market size info (total market capitalization to GDP) are from the World Bank, World Development Indicators. The statutory corporate income tax rate is adopted from Devereux, Griffith, and Klemm (2002).

4 Results

4.1 Analysis of Variance

In this section, I explore how much different sources explain leverage variation. I use pooled data across firms from different countries and over eight years. Pooled data analysis is more powerful than simple cross-sectional data analysis since it allows the incorporation of both firm- and country-specific factors plus time invariant country effects.

Table 3 Panel A presents the ANOVA results for listed firm broad leverage. The largest share (about 50%) of leverage variation is explained by industry dummies. Size dummies and country dummies explain 20% and 18%, respectively. In the second column, I add firm profitability and tangibility. The results seem to be robust to the inclusion of the firm-specific variables and the model gains 2% in descriptive power. In the last column of Table 3, I include in addition to firm characteristics the country-specific variables. The explanatory share of country dummies drops to 11%. Hence, unobservable country characteristics explain only 11% of listed firm leverage variation. Table 3 Panel B presents the comparable ANOVA results for listed firm narrow leverage. Differently from broad leverage, the inclusion of firm-specific characteristics decreases

the explanatory power of size and industry dummies significantly while the inclusion of country-specific variables does not decrease the explanatory share of country dummies.

Table 4 Panel A presents the corresponding results for unlisted companies' broad leverage. Country dummies explain close to half while industry and size dummies explain approximately one-fourth and one-fifth of leverage variation, respectively. The inclusion of firm characteristics in the second column does not change the results. Hence, the well-known firm characteristics contribute little to the leverage determination. The inclusion of country variables in column 3 decreases the significance of country dummies by half. Still, a large 25% of leverage variation is explained by unobservable country institutional factors. Table 4 Panel B presents the comparable ANOVA results for unlisted firm narrow leverage. For this leverage definition the country dummies are even more prevalent. The size and industry of the firm explain a minor share of leverage variation.

An interesting finding from comparing listed and unlisted firms is that while industry effects explain approximately 2.5 times more than country effects for listed firms, for unlisted firms the pattern is reversed — country effects explain roughly two times more than industry effects (for the narrow definition of leverage even five times more). Hence, it seems that the country of incorporation bears more valuable information for the unlisted firms. Both observable and unobservable country factors explain a larger share of the leverage variation of unlisted firms.

One explanation for the different influence of country factors for listed and unlisted firms is that listed firms have better financing opportunities. Being listed on the stock market can be considered as a signal of good quality and therefore the potential financing sources for those firms are not limited to domestic financiers. Claessens, Klingebiel, and Schmukler (2006) report that for high-income countries the market capitalization of international firms (firms that cross-list abroad) to total market capitalization is 56% in 2000. This explains why listed firm leverage variation is less explained by country factors compared to unlisted firms. Hence, for listed firms the industry technology carries the most important part of leverage determination. Unlisted companies on the other hand rely mainly on finance from the domestic market. Therefore, the country

factors matter a lot in explaining leverage variation.

Note that the adjusted R^2's are quite low. In a comparable study Booth, Aivazian, Demirgüç-Kunt, and Maksimovic (2001) received a R^2 above 40%. On the other hand, Schmukler and Vesperoni (2001) reported a R^2 as low as 4-12%. An open question is to what extent the low explanatory power of the existing empirical studies correspond to the measurement error in leverage ratios or alternatively to the lack of dynamic modelling.[21]

Since stock market-listed firms are on average much larger than unlisted firms, it is interesting to see how the firms from different size groups respond to industry and country effects. In Table 5 Panel A the results are presented for listed firm broad leverage.[22] Firms from the three smallest size groups are combined since the number of observations in each class separately were small. The industry dummies explain a larger share of leverage variation compared to country effects in all size classes. The same holds for narrow leverage (Table 5 Panel B).

Table 6 presents the results for unlisted firms. Up to the fourth size class of firms, country factors explain the biggest share of broad leverage variation (Panel A). The industry and country characteristics explain roughly the same share of leverage variation for firms in the fourth size group. The largest firms face a reversed pattern — industry effects largely dominate the country effects. In other words, we observe the dilution of country effects on firm leverage when firms become larger. The largest unlisted firms share a common feature with listed firms — industry effects dominate country effects. Hence, it is important to distinguish the size of the firm besides the traded/nontraded firm distinction. It appears that being listed does not affect the sources of capital structure for large firms. This might be since large firms are more likely to go public (Pagano, Panetta, and Zingales 1998) as well as more likely to issue equity in international markets (Claessens and Schmukler 2007). Interestingly for the narrow leverage definition (Table 6 Panel B) we observe the same pattern for all size classes — country factors remain the most important factor for all firms irrespective

[21] See Strebulaev (2007) for details about dynamic capital structure.

[22] Firm and country variables are not introduced here since they do not change the pattern of results.

of size. Table 7 shows the liability structure across size groups. Current liabilities are far more important for the smallest firms (Size 1). The liability structure of the largest firms (Size 5) resembles most the liability structure of listed firms in Table 2. The different results found in ANOVA on the size groups of firms while using different leverage measures call for attention.

The analysis in this section shows that both firm- and country-specific variables are important for explaining leverage variation. The relative importance of those factors varies by firm type. Small and unlisted firms are affected more by country characteristics irrespective of the leverage measure used. Half of the country explanatory power emerges from unobservable institutional factors for unlisted firms. Therefore, it is important to consider a firm's country of incorporation in a study of leverage even after controlling for observable country factors.

4.2 Regression Analysis

As in the ANOVA analysis I use pooled data in the regression analysis. I compare the results of this section with findings from earlier studies on capital structure. Table 8 reports the results. All regressions include country and year dummies, which are jointly statistically significant in all specifications.

Panel A of Table 8 reports the leverage regression results for listed firms. Columns 1 and 2 report the results for the broad leverage measure and column 3 and 4 for narrow leverage. All regressions include country and year dummies. In the 1st and 3rd column, no country-specific time-varying variables are included into the leverage estimation. All firm-specific factors are statistically significant in all specifications. Size[23] and tangibility are positively related to leverage. Profitability is negatively related to leverage. The signs coincide with the findings of earlier capital structure studies on firms from developed countries (Rajan and Zingales 1995). In the 2nd and 4th columns, I add a set of country time-varying variables. The goodness of fit almost does not change. As in ANOVA, the inclusion of country-specific variables absorbs

[23] All regression results are robust if, instead of the logarithm of total assets, the discrete size variable — the five size groups exploited in the ANOVA section — is used.

some part of the explanatory power of country dummies. Only two out of five country variables are statistically significant for the broad leverage regression and three for the narrow leverage regression. The higher savings ratio to GDP and lower stock market capitalization are related to higher leverage. Still note that the coefficients for country-specific variables are very small.

Panel B of Table 8 presents the results for unlisted firms. The coefficients on all firm characteristics in all specifications are statistically significant. For the narrow leverage measure (column 3 and 4) the coefficients have the same signs as for listed companies but the signs are negative for tangibility and size for the broad leverage regressions. Larger firms as well as firms with a higher share of tangible assets have lower broad leverage. Booth, Aivazian, Demirgüç-Kunt, and Maksimovic (2001) also found a negative coefficient on tangibility in their sample of firms from developing countries. They define leverage as total liabilities over total liabilities plus net worth, which corresponds to my broad leverage definition. It is well known for transition countries to have a negative coefficient for tangibility (Cornelli, Portes, and Schaffer 1998). Cornelli, Portes, and Schaffer's result was robust for two leverage definitions — total debt to total assets and total bank debt to total assets. Therefore, the negative coefficient in front of tangibility in my broad leverage regression of unlisted firms from Western European countries is consistent with the results from less developed countries. The negative sign in front of size is puzzling.[24] One explanation for the negative relation between size and leverage may be that size proxies firm growth opportunity, which is expected to be negatively related to leverage. This is supported by Evans's (1987) finding that small firms grow more quickly.

Four out of five country variables in unlisted firm leverage regressions have highly statistically significant coefficients for both leverage measures. As in the case of listed firms the coefficients have very low values. The negative signs for GDP growth in both leverage measure regressions contradict theoretical predictions, as do the negative coefficients on inflation and savings rate in the broad leverage regression.

[24]In fact, Rajan and Zingales (1995) found a negative significant coefficient in front of size for German listed firms.

The main difference between the two leverage measures used in my analysis is the inclusion of trade credit and other non-debt current liabilities in the broad leverage measure. As was shown in the section on the ANOVA analysis, unlisted firms (see Table 1) and small firms (see Table 7) have on average a larger share of current liabilities. This may be considered as a potential explanation of the negative signs in front of tangibility and the log size in the broad leverage regressions. To see whether the larger share of current liabilities explains those negative signs I run the broad leverage measure regression across size groups. Table 9 presents the results. In Panel A for listed firm regressions we see that the signs are really different for the smallest firms — tangibility as well as size enter with negative coefficients. From Panel B for unlisted firms we see that the signs in front of tangibility and the logarithm of size change across size groups but we can not conclude that the signs are negative for smaller firms and positive for larger firms. Therefore, the larger proportion of current liabilities does not explain the flipped signs in the broad leverage regression.

I run the regressions also on cross-sectional data to see whether the results are stable over time and over countries. I find firm-specific factors to have stable coefficients over time for both leverage measures. The coefficients in front of country-specific time-varying variables change signs and significance over the years. This might be explained by the lack of variation in economy-wide variables across countries due to the similarity of countries in my study. I observe different signs on estimated coefficients in front of firm-specific variables in some country regressions compared to the pooled regression.[25]

5 Conclusions

I use a large European firm data set to study the sources of leverage variation and provide the first available evidence on capital structure determinants for small firms. The importance of firm versus country factors in driving firm capital structure varies across firm types. Country-specific factors are the most important for small and unlisted firms, suggesting that these firms, which are likely to operate under borrowing con-

[25]More specific results of year-specific and country-specific regressions are available on request.

straints, face non-firm-specific determinants of leverage. Specifically, I control for five country-specific time-varying macroeconomic variables while capturing the effects of time-invariant unmeasured country factors (such as institutions) using a set of dummy variables. I find that the share of leverage variation related to country-specific unobservable factors for listed and unlisted firms is approximately 10 and 25 percent, respectively. This is an important finding for at least two reasons: First, apparently a change in domestic macroeconomic variables and/or financial institutions can change a firms financial structure. Second, research in the field of capital structure should pay more attention to the investigation of country-of-incorporation factors.

I use two leverage measures in my analysis and I find that the results are robust to the measure used for the listed firms but not for unlisted firms. The main difference between the two measures is that the broad one includes trade credit and other current liabilities. My findings based on listed firms are in accord with the existing theory and empirics of firm capital structure in that I find a positive relationship between firm size and leverage as well as between tangibility and leverage. The results for unlisted firms, however, are similar to the typical findings in the literature only when based on the narrow leverage measure (debt over debt plus shareholders funds). In contrast, when I use the broad leverage measure (total liabilities over total assets), the regression analysis results in a negative leverage effect of total assets and of the share of tangible assets to total assets. The puzzling new evidence reported here for firm types that have so far escaped investigation motivates future research in this area.

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Table 1 — Balance sheet structure by items across countries

Panel A — Listed firms

	Germany	France	Italy	United Kingdom	Belgium	Finland	Portugal	Spain	Sweden	Switzerland
Total current assets	60	63	59	51	54	53	46	49	55	49
Cash	13	15	10	14	11	13	3	13	12	11
Trade debtors	19	25	20	16	21	17	26	21	17	17
Inventories	15	13	14	13	15	13	12	14	12	13
Other current assets	13	10	15	9	6	9	5	1	14	9
Total fixed assets	40	37	41	49	46	47	54	51	45	51
Tangible fixed assets	24	18	24	31	28	32	35	34	22	37
Intangible fixed assets	9	12	10	14	10	9	10	4	14	7
Other fixed assets	7	8	7	4	9	7	9	13	8	7
Total assets	100	100	100	100	100	100	100	100	100	100
Total current liabilities	22	50	39	33	41	31	41	31	28	27
Short-term debt	7	16	11	8	11	5	16	9	3	7
Trade creditors	9	17	15	11	15	8	12	12	9	9
Other current liabilities	6	17	12	15	15	17	13	9	16	11
Total non-current liabilities	32	8	17	17	19	20	21	18	21	27
Long-term debt	18	3	2	13	13	16	19	15	12	18
Other non-current liabilities	14	5	15	4	6	4	2	3	9	9
Shareholder funds	45	42	44	50	41	49	38	52	51	47
Total liabilities and shareholder funds	100	100	100	100	100	100	100	100	100	100
Number of obs.	614	707	181	1,025	89	111	62	164	249	182

Table 1 — Balance sheet structure by items across countries
Panel B — Unlisted firms

	Germany	France	Italy	United Kingdom	Belgium	Finland	Portugal	Spain	Sweden	Switzerland
Total current assets	59	74	76	59	61	57	65	66	62	38
Cash	9	15	8	10	11	11	6	13	10	10
Trade debtors	28	33	21	18	27	17	34	32	20	15
Inventories	17	17	21	14	15	21	23	20	21	5
Other current assets	6	11	27	17	8	8	2	1	12	8
Total fixed assets	41	26	24	43	39	43	36	35	40	63
Tangible fixed assets	33	14	18	35	30	34	29	25	32	53
Intangible fixed assets	1	5	3	2	1	3	1	5	2	2
Other fixed assets	7	7	3	5	8	7	5	5	6	8
Total assets	100	100	100	101	100	100	100	101	101	101
Total current liabilities	38	70	70	52	53	40	51	55	40	25
Short-term debt	6	8	9	19	8	4	9	2	2	5
Trade creditors	12	29	18	13	24	14	18	4	16	10
Other current liabilities	20	33	43	20	22	22	24	49	23	11
Total non-current liabilities	36	16	12	36	23	26	22	16	32	40
Long-term debt	22	2	0	23	19	20	22	16	21	28
Other non-current liabilities	14	13	12	12	4	6	0	0	11	12
Shareholder funds	26	14	18	13	24	34	27	29	28	35
Total liabilities and shareholder funds	100	100	100	100	100	100	100	100	100	100
Number of obs.	7,614	139,952	105,300	61,174	29,440	9,621	7,897	131,044	34,324	351

Notes: Total assets may sum up differently than 100 due to some missing values.

TABLE 2 — TWO LEVERAGE MEASURES ACROSS LISTED AND UNLISTED FIRMS

Country		Listed firms		Unlisted firms	
		Leverage1	Leverage2	Leverage1	Leverage2
Belgium	Mean	.59	.36	.72	.46
	Median	.58	.34	.76	.45
	St. Dev.	.23	.27	.24	.36
	Number of firms	84	84	28,194	28,194
Finland	Mean	.51	.29	.65	.39
	Median	.54	.28	.67	.34
	St. Dev.	.16	.20	.23	.32
	Number of firms	111	111	9,549	9,549
France	Mean	.57	.30	.71	.23
	Median	.60	.28	.74	.12
	St. Dev.	.22	.24	.25	.32
	Number of firms	703	703	136,868	136,868
Germany	Mean	.54	.36	.73	.40
	Median	.57	.33	.77	.35
	St. Dev.	.25	.28	.24	.38
	Number of firms	558	558	6,637	6,637
Italy	Mean	.57	.26	.81	.23
	Median	.59	.20	.86	.00
	St. Dev.	.21	.23	.18	.33
	Number of firms	127	127	86,209	86,209
Portugal	Mean	.62	.49	.72	.50
	Median	.64	.51	.74	.51
	St. Dev.	.22	.26	.20	.31
	Number of firms	62	62	7830	7830
Spain	Mean	.50	.33	.70	.35
	Median	.55	.36	.75	.28
	St. Dev.	.23	.23	.26	.35
	Number of firms	154	154	113,711	113,711
Sweden	Mean	.53	.23	.72	.38
	Median	.55	.15	.75	.34
	St. Dev.	.20	.24	.22	.36
	Number of firms	229	229	31,834	31,834
Switzerland	Mean	.53	.34	.64	.43
	Median	.56	.32	.68	.46
	St. Dev.	.18	.20	0.24	.32
	Number of firms	181	181	349	349
United Kingdom	Mean	.49	.29	.69	.46
	Median	.50	.26	.70	.42
	St. Dev.	.23	.25	.28	.40
	Number of firms	1,010	1,010	583,83	58,383

NOTES: Leverage1 is defined as total liabilities over total assets. Leverage2 is defined as debt over debt plus equity.

Table 3 — Anova results for listed firms

Panel A — broad leverage

Source	SSR		SSR		SSR	
Size	20	20%	19	18%	20	17%
	(5)		(5)		(5)	
Industry	46	47%	51	46%	51	44%
	(48)		(48)		(48)	
Country	17	18%	19	17%	13	11%
	(10)		(10)		(10)	
Year	4	4%	4	4%	1	1%
	(8)		(8)		(8)	
Model	98		111		114	
Total	1,027		1,027		1,027	
Firms ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R-squared	0.09		0.11		0.11	
Obs.	20,686		20,686		20,686	

Panel B — narrow leverage

Source	SSR		SSR		SSR	
Size	25	19%	20	11%	20	11%
	(5)		(5)		(5)	
Industry	58	44%	46	26%	47	25%
	(48)		(48)		(48)	
Country	24	18%	24	13%	26	14%
	(10)		(10)		(10)	
Year	2	2%	2	1%	1	1%
	(8)		(8)		(8)	
Model	131		180		185	
Total	1,395		1,395		1,395	
Firms ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R-squared	0.09		0.13		0.13	
Obs.	20,686		20,686		20,686	

Notes: Numbers in cells refer to the partial sum of squares (SSR). The numbers in parentheses refer to the number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than $1 million, Class 2 total assets between $1 and 2 million, Class 3 total assets between $2 and 5 million, Class 4 total assets between $5 to 50 million, and Class 5 total assets above $50 million. Firm characteristics are tangible assets to total assets and profit to assets ratios. Country characteristics are GDP growth rate, inflation, savings to GDP, statutory corporate income tax rate, and total market capitalization to GDP.

Table 4 — Anova results for unlisted firms

Panel A — broad leverage

Source	SSR		SSR		SSR	
Size	2,508	21%	2,448	21%	2,434	20%
	(5)		(5)		(5)	
Industry	2,876	24%	2,708	23%	2,709	23%
	(51)		(51)		(51)	
Country	6,082	52%	5,990	50%	2,953	25%
	(10)		(10)		(10)	
Year	50	0%	52	0%	46	0%
	(8)		(8)		(8)	
Model	11,773		11,936		11,971	
Total	180,232		180,232		180,232	
Firms ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R-squared	0.07		0.07		0.07	
Obs.	3,035,109		3,035,109		3,035,109	

Panel B — narrow leverage

Source	SSR		SSR		SSR	
Size	1,746	5%	1,614	5%	1,612	5%
	(5)		(5)		(5)	
Industry	4,375	14%	2,969	8%	2,968	8%
	(51)		(51)		(51)	
Country	21,611	68%	16,490	47%	9,262	26%
	(10)		(10)		(10)	
Year	222	1%	187	1%	137	0%
	(8)		(8)		(8)	
Model	31,992		35,160		35,229	
Total	375,965		375,965		375,965	
Firms ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R-squared	0.09		0.09		0.09	
Obs.	3,035,109		3,035,109		3,035,109	

Notes: Numbers in cells refer to the partial sum of squares (SSR). The numbers in parentheses refer to the number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than $1 million, Class 2 total assets between $1 and 2 million, Class 3 total assets between $2 and 5 million, Class 4 total assets between $5 to 50 million, and Class 5 total assets above $50 million. Firm characteristics are tangible assets to total assets and profit to assets ratios. Country characteristics are GDP growth rate, inflation, savings to GDP, statutory corporate income tax rate, and total market capitalization to GDP.

TABLE 5 — ANOVA RESULTS FOR LISTED FIRMS BY SIZE CLASSES

PANEL A — BROAD LEVERAGE

Source	Size<4		Size 4		Size 5	
Industry	14	70%	21	61%	37	71%
	(39)		(46)		(47)	
Country	4	21%	8	24%	13	24%
	(10)		(10)		(10)	
Year	1	3%	4	11%	1	2%
	(8)		(8)		(8)	
Model	20		35		52	
Total	91		381		529	
Adj. R-squared	0.18		0.08		0.09	
Obs.	1,086		6,269		13,331	

PANEL B — NARROW LEVERAGE

Source	Size<4		Size 4		Size 5	
Industry	9	59%	20	58%	54	70%
	(39)		(46)		(47)	
Country	5	34%	11	31%	16	21%
	(10)		(10)		(10)	
Year	1	3%	1	3%	4	5%
	(8)		(8)		(8)	
Model	15		35		78	
Total	102		458		792	
Adj. R-squared	0.10		0.07		0.09	
Obs.	1,086		6,269		13,331	

NOTES:Numbers in cells refer to the partial sum of squares (SSR). The numbers in parentheses refer to the number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than $1 million, Class 2 total assets between $1 and 2 million, Class 3 total assets between $2 and 5 million, Class 4 total assets between $5 to 50 million, and Class 5 total assets above $50 million.

Table 6 — Anova results for unlisted firms by size classes

Panel A — broad leverage

Source	Size 1		Size 2		Size 3		Size 4		Size 5	
Industry	429	38%	476	22%	1,017	28%	1,436	46%	434	71%
	(50)		(50)		(51)		(51)		(51)	
Country	674	59%	1,599	74%	2,286	63%	1,620	52%	159	26%
	(10)		(10)		(10)		(10)		(10)	
Year	21	2%	14	1%	13	0%	15	0%	2	0%
	(8)		(8)		(8)		(8)		(8)	
Model	1,136		2154		3,610		3,113		608	
Total	45,337		32177		45766		44987		9497	
Adj. R-squared	0.03		0.07		0.08		0.07		0.06	
Obs.	853,024		632,717		737,598		681,042		130,728	

Panel B — narrow leverage

Source	Size 1		Size 2		Size 3		Size 4		Size 5	
Industry	1,311	16%	822	11%	1,052	14%	1,602	22%	517	22%
	(50)		(50)		(51)		(51)		(51)	
Country	6,652	81%	6,276	82%	5,956	78%	5,490	76%	1,879	78%
	(10)		(10)		(10)		(10)		(10)	
Year	95	1%	41	1%	82	1%	33	0%	6	0%
	(8)		(8)		(8)		(8)		(8)	
Model	8,167		7,680		7,626		7,186		2,395	
Total	114,315		70,423		85,797		835,29		17,296	
Adj. R-squared	0.07		0.11		0.09		0.09		0.14	
Obs.	853,024		632,717		737,598		681,042		130,728	

Notes:Numbers in cells refer to the partial sum of squares (SSR). The numbers in parentheses refer to the number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than $1 million, Class 2 total assets between $1 and 2 million, Class 3 total assets between $2 and 5 million, Class 4 total assets between $5 to 50 million, and Class 5 total assets above $50 million.

TABLE 7 — LIABILITY STRUCTURE ACROSS COUNTRIES AND SIZES

		Current liabilities	Non-current liabilities	Shareholder funds	Number of firms
Belgium	Size 1	67	22	11	7,045
	Size 2	51	22	27	6,339
	Size 3	47	23	30	8,581
	Size 4	50	22	28	6,341
	Size 5	45	23	31	1,223
Finland	Size 1	47	23	30	4,142
	Size 2	40	24	35	1,701
	Size 3	36	29	35	1,634
	Size 4	32	29	39	1,750
	Size 5	30	31	40	505
France	Size 1	93	22	-15	49,099
	Size 2	63	10	27	32,392
	Size 3	58	12	31	29,931
	Size 4	53	15	31	24,362
	Size 5	46	20	34	4,875
Germany	Size 1	42	39	18	640
	Size 2	43	41	16	632
	Size 3	39	39	22	1,157
	Size 4	36	33	30	3,194
	Size 5	34	34	32	2,605
Italy	Size 1	79	10	11	16,953
	Size 2	74	10	16	25,728
	Size 3	70	11	19	31,748
	Size 4	63	15	22	27,887
	Size 5	56	18	26	3,165
Portugal	Size 1	57	21	22	1,408
	Size 2	53	22	24	1,690
	Size 3	51	22	27	2,189
	Size 4	47	22	31	2,261
	Size 5	41	25	34	411
Spain	Size 1	64	15	22	54,188
	Size 2	53	16	30	28,635
	Size 3	47	18	35	27,028
	Size 4	46	18	36	19,081
	Size 5	43	20	37	2,276
Sweden	Size 1	50	26	25	13,097
	Size 2	40	30	30	6,525
	Size 3	33	38	29	6,758
	Size 4	31	39	30	6,554
	Size 5	30	39	31	1,639
Switzerland	Size 1	43	2	55	3
	Size 2	43	16	41	4
	Size 3	30	52	19	22
	Size 4	24	36	40	181
	Size 5	26	35	39	323
United Kingdom	Size 1	81	152	-133	5,703
	Size 2	61	21	18	6,717
	Size 3	48	22	30	19,316
	Size 4	47	24	29	23,212
	Size 5	41	30	29	7,251

NOTES: Firm size classes: Class 1 total assets smaller than $1 million, Class 2 total assets between $1 and 2 million, Class 3 total assets between $2 and 5 million, Class 4 total assets between $5 to 50 million, and Class 5 total assets above $50 million. The smallest firms in France and the UK had on average negative shareholder funds, which explains the bizzare figures.

TABLE 8 — LEVERAGE REGRESSION IN 1995-2002

PANEL A — LISTED FIRMS

	Leverage 1		Leverage 2	
Const.	.005	-.413	-.037	-.002
	(.034)	(.065)***	(.033)	(.073)
Tangibility	.042	.04	.15	.151
	(.014)***	(.014)***	(.016)***	(.016)***
Profitability	-.095	-.096	-.119	-.119
	(.01)***	(.01)***	(.014)***	(.014)***
Log assets	.016	.016	.019	.019
	(.002)***	(.002)***	(.002)***	(.002)***
Industry leverage	.751	.75	.501	.502
	(.043)***	(.043)***	(.035)***	(.035)***
GDP growth		-1.00e-05		.002
		(.002)		(.003)
Inflation		-.005		-.001
		(.002)**		(.003)
Corporate tax		-.00007		-.004
		(.0005)		(.0007)***
Savings		.018		.008
		(.002)***		(.003)***
Market Capitalization		0		-.0003
		(.00007)**		(.00008)***
Obs.	20686	20686	20686	20686
R^2	.111	.114	.13	.133

NOTES: Leverage1 is defined as total liabilities over total assets. Leverage2 is defined as debt over debt plus equity. Standard errors are in brackets. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively. Standard errors are based on clustering across firms. All regressions include country and year dummies.

Panel B — Unlisted firms

	Leverage 1		Leverage 2	
Const.	.279	.313	.241	.184
	(.008)***	(.009)***	(.003)***	(.008)***
Tangibility	-.022	-.022	.127	.127
	(.005)***	(.005)***	(.026)***	(.026)***
Profitability	-.001	-.001	-.001	-.001
	(.001)	(.001)	(.001)	(.001)
Log assets	-.015	-.015	.011	.011
	(.0002)***	(.0002)***	(.0004)***	(.0004)***
Industry leverage	.764	.764	.390	.389
	(.009)***	(.009)***	(.023)***	(.023)***
GDP growth		-.001		-.004
		(.0002)***		(.0003)***
Inflation		-.003		.001
		(.0002)***		(.0004)***
Corporate tax		-.00008		.0001
		(.00006)		(.00009)
Savings		-.0005		.003
		(.0002)**		(.0004)***
Market Capitalization		-.00009		-.0002
		(9.30e-06)***		(.00002)***
Obs.	3035109	3035109	3035109	3035109
R^2	.059	.059	.09	.09

Notes: Leverage1 is defined as total liabilities over total assets. Leverage2 is defined as debt over debt plus equity. Standard errors are in brackets. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively. Standard errors are based on clustering across firms. All regressions include country and year dummies.

Table 9 — Broad leverage regression in 1995-2002, across size classes

Panel A — Listed firms

	Size 1-3	Size 4	Size 5
Const.	1.182	.064	-.032
	(.264)***	(.111)	(.043)
Tangibility	-.121	.107	.023
	(.102)	(.027)***	(.016)
Profitability	-.074	-.081	-.143
	(.016)***	(.014)***	(.031)***
Log assets	-.07	.007	.018
	(.018)***	(.009)	(.002)***
Industry leverage	.16	.707	.79
	(.16)	(.069)***	(.055)***
Obs.	1086	6269	13331
R^2	.128	.093	.123

Notes: ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively. Standard errors are based on clustering across firms. All regressions include country and year dummies.

Panel B — Unlisted firms

	Size 1	Size 2	Size 3	Size 4	Size 5
Const.	.355	.643	.376	-.058	-.11
	(.012)***	(.019)***	(.018)***	(.02)***	(.033)***
Tangibility	.03	-.061	-.069	-.019	.032
	(.003)***	(.003)***	(.003)***	(.01)**	(.006)***
Profitability	-.0007	-.615	-.001	-.227	-.253
	(.0005)	(.051)***	(.002)	(.086)***	(.075)***
Log assets	.0006	-.043	-.026	.004	-.005
	(.0009)	(.002)***	(.002)***	(.001)***	(.001)***
Industry leverage	.506	.578	.743	1	1.193
	(.013)***	(.014)***	(.014)***	(.019)***	(.037)***
Obs.	853024	632717	737598	681042	130728
R^2	.022	.159	.079	.088	.075

Notes: ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively. Standard errors are based on clustering across firms. All regressions include country and year dummies.

APPENDIX Table 2 — Representativeness of data, Amadeus data versus "Enterprises in Europe"

Country	Correlation of size distribution across industries	Correlation of industry distribution
Belgium	.995	.857
Finland	.975	.601
France	.989	.552
Germany	-.746	.000
Italy	.966	.564
Portugal	.844	.773
Spain	.991	.640
Sweden	.986	.792
United Kingdom	.492	.148

Notes: Size and industry distributions are calculated based on the number of firms. Firms were divided into 3 size classes: 10-49, 50-249, and more than 250 employees. Industries were divided into 6 groups: 10-41 Industry and Energy, 45 Construction, 50-55 Trade and Hotels and Restaurants, 60-64 Transport and Communication, 74 Other Business Activities, and 70-73, 85, 90, 92, 93 Other Services. Amadeus data is for 1997. EU data is for 1997 except for France, Italy, Portugal, and Sweden for which 1996 data were used.

APPENDIX Table 2 — Cross-country capital structure studies

Paper	Data base	Countries	Time period	Number of firms
Rajan and Zingales (1995)	Global Vantage	7 developed countries	1987-91	4,557
Demirgüç-Kunt and Maksimovic (1996)	International Finance Corporation and Global Vantage	30 developed and developing countries	1980-91	7,280
Schmukler and Vesperoni (2001)	International Finance Corporation and World Scope	7 developing countries	1980-99	1,973
Booth, Aivazian, Demirgüç-Kunt and Maksimovic (2001)	International Finance Corporation	10 developing countries	1980-91	631
Giannetti (2003)	Amadeus top 200,000 companies	8 West European countries	1993-97	55,611

Sources of Capital Structure: Evidence from Transition Countries

Karin Jõeveer*

Abstract

This study explores the significance of firm-specific, institutional, and macroeconomic factors in explaining variation in leverage using a sample of firms from nine Eastern European countries. Country-specific factors are the main determinants of variation in leverage for small unlisted companies, while firm-specific factors explain most of the variation in leverage for listed and large unlisted companies. Around half of the variation in leverage related to country factors is explained by known macroeconomic and institutional factors, while the remainder is explained by unmeasurable institutional differences (e.g. law and enforcement). These findings are in line with the results for Western European countries in Jõeveer (2005) and show that country characteristics are not more significant determinants of leverage in these transition economies.

Keywords: capital structure, Eastern Europe.

JEL classification: G32

*This paper was written during my stay at the Research Department of Bank of Estonia. I am grateful for their hospitality and financial support. Contact: CERGE-EI, P.O. Box 882, Politickych veznu 7, 11121 Prague 1, Czech Republic. E-mail: karin.joeveer@cerge-ei.cz.

1 Introduction

Firm capital structure is irrelevant in efficient financial markets as shown by Modigliani and Miller (1958).[1] Subsequent theoretical work has taken into account the imperfections of financial markets and has shown that firm capital structure emerges from three sources: firm-specific, country of incorporation institutional, and macroeconomic factors. Empirical research has focused on finding the best set of determinants of leverage (Titman and Wessel 1988, Frank and Goyal 2004), though lack of comparable firm-level cross-country data has somewhat hindered the exploration of significant country factors. In this paper I evaluate the significance of all three sources.

The importance of the country of incorporation for firm leverage has been analysed in a few cross-country studies. Booth, Aivazian, Demirgüç-Kunt, and Maksimovic (2001) show on a sample of firms from ten developing countries that country fixed effects explain a large share of leverage variation, but they do not decompose the country effects to show what country characteristics matter. On a sample of firms from developing Asian and South American countries, Schmukler and Vesperoni (2001) explore the relation between leverage and financial liberalization. Using data on Western European firms Giannetti (2003) shows that financial development and creditor protection are significant determinants of leverage. Jõeveer (2005), also using Western European firm data, shows that half of the country explanatory power is determined by six country macroeconomic and institutional factors while another half is explained by an unmeasurable institutional difference. All the above-mentioned studies confirm that the country of incorporation does matter for the capital structure of the firm.

Rajan and Zingales (1995) conclude their paper thus: "a better understanding of the influence of institutions can provide us enough inter-country variation so as to enable us to identify the fundamental determinants of capital structure." My paper overcomes the lack of inter-country variation by studying firm-level data from nine Eastern European countries over 1995-2002, where the institutional and other country-specific determinants of capital structure noted in capital structure theory (e.g. adjustment

[1] Rubinstein (2003) notes that Williams (1938) already expressed the same idea.

costs of capital, asymmetric information between owners and investors, and capital market conditions) are expected to be especially significant. Therefore, firms from Eastern European countries, where modern financial markets emerged only during recent decades, are an excellent sample to study. The methods and speed with which the missing institutions were introduced differed across countries (Berglof and Bolton 2002), providing large variation in country factors. The leverage of firms in early transition has been studied by Cornelli, Portes, and Schaffer (1998) and in later transition by Nivorozhkin (2005) and De Haas and Peeters (2006). My study complements these existing studies by investigating and evaluating the importance of the country of incorporation.

The empirical methodology of this paper follows that of Jõeveer (2005). There are no stylized facts about the sources of leverage variation in transition countries, so unlike previous studies on transition economies I make use of the variation available in the cross-country data. First, I perform an analysis of variance (ANOVA) in order to detect the importance of size, industry, and country factors for leverage variation. Second, regression analysis is used to compare the direction of the effect of the various leverage determinants in transition countries to the effects found in the existing capital structure studies.

The paper is organized as follows. In the next section I provide an overview of the related research. In Section 3 I introduce the data and the estimation strategy. Section 4 contains the results, followed by a concluding section.

2 Capital Structure in Transition Economies

The importance of studying the capital structure of firms in transition economies was first pointed out by Cornelli, Portes, and Schaffer (1998). Since modern financial markets in those countries emerged in the early 1990's, in terms of capital structure theory it meant that local country factors could be especially significant in explaining firm leverage.

The two most influential theories of capital structure—trade-off theory and pecking

order theory—find that country institutional factors matter to firm leverage. Trade-off theory argues that firms balance the tax benefits of loans with potential bankruptcy costs to achieve an optimal leverage level (see Miller 1977 for a discussion). Hence, local tax levels as well as bankruptcy codes matter. In the pecking order theory of capital structure, firms prefer internal funds to outside sources since the latter are mispriced due to the asymmetric information between owners and investors (see Myers 1984). Hence, the transparency of the firm's activities is important. This asymmetric information is expected to be especially large in transition economies, meaning that firms are less likely to turn to outside sources of finance even if the investment opportunities exceed the internal funds. Also market timing theory reveals that due to changes in macroeconomic factors the cost of equity capital and debt varies, causing the leverage to vary as well (see Baker and Wurgler 2002).

Frank and Goyal (2004) note that seven variables—median industry leverage, market-to-book ratio, collateral, profit, dividend paying, logarithm of assets and expected inflation—perform best in explaining the leverage of U.S. firms. My study augments Frank and Goyal's (2004) work by evaluating the determinants of leverage in a cross-country setting, which gives a larger variation in country characteristics. I add to the analysis besides inflation five additional country-specific variables: GDP growth, domestic credit provided by the banking sector to GDP, stock market capitalization to GDP, share of foreign owned banks, and government consumption to GDP.[2]

GDP growth has been used in previous studies (Frank and Goyal 2004, Korajczyk and Levy 2003 in their analysis of aggregate nonfinancial corporate profit growth) to proxy the growth opportunities and the overall economic conditions. GDP growth is expected to be positively related to leverage. The ratio of domestic credit provided by the banking sector to GDP proxies funds available in the local market. It is expected to be positively related to leverage. The ratio of stock market capitalization to GDP proxies the development of the financial sector. Giannetti (2003) has shown that this indicator is negatively related to the leverage of Western European firms.

[2]Note that Frank and Goyal (2004) experimented with several country-specific variables but all others besides inflation were less robust determinants.

The share of foreign-owned banks is an important indicator in Eastern Europe because under socialism there was no competitive banking system, hence there was a lack of knowledge and experience of modern banking in the early 1990's. A higher share of foreign-owned banks reflects a higher quality of the banking system as well as larger competition among banks. This translates into more funds available in the domestic market and hence the higher leverage of firms.[3] Note that the share of foreign-owned banks is highly correlated (73%) with the ratio of FDI to GDP. Hence, the higher share of foreign-owned banks might be interpreted as a greater interest among foreign investors in general in a given economy. Higher corporate taxes have been found to be negatively related to leverage (Desai, Foley, and Hines 2004, Giannetti 2003). Due to data unavailability I use the fraction of government consumption to GDP as a proxy for residents' tax burden.

Capital structure studies on firms from transition economies have generally focused on the level of leverage and on the firm-specific determinants of leverage. Cornelli, Portes, and Schaffer (1998) use data on Hungarian and Polish firms from the early 1990's to report stylized facts about firm leverage in transition countries. They find that the level of leverage is lower than in Western economies and that the fraction of short-term financing dominates long-term debt. They estimate a simple static leverage regression, where the explanatory variables are tangibility, size, profitability and a dummy for state ownership. In contrast to studies on Western firms, these authors find that the share of tangible assets, which proxies the available collateral, is negatively related to leverage in the case of transition countries. They offer two explanations for this: first, pre-transition firms financed their fixed assets with equity and therefore the relationship to debt is negative; second, the book value of fixed assets might differ from the market values. The authors thus report that Eastern European firm capital structure behaves differently from Western European structure with respect to firm-specific characteristics. The lack of country-specific variability in their study, however, means they are unable to measure the significance of institutional and macroeconomic

[3]See Giannetti and Ongena (2005) for more details about the influence of foreign bank entry on domestic firm activities in Eastern Europe.

factors, which is the target of the present paper.

Later studies by Nivorozhkin (2005) and De Haas and Peeters (2006) explore the dynamic capital structure of firms in transition countries. In a dynamic capital structure framework actual leverage deviates from desired levels because of adjustment costs. Both papers use data from the Amadeus database available from Bureau Van Dijk and adopt the methodology of Banerjee, Heshmati, and Wihlborg (2004); this methodology allows both the desired leverage and the adjustment speed to vary across firms and over time. De Haas and Peeters (2006) analyse ten countries over the period 1993-2001. Nivorozhkin (2005) analyses five countries over 1997-2001. Both papers show that firms are moving towards their leverage targets and conclude that Eastern European capital markets need to deepen for leverage to reach the Western European level.

This paper differs from the existing studies on firms from transition economies by focusing on sources of capital structure with a special interest in country-specific factors. The cross-country yearly firm-level data used in this study are an excellent basis on which to evaluate the importance of firm-specific, country institutional and macroeconomic factors for firm capital structure determination.

3 Data and Methodology

The data used in this paper are taken from the Amadeus database available from Bureau Van Dijk. This database contains firm-level data from all over Europe. The Amadeus database is available in different sizes. Firms in this study are taken from the Amadeus Top 1 million companies.[4] The analysis is based on eight years of data (1995-2002) for nine countries (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia). The database consists not only of stock market-listed firms but, more importantly, also covers unlisted companies. Klapper, Sarria-Allende, and Sulla (2002) report that 86% of Eastern European firms in the Amadeus sample for 1999 have fewer than 250 employees. The data hence covers

[4]For comparison the firms in De Haas and Peeters (2006) are from the Amadeus Top 200,000 companies, which covers fewer firms (smaller firms are not covered).

small- and medium-sized firms as well as large companies.

The sample is unbalanced and the representativeness across countries varies.[5] Romania has the greatest coverage. The largest firms are from Poland and the Czech and Slovak Republics while the smallest are from Bulgaria, Estonia and Romania (see Table 1).

The methodology used in this paper is adopted from Jõeveer (2005). Hence, the results of the current study are directly comparable to the findings based on the Western European firms analysed in Jõeveer (2005). The analysis is divided into two parts. The first part is the Analysis of Variance (ANOVA), which helps to measure the share of different sources in explaining leverage variation. The second part analyses a regression of leverage on firm- and country-specific factors.

I consider four sets of explanatory variables in the ANOVA analysis—size, industry, country, and year. Size and industry represent the firm-specific factors while country dummies capture the effect of the local financial market.[6] I have split firms into five size classes based on total assets.[7] Firms from 51 industries are represented (NACE 2 digit classification).[8]

The regression analysis focuses on the estimation of the following two specifications:

$$Y_{ijt} = \alpha + \beta_j + \gamma_t + \delta X_{ijt} + \varepsilon_{ijt}, \tag{1}$$

$$Y_{ijt} = \alpha + \beta_j + \gamma_t + \delta X_{ijt} + \zeta C_{jt} + \varepsilon_{ijt}, \tag{2}$$

[5]For the Czech Republic and Estonia I know the size distribution of all firms across industries, which I compared with the size distribution of the Amadeus sample. The Amadeus sample overestimates the share of largest firms, which is likely due to the sample selection criteria. Companies in the Amadeus Top 1 million sample have to meet at least one of the following criteria: operating revenue greater than 1 million euros, total assets greater than 2 million euros or number of employees above 10.

[6]I experimented by adding firm age dummies into the ANOVA analysis; this did not change the pattern of results.

[7]The size classes are following: total assets up to $1 million, between $1-2 million, between $2-5 million, between $5-50 million and above $50 million.

[8]Firms from the financial intermediation sector are excluded from the study due to their specific liability structure. Also, observations with extreme values (if leverage is less (more) than three times the inter quartile range away from 25th (75th) percentile) of leverage are excluded.

where i, j and t are the indexes of firm, country, and year, respectively. The second equation is the same as the first equation augmented by country-specific time-variant variables (C_{jt}) beside country fixed effects (β_j). X_{ijt} represents firm-specific variables. γ_t is the year effect and ε_{ij} is the random disturbance.

I use six country variables to capture the measurable country effects: GDP growth, inflation (proxies for the cost of capital),[9] domestic credit provided by the banking sector to GDP, stock market capitalization to GDP, share of foreign-owned banks, and government consumption to GDP.[10] Firm-specific characteristics included in the analysis are: profitability (after-tax profit to total assets ratio), tangibility (tangible fixed assets to total assets ratio), size (logarithm of assets), median industry leverage and age dummies.[11]

I use two leverage measures as in Jõeveer (2005). Broad leverage is defined as total liabilities over total assets, while narrow leverage is defined as debt (both long-term and short-term) over the sum of debt and shareholder funds. The advantage of the former measure is that it is available for all firms in the data set; the shortcoming is that it is likely to overstate the true level of leverage. Since the theory of capital structure refers to the part of liabilities which are used for financing (in total liabilities some short-term items might be used for transactions only), the narrow leverage would seem to be a more relevant measure. But it is still possible that trade credit is used for financing as well and it would therefore be wrong to exclude it from a capital structure study (see the discussion in Rajan and Zingales 1995). The two leverage measures differ greatly from each other (see Table 1). The average of broad leverage is around 60%, whereas the mean of narrow leverage reaches 40% only for Latvian and Polish firms but is as low as 5% for Hungarian firms. Compared to results for Western European

[9]I consider interest rate as a proxy for the cost of capital as well, but due to a high correlation with inflation it was left out of the final specification.

[10]The country-specific variables are taken from the World Bank World Development Indicators except for the share of foreign-owned banks, which is taken from the EBRD Transition Report.

[11]Age is included since both Nivorozhkin (2005) and De Haas and Peeters (2006) find it to be a significant determinant of leverage in transition economies. I have no information about dividend payments nor the market value of the company for unlisted firms. Thus the two significant firm-specific characteristics based on Frank and Goyal (2004)—dividend payment and market-to-book ratio—are not included in the analysis.

firms in Jõeveer (2005), both leverage measures are smaller for Eastern European firms. Smaller firm indebtedness in Eastern Europe compared to Western Europe might be explained by the fact that domestic credit provided by the banking sector (to GDP) is around 40% in the former and more than 100% in the latter. Leverage measures used in other studies on transition economies are similar to the ones used in my study.[12]

I perform the analysis separately on listed and unlisted firms. Since I consider being listed as a good signal for financiers both domestic as well as foreign, I expect that local institutions matter less for listed firms' capital structure.

4 Results

I present the results separately for listed and unlisted firms across the two leverage measures. Table 2 presents the results of the ANOVA analysis for listed firms. Industry dummies explain most of the leverage variation for both leverage measures (Panel A and B). In the second column, besides the four sets of discrete variables, firm tangibility and profitability are included. This increases the adjusted R^2 and decreases the explanatory power of the other variables. In the last column, firm characteristics and measurable time-variant country factors are included. Half of the country effects can be explained by known country characteristics, suggesting that unmeasurable institutional differences between countries explain less than 10% of firm leverage variation. For listed firms the ANOVA results are robust to the leverage measure used.

Results of the ANOVA analysis for unlisted firms are presented in Table 3. The results are not robust to the leverage measure used. For broad leverage, variation in industry characteristics explains more than country characteristics. For narrow leverage the results are the opposite—country characteristics explain more than firm characteristics. Even after controlling for other firm- and country-specific factors (last column), 26% of narrow leverage variation is explained by unmeasurable institutional

[12]Cornelli, Portes, and Schaffer (1998) conduct their study on two measures, which corresponds to the two measures in this paper, and find that their results are robust to the leverage measures. Nivorozhkin (2005) uses a leverage measure which corresponds to narrow leverage. De Haas and Peeters (2006) calculate the debt in leverage ratio as total liabilities minus trade credit. The measure they use is thus somewhere between the two measures used in this paper.

differences. For broad leverage the comparable number is only 11%. Unmeasurable institutional differences could be related to the legal environment (e.g. bankruptcy law, accounting regulations) but it is still puzzling how such institutional differences have a different effect on listed and unlisted firms.

For unlisted firms the ANOVA results differ for different leverage measures, so it is really important which leverage measure is used. The main difference between the two measures comes from the current liability side—narrow leverage takes into account only short-term debt (not all short-term liabilities). Narrow leverage captures the loan capacity of the firm, which seems to be highly country-specific for unlisted firms. Broad leverage, on the other hand, captures non-debt liabilities like trade credit, which is a particularly important source of funds for more financially constrained firms (Petersen and Rajan 1997). The trade credit is also a more important source of funds for Eastern European firms than for Western European firms. Trade credit is 43% of total liabilities in my Eastern European sample while it is only 24% in the Jõeveer (2005) sample of firms from ten Western European countries. The non-debt liabilities in Eastern Europe might have been used as substitutes for debt (if the latter was not available) so that the country-specific variation in broad leverage is eliminated.

The different results obtained for listed and unlisted firms could be explained by the fact that listed firms are larger.[13] To see whether the results differ due to size differences I conducted an ANOVA analysis in each of the five size classes. Table 4 presents the results for listed firms. For both leverage measures, industry factors explain the most for all size classes.[14] For unlisted firms (Table 5) the results are different for firms from different size classes. Country factors explain the most for the smallest firms' broad leverage variation. For firms from the four larger size classes, industry factors dominate in explaining the leverage variation. This is consistent with the hypothesis that smaller firms rely more heavily on the local financial market. For unlisted firms' narrow leverage, country factors explain the most for the four smallest

[13]The difference might also be caused by ownership—stock market-listed companies are more likely to have foreign owners, which might ease their financing needs. As I do not have information about foreign ownership I can not test this.

[14]I combined the three smallest size classes due to lack of observations.

size classes. The explanatory shares of country and industry factors are equal for the largest firms. These results on size classes confirm that for the smallest unlisted firms, country factors are the most significant leverage determinants for both leverage measures.[15] Those firms are clearly more constrained by the local financial market than are other firms.

The results of the ANOVA analysis are comparable to the findings from Western European countries presented in Jõeveer (2005). Exactly as was the case for the listed firms in Western Europe, industry factors were the most significant determinants of leverage variation irrespective of firm size. For unlisted Western firms the country factors always explained the largest share of narrow leverage variation irrespective of size. For unlisted Western firms' broad leverage, country factors mattered the most for the four smaller size classes while for the largest size class, industry factors turned out to be the most significant. The average firm in Western Europe is larger than in Eastern Europe, which might explain why we observe a change in the explanatory power of country and industry factors in smaller size classes in the Eastern European sample. The firms in size classes 2 to 4 are relatively larger than the average firm in the Eastern European sample than in the Western European sample. Hence, the ANOVA analysis stresses the importance of country factors for small unlisted companies' leverage variation and it is irrelevant whether those firms are drawn from the pool of developed or less developed economies. The financing mix of both Eastern and Western European small firms is, compared to large firms, less dependent on firm-specific technological factors and more dependent on country of incorporation factors. A comparison of the results of Eastern and Western European firm leverage analyses does not support the initial expectation that the lesser-developed financial markets in the East might cause country factors to be more pronounced for the firm's capital structure choice.

The results of the regression analysis are presented in Table 6.[16] The results of listed firms are reported in Panel A. The coefficient in front of tangibility has a negative sign and is statistically significant. This confirms the results of previous studies

[15] A different size classification does not change the findings.

[16] The OLS estimation results presented here are very similar to the results achieved by fixed effects (available on request).

on transition countries (Cornelli, Portes, and Schaffer 1998) but contradicts the predictions of theoretical studies and empirical findings from Western countries (Rajan and Zingales 1998). A surprising result is that profitability is estimated imprecisely, so the profitability of Eastern European listed firms does not explain the leverage level. The logarithm of firm size is positively related to leverage, so larger listed firms have higher leverage. This is in accordance with both trade-off theory.[17] and pecking order theory[18] Age is a significant determinant of leverage only at the 10% level for the broad leverage measure—firms established in early transition are more leveraged than firms established before 1987 or after 1995. The country-specific macroeconomic and institutional factors are included in addition to country fixed-effects in columns 2 and 4. The significance and the direction of the effect of country-specific factors vary across leverage measures. As expected, GDP growth and domestic bank credit to GDP are positively related to narrow leverage. The negative coefficients in front of market capitalization to GDP and the share of foreign banks in the narrow leverage regression, however, are puzzling.

For unlisted firms (Table 6 Panel B) tangibility is measured imprecisely, such that the amount of collateral available does not convert into higher indebtedness. Profitability is statistically significant only for the narrow leverage measure, meaning that the more profitable unlisted firms are likely to have less credit. This finding follows the prediction of pecking-order theory. As in Jõeveer (2005), the logarithm of size enters with a negative sign in the broad leverage regression and with a positive sign in the narrow leverage regression. This finding stresses once again that for unlisted firms the two leverage ratios measure different things. Based on age dummies included in the regression, the younger firms are shown to be more leveraged than older firms. Hence I do not observe that an established reputation would lead to higher leverage as expected. One explanation for this might be that older firms have enough internal funds and do not need debt finance. I find country factors to be more significant and have

[17]Larger firms face a proportionally smaller bankruptcy cost, so they are likely to have more debt.

[18]Larger firms are more transparent so they should face less asymmetry of information. Larger firms should therefore rely more on external finance. Since equity issues are not common in transition countries it is likely that large firms rely more on debt.

larger coefficients for narrow leverage than for broad leverage. The signs of country characteristics in the narrow leverage regression are as expected except for the negative sign in front of the share of foreign banks.

The results of the regression analysis are in line with previous studies on firms from transition countries. It is interesting that firm-specific factors tangibility and profitability are only weakly related to leverage. From country-specific factors it is notable that the positive significant coefficient in front of domestic bank credit in the narrow leverage regression appears for both listed and unlisted firms. This result confirms the hypothesis that less local credit causes lower leverage levels.

5 Conclusions

In this paper I study the importance of firm-specific, country institutional, and macroeconomic factors for determining the capital structure of firms. The analysis is based on firm-level data from nine Eastern European countries in 1995-2002. I use both broad and narrow measures of leverage in this paper.

I find that the largest share of listed firms' leverage variation (irrespective of leverage measure) is explained by industry factors. The unmeasurable country institutional factors explain less than 10% of leverage variation. For unlisted firms, in contrast, the results are not robust to the leverage measure used. For broad leverage the industry factors explain the most while for narrow leverage the country factors dominate. Further, the unmeasurable country institutional differences explain as much as 26% of narrow leverage variation while it explains only 11% for broad leverage variation. The results across size classes show that for smaller unlisted firms, country factors are the most significant explanatory factors for both leverage measures. These results show that for small and unlisted firms the leverage definition is very significant. Smaller firms seem to be more constrained by the financial market in their country of incorporation.

The results of this study are very similar to the findings of Jõeveer (2005) on a sample of Western European firms. The capital structure variation of small- and medium-sized firms is more dependent on country institutional factors, irrespective of

the development of the local financial markets. The regression analysis of leverage confirms the existing results based on transition countries. These findings stress the need to deepen our understanding of the role of institutions in the capital structure of firms.

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Table 1 — Summary statistics in 2000

Country	Leverage 1	Leverage 2	Total Assets	Number of Firms
Bulgaria				
Mean	0.59	0.12	1386	13189
Median	0.58	0	211	
St. dev.	0.36	0.25	12977	
Czech Republic				
Mean	0.61	0.28	10058	7374
Median	0.63	0.16	2100	
St. dev.	0.31	0.33	83557	
Estonia				
Mean	0.62	0.31	1677	5224
Median	0.63	0.21	332	
St. dev.	0.3	0.33	12575	
Hungary				
Mean	0.62	0.05	5738	7923
Median	0.63	0	907	
St. dev.	0.3	0.14	40254	
Latvia				
Mean	0.65	0.4	3699	2178
Median	0.69	0.35	744	
St. dev.	0.28	0.35	22422	
Lithuania				
Mean	0.53	0.34	6693	1143
Median	0.54	0.3	1091	
St. dev.	0.26	0.26	41957	
Poland				
Mean	0.59	0.4	16283	10933
Median	0.59	0.35	3365	
St. dev.	0.37	0.32	114655	
Romania				
Mean	0.76	0.2	1628	23274
Median	0.81	0	161	
St. dev.	0.31	0.32	34299	
Slovak Republic				
Mean	0.59	0.3	10770	1312
Median	0.62	0.17	2120	
St. dev.	0.32	0.34	58098	

Notes: Leverage 1 is defined as total liabilities to total assets. Leverage 2 is defined as debt to debt plus shareholders' funds. Total assets are in thousands of USD.

TABLE 2 — ANOVA RESULTS FOR LISTED FIRMS

PANEL A — BROAD LEVERAGE

Source	SSR		SSR		SSR	
Size	4.97	12%	4.00	7%	4.24	8%
	(5)		(5)		(5)	
Industry	25.86	63%	27.64	51%	27.17	49%
	(47)		(47)		(47)	
Country	8.30	20%	8.50	16%	4.91	9%
	(9)		(9)		(9)	
Year	5.88	14%	3.69	7%	0.50	1%
	(8)		(8)		(8)	
Model	41.22		54.00		55.38	
Total	223.16		223.16		223.16	
Firm ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R^2	0.17		0.23		0.23	
Obs.	3512		3512		3512	

PANEL B — NARROW LEVERAGE

Source	SSR		SSR		SSR	
Size	7.54	26%	6.29	20%	6.58	19%
	(5)		(5)		(5)	
Industry	9.36	32%	10.67	33%	10.16	30%
	(46)		(46)		(46)	
Country	6.10	21%	6.38	20%	2.53	7%
	(9)		(9)		(9)	
Year	2.29	8%	2.46	8%	1.17	3%
	(8)		(8)		(8)	
Model	28.89		31.94		33.87	
Total	126.16		126.16		126.16	
Firm ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R^2	0.21		0.24		0.25	
Obs.	2905		2905		2905	

NOTES: Numbers in cells refer to partial sum of squares (SSR). The numbers in parentheses refer to number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders' funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets (TA) smaller than $1 million, Class 2 TA between $1 and 2 million, Class 3 TA between $2 and 5 million, Class 4 TA between $5 to 50 million, and Class 5 TA above $50 million. Firm characteristics are tangible assets to total assets and profit to asset ratios. Country characteristics are GDP growth rate, inflation, domestic credit to GDP, total market capitalization to GDP, share of foreign-owned banks' assets and government consumption to GDP.

TABLE 3 — ANOVA RESULTS FOR UNLISTED FIRMS

PANEL A — BROAD LEVERAGE

Source	SSR		SSR		SSR	
Size	268.71	6%	266.35	6%	255.70	5%
	(5)		(5)		(5)	
Industry	1469.74	34%	1412.97	31%	1418.39	30%
	(51)		(51)		(51)	
Country	1093.85	25%	1107.77	24%	547.39	11%
	(9)		(9)		(9)	
Year	949.34	22%	915.03	20%	48.99	1%
	(8)		(8)		(8)	
Model	4295.34		4629.87		4770.03	
Total	41696.58		41696.58		41696.58	
Firm ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R^2	0.10		0.11		0.11	
Obs.	379324		379324		379324	

PANEL B — NARROW LEVERAGE

Source	SSR		SSR		SSR	
Size	285.51	8%	279.61	8%	282.90	8%
	(5)		(5)		(5)	
Industry	578.33	16%	575.23	16%	578.77	16%
	(51)		(51)		(51)	
Country	1892.11	53%	1890.64	53%	972.83	26%
	(9)		(9)		(9)	
Year	118.71	3%	114.33	3%	55.86	1%
	(8)		(8)		(8)	
Model	3563.85		3585.06		3730.67	
Total	29763.80		29763.80		29763.80	
Firm ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R^2	0.12		0.12		0.13	
Obs.	330292		330292		330292	

NOTES: Numbers in cells refer to partial sum of squares (SSR). The numbers in parentheses refer to number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders' funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets (TA) smaller than $1 million, Class 2 TA between $1 and 2 million, Class 3 TA between $2 and 5 million, Class 4 TA between $5 to 50 million, and Class 5 TA above $50 million. Firm characteristics are tangible assets to total assets and profit to asset ratios. Country characteristics are GDP growth rate, inflation, domestic credit to GDP, total market capitalization to GDP, share of foreign-owned banks' assets and government consumption to GDP.

TABLE 4 — ANOVA RESULTS FOR LISTED FIRMS BY SIZE CLASS

PANEL A — BROAD LEVERAGE

Source	Size<4		Size 4		Size 5	
Industry	16.43	75%	15.22	64%	9.11	64%
	(41)		(39)		(38)	
Country	0.65	3%	7.17	30%	2.72	19%
	(7)		(9)		(9)	
Year	4.67	21%	2.54	11%	0.75	5%
	(8)		(8)		(8)	
Model	21.91		23.71		14.26	
Total	84.72		100.74		35.69	
Adj. R^2	0.22		0.21		0.35	
Obs.	1156		1651		705	

PANEL B — NARROW LEVERAGE

Source	Size<4		Size 4		Size 5	
Industry	3.61	56%	7.26	58%	5.73	53%
	(40)		(36)		(35)	
Country	0.25	4%	3.40	27%	3.80	35%
	(7)		(9)		(9)	
Year	2.49	39%	0.96	8%	0.27	2%
	(8)		(8)		(8)	
Model	6.46		12.53		10.84	
Total	31.57		60.45		26.10	
Adj. R^2	0.17		0.18		0.35	
Obs.	1103		1283		519	

NOTES: Numbers in cells refer to partial sum of squares (SSR). The numbers in parentheses refer to number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders' funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets (TA) smaller than $1 million, Class 2 TA between $1 and 2 million, Class 3 TA between $2 and 5 million, Class 4 TA between $5 to 50 million, and Class 5 TA above $50 million.

TABLE 5 — ANOVA RESULTS FOR UNLISTED FIRMS BY SIZE CLASS

PANEL A — BROAD LEVERAGE

Source	Size 1		Size 2		Size 3		Size 4		Size 5	
Industry	595.88	24%	232.97	62%	333.23	69%	477.56	81%	97.77	79%
	(51)		(50)		(50)		(51)		(51)	
Country	1163.07	46%	44.42	12%	46.37	10%	22.72	4%	6.14	5%
	(9)		(9)		(9)		(9)		(9)	
Year	658.33	26%	109.44	29%	99.52	21%	71.64	12%	8.70	7%
	(8)		(8)		(8)		(8)		(8)	
Model	2513.39		376.79		481.63		587.57		123.85	
Total	27180.28		4099.03		4877.94		4236.45		520.58	
Adj. R^2	0.09		0.09		0.10		0.14		0.23	
Obs.	242254		42335		46791		43126		4818	

PANEL B — NARROW LEVERAGE

Source	Size 1		Size 2		Size 3		Size 4		Size 5	
Industry	351.82	24%	81.26	22%	89.61	19%	141.80	24%	44.66	36%
	(51)		(50)		(50)		(51)		(51)	
Country	889.94	60%	297.46	79%	353.14	73%	348.26	59%	43.47	35%
	(9)		(9)		(9)		(9)		(9)	
Year	130.03	9%	21.46	6%	7.64	2%	24.17	4%	5.05	4%
	(8)		(8)		(8)		(8)		(8)	
Model	1473.35		403.09		454.02		516.17		96.89	
Total	17591.97		3542.17		3777.65		3523.31		411.44	
Adj. R^2	0.08		0.11		0.12		0.14		0.22	
Obs.	219906		35190		37293		34074		3829	

NOTES: Numbers in cells refer to partial sum of squares (SSR). The numbers in parentheses refer to number of indicators. Broad leverage is defined as total liabilities to total assets. Narrow leverage is defined as debt to debt plus shareholders' funds. Industry is 3-digit NACE. Firm size classes: Class 1 total assets (TA) smaller than $1 million, Class 2 TA between $1 and 2 million, Class 3 TA between $2 and 5 million, Class 4 TA between $5 to 50 million, and Class 5 TA above $50 million.

Table 6 – Leverage regression in 1995-2002

Panel A – Listed firms

	Leverage 1		Leverage 2	
Const.	.038	.044	-.084	-.12
	(.055)	(.081)	(.047)*	(.078)
Tangibility	-.217	-.207	-.124	-.113
	(.035)***	(.036)***	(.025)***	(.026)***
Profitability	-.002	-.002	.0002	.0005
	(.002)	(.002)	(.001)	(.001)
Log assets	.022	.023	.029	.03
	(.006)***	(.006)***	(.005)***	(.005)***
Established 1987-95	.042	.043	.026	.027
	(.024)*	(.024)*	(.02)	(.02)
Established after 1995	1.00e-05	.002	-.008	-.006
	(.023)	(.024)	(.018)	(.018)
Industry leverage	.806	.794	.682	.656
	(.058)***	(.059)***	(.071)***	(.071)***
GDP growth		-.003		.005
		(.002)***		(.002)***
Inflation		-.00006		-.00003
		(.00003)***		(.00003)
Domestic bank credit		.0005		.001
		(.0004)		(.0004)***
Market capitalization		-.001		-.003
		(.001)		(.001)***
Share of foreign banks		.001		-.001
		(.0007)**		(.0006)**
Government consumption		-.002		-.002
		(.003)		(.003)
Obs.	3512	3512	2905	2905
R^2	.234	.238	.245	.258

Notes: Leverage 1 is defined as total liabilities over total assets. Leverage 2 is defined as debt over debt plus equity. Standard errors are in brackets. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. Standard errors are based on clustering across firms. All regressions include country and year dummies. Tangibility is defined as tangible assets to total assets. Profitability is defined as profit to total assets. Established 1987-95 is a dummy equal to one if the firm was established between 1987-95. Established after 1995 is a dummy equal to one if the firm was established after 1995. Domestic bank credit, total market capitalization and government consumption are measured as ratio to GDP.

Panel B – Unlisted firms

	Leverage 1		Leverage 2	
Const.	.145	.371	-.129	-.182
	(.013)***	(.017)***	(.005)***	(.013)***
Tangibility	-.015	-.015	.0007	.0007
	(.014)	(.014)	(.0007)	(.0007)
Profitability	-.025	-.024	-.013	-.013
	(.016)	(.016)	(.007)**	(.006)**
Log assets	-.014	-.014	.023	.023
	(.0007)***	(.0007)***	(.0005)***	(.0005)***
Established 1987-95	.059	.065	.087	.091
	(.005)***	(.005)***	(.004)***	(.004)***
Established after 1995	.119	.123	.092	.096
	(.005)***	(.005)***	(.004)***	(.004)***
Industry leverage	.571	.57	.557	.548
	(.013)***	(.013)***	(.016)***	(.016)***
GDP growth		.00006		.007
		(.0002)		(.0002)***
Inflation		-.0001		.00002
		(5.88e-06)***		(5.30e-06)***
Domestic bank credit		-.00003		.002
		(.00008)		(.00008)***
Market capitalization		-.00009		.001
		(.0001)		(.0001)***
Share of foreign banks		.0009		-.0003
		(.00009)***		(.0001)***
Government consumption		-.011		-.002
		(.0004)***		(.0004)***
Obs.	379324	379324	330292	330292
R^2	.123	.126	.118	.123

Notes: Leverage 1 is defined as total liabilities over total assets. Leverage 2 is defined as debt over debt plus equity. Standard errors are in brackets. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. Standard errors are based on clustering across firms. All regressions include country and year dummies. Tangibility is defined as tangible assets to total assets. Profitability is defined as profit to total assets. Established 1987-95 is a dummy equal to one if the firm was established between 1987-95. Established after 1995 is a dummy equal to one if the firm was established after 1995. Domestic bank credit, total market capitalization and government consumption are measured as ratio to GDP.